

ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis

International Bachelor Economics and Business Economics

The Interplay of Natural Resources and Corruption with Entrepreneurship

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Date final version: 26-07-2021

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Abstract

Economic theory predicts that the negative effect of natural resources on entrepreneurship is stronger in environments with relatively high levels of corruption. Governments receive rents from natural resources through taxes or ownership of the resources. Potential entrepreneurs are attracted by the possibility to extract parts of these rents from the government and thus perform rent-seeking behaviour instead of becoming an entrepreneur. The more corrupt the government is, the more opportunity there is to extract rents and perform rent-seeking behaviour. This study investigates to what extent the interaction between natural resources and corruption affects entrepreneurship and examines whether the relation also holds or differs for specific types of natural resources. The three main data sources used are the Global Entrepreneurship Monitor annual surveys to measure entrepreneurship, Transparency International to measure corruption via their Corruption Perceptions Index and World Bank to obtain information on natural resources. The timeframe of the study is 2004-2017. The relation is analysed by using Arellano-Bond estimations with country fixed effects. The results show no significant estimates for the rents per capita of natural resources, corruption, or the interaction effect between rents per capita of natural resources and corruption. No convincing evidence is found to support the theory that corruption strengthens the negative relation of rents per capita of natural resources with entrepreneurship. Nor did we find convincing evidence that rents per capita of natural resources has a significant negative relation with entrepreneurship, or that corruption has a significant negative relation with entrepreneurship.

1. Introduction

A field that is potentially both positively and negatively affected by natural resources is entrepreneurship, which refers to the act of creating and developing a new business of any kind (Baumol, 1993). On the one hand, the discovery and exploitation of natural resources leads to the creation of a new industry and new business opportunities and therefore stimulates entrepreneurial activity (Majbouri, 2016). On the other hand, natural resources rents can create a disincentive for entrepreneurship. Governments receive part of the profits through taxes or ownership of the resources. In order to exploit these profits, potential entrepreneurs try to connect themselves or even enter the government. This rent-seeking behaviour dissuades them from participating in entrepreneurship. Especially in a corrupt environment where rent-seeking behaviour is more feasible, the negative effects may overshadow the positive effects (Torvik, 2002). In this study corruption refers the abuse of entrusted power for private gain (Andersson & Heywood, 2009). Although research is limited on this topic, Majbouri (2016) shows that the higher the per capita profit from oil and gas, the lower the entrepreneurial activity, but only in corrupt environments. This result is found by using data from Global Entrepreneurship Monitor annual surveys and analysing oil and gas rents of 27 countries from 2004 up to 2009. It has not been investigated before whether this only applies to oil and gas or to natural resources in general and other specific natural resources, such as coal, minerals and forest. Therefore, the central research question of this paper is:

To what extent does the interaction between natural resources and corruption affect entrepreneurship?

This study aims to extend the limited scope of Majbouri's study, which only included oil and gas. Other natural resources, such as coal, minerals and forest, are also major income sources for numerous countries (IRP, 2019). Therefore, in addition to oil and gas this study includes coal, mineral, and forest rents. A greater number of countries can be included in the analysis due to this broader scope. Moreover, instead of studying five years of data (Majbouri, 2016), this study includes 14 years of data.

Corruption and rent-seeking can both be seen as detrimental for society. It is therefore important to understand how they relate to entrepreneurship and whether rents from natural resources intensify or attenuate their effect. This study provides insights on whether this relation is existent and therefore potentially contributes to government policies. It may give rise to regulation or

deregulation of governmental involvement in natural resources, as altering these could be beneficial for the entrepreneurial climate.

The three main data sources used are the Global Entrepreneurship Monitor annual surveys to measure entrepreneurship, Transparency International to measure corruption via their Corruption Perceptions Index and World Bank to obtain information on natural resources. The timeframe of the study is 2004 up to 2018. The results are obtained by using Arellano-Bond estimations with country fixed effects. The dependent variable is the share of entrepreneurs out of the adult population of a country and the main independent variable of interest is the interaction term between rents per capita of natural resources and corruption. The analysis also includes rents per capita of natural resources and corruption as separate independent variables.

The rest of this paper is constructed as follows: Chapter 2 discusses the theoretical framework relating to natural resources, corruption and entrepreneurship. In Chapter 3, the six datasets used in this paper are described. Chapter 4 explains the methodology. Chapter 5 presents the results of the Arellano-Bond estimations and Chapter 6 discusses the results. Chapter 7 contains the limitations of this study and Chapter 8 is the conclusion.

2. Theoretical framework

Two important terms required for understanding this paper are natural resources and rent. The term natural resources consists of the natural resources oil, gas, coal, minerals and forest. These resources will be analysed together and separately in this study. The term rent is represented as the difference between the total return to a factor of production (land, labour, or capital) and its supply price (Boulding, 2013). In other words, rent is equal to the profit obtained from the natural resource. This chapter has the following structure: first a discussion on the relation of natural resources with economic growth and entrepreneurship, then an elaboration on the relation between corruption and entrepreneurship and finally an explanation of the theory on interacting natural resources with corruption in relation to entrepreneurship.

Empirical evidence suggests that natural resources are a blessing for a limited number of countries and are a curse to the vast majority of countries with high natural resource wealth (Van der Ploeg, 2011). For countries as Norway, Botswana and Canada, natural resource wealth led to economic growth and development. A particularly interesting example is Botswana. In 1967, one year after its independence and still highly undeveloped, diamonds were discovered and in the following decades Botswana managed to maintain one of the highest economic growth rates of Africa. Nowadays it is one of most developed countries of Africa with relatively low levels of

corruption and well-functioning institutions (Gylfason, 2011). However, these countries are rather the exception than the rule. Often resource-poor countries outperform resource rich-countries in terms of economic growth, this phenomenon is the so-called resource curse. The three main explanations for the resource curse are the Dutch disease (Sachs & Warner, 1995), price volatility (Van Der Ploeg & Poelhekke, 2009) and quality of institutions (Mehlum et al., 2006). First, the Dutch disease is an economic term for the appreciation of a nation's currency due to the discovery and exploitation of natural resources. The appreciation of the currency decreases the price competitiveness of exports and increases imports. In the long run, unemployment rates can increase and economic growth will decline (Sachs & Warner, 1995). Second, countries that specialize in goods with high price volatility have high volatility in terms of trade, receive less foreign direct investment, and experience low growth rates. The high volatility of world prices of natural resources can therefore cause low growth rates in the long-run (Van Der Ploeg & Poelhekke, 2009). Third, the quality of the institutions determines whether a country experiences economic growth due to the exploitation of natural resources. The combination of natural resources and grabber friendly institutions, where rent-seeking activities can be performed, results in low economic growth (Mehlum et al., 2006). Torvik (2002) predicts that the number of productive entrepreneurs decreases when natural resources rents increase, as more entrepreneurs become engaged in rent-seeking activities. Moreover, according to Sachs and Warner (2001), natural resource abundance could crowd-out entrepreneurial activity due to increasing wages in the natural resource sector. On the contrary, Majbouri (2016) predicts that natural resources lead to the establishment of new industries, which translates into new business opportunities and therefore stimulates entrepreneurial activity. This might be plausible under ideal circumstances, however, taking rent-seeking behaviour and the natural resource curse into account, it seems more likely that rents of natural resources are negatively related to entrepreneurship. Therefore, the following hypothesis is formulated:

H1: Rents per capita of natural resources has a negative relation with entrepreneurship.

Another controversial question among economist is whether corruption is detrimental or beneficial to entrepreneurial activity. In other words, does corruption grease or sand the wheels of entrepreneurship? On the one hand, there is the idea that corruption can increase efficiency and facilitate firm entry. Méon and Weill (2008) find a positive association between corruption and efficiency in countries where institutions are ineffective. They argue that the slowness of bureaucratic inefficiency can be compensated for through corruption. Bribes could give civil servants an incentive to efficiently process the establishment of new firms in an otherwise inefficient administration. Moreover, Keita and Laurila (2016) show that the effect of distortions

caused by flaws in rule of law and government inefficiency can be mitigated due to corruption. A possible explanation is that corruption allows agents to escape the consequences of malfunctioning policies. In addition, corruption facilitates firm entry in highly regulated economies. Corruption can reduce the administrative barriers to enter the market as bribes can be paid to facilitate the entry process (Dreher & Gassebner, 2013). On the other hand, the more mainstream idea is that corruption is detrimental for entrepreneurship as it creates opportunities for rent-seeking behaviour. Corrupt environments create incentives for potential entrepreneurs to earn income through bribing, lobbying, illegal political activities rather than through becoming an entrepreneur. Empirical research shows strong evidence of this effect. Low levels of productive entrepreneurship are usually present in countries with high levels of corruption (Avnimelech et al., 2014). Bologna and Ross (2015) find that higher levels of corruption are generally associated with low numbers of business establishments. Furthermore, corruption has a negative effect on entrepreneurship and economic growth, even if business climates are bad (Dutta & Sobel, 2016). Controlling and reducing corruption leads to higher levels of innovation and entrepreneurship (Anokhiz & Schulze, 2009). In line with the more mainstream idea that corruption sands the wheels of entrepreneurship, the following hypothesis is formulated:

H2: Corruption has a negative relation with entrepreneurship.

Two activities potential entrepreneurs can engage in are productive entrepreneurship and rent-seeking (Baumol 1990). Productive entrepreneurship (hereafter referred to as entrepreneurship) is the process of creating and selling products and services that are valued in the marketplace, which enhances economic growth. Figuratively speaking, it increases the total volume of the economic pie of a country. On the contrary, rent-seeking, which can be seen as unproductive entrepreneurship, is the process of creating connections with sources of rent, and competing to capture more of the rent in the economy. This is the so called attempt to gain a slice of the pie instead of increasing its total volume. Examples of this behaviour are the use of loopholes in the legal system or connecting with governments to obtain rents. Rent-seeking is attractive when rents are concentrated in a limited number of sources that are prone to corruption (Majbouri, 2016). This could be the case for a corrupt government that directly or indirectly receives large rents from natural resources.

Majbouri (2016) and van der Ploeg (2011) analyse the choice of potential entrepreneurs to engage in entrepreneurship or rent-seeking based on the returns of these activities. Figure 1 presents a graphical illustration of this analysis and is constructed based on Mehlum et al. (2006) and van der Ploeg (2011). The vertical axis represents the profits per entrepreneur or the rents

per rent-seeker and the horizontal axis represents the number of potential entrepreneurs. The total number of potential entrepreneurs in this model is fixed. The number of potential entrepreneurs choosing entrepreneurship depends on the profits earned from it. High profits result in high supply of entrepreneurs, whereas low profits result in low supply. On the contrary, the number of rent-seekers is determined by the total rent in the economy. Because the total rent is fixed, the rents per rent-seeker decrease when more potential entrepreneurs choose rent-seeking. A potential entrepreneur will choose the activity that yields the highest profit. Therefore, in equilibrium the number of entrepreneurs and rent-seekers receive the same average benefit in profit or rents.

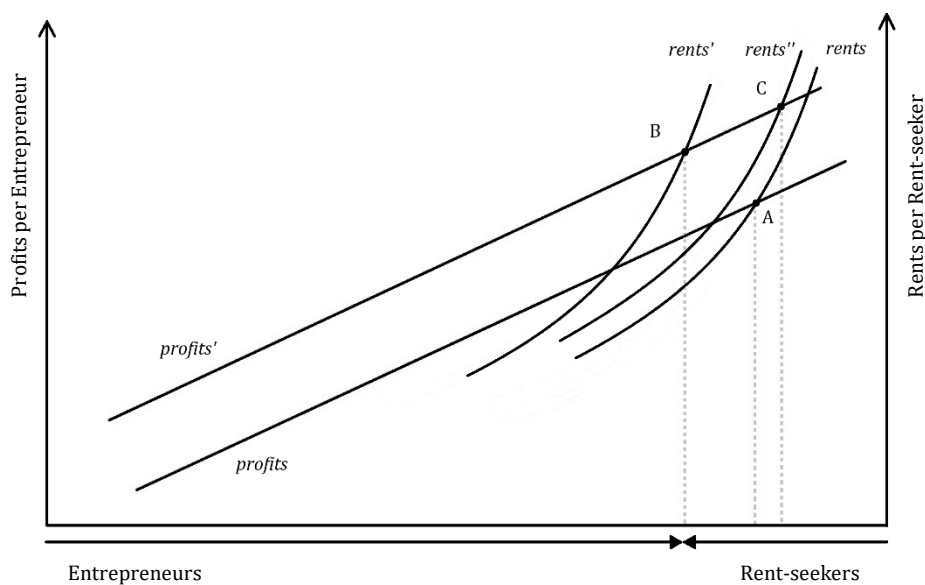


Figure 1 Entrepreneurship and rent-seeking in relation to its profits and rents. Based on Mehlum et al. (2006, p.11) and van der Ploeg (2011, p.383).

In the initial situation a country does not have any natural resources. This situation is described in point A, where the *profits* and *rents* curves cross. Rent-seeking behaviour is still present as legal loopholes or other methods can be exploited. The discovery of natural resources disturbs the equilibrium. It leads to the creation of a new industry and new business opportunities. Therefore, profit expectations increase and the profit function shifts upwards to *profits'*. At the same time, governmental income rapidly grows via taxes and ownership of the resources. This results in an increase in the total rents of the economy and shifts the rents curve upwards. Simultaneously, potential entrepreneurs are attracted to participate in rent-seeking as total rents increase. As a result, the rent curve shifts to *rents'* and point B describes the new equilibrium. This shift is particularly present in case of relatively high levels of government corruption which leaves opportunity for rent-seeking. However, the rents curve shifts differently if the government has a

low level of corruption. The discovery of natural resources will not necessarily lead to more opportunities for rent-seeking as there is only limited opportunity for this behaviour in non-corrupt governments. The positive effect of natural resources on new business opportunities and entrepreneurship will be at least the same as in the case of corruption. Therefore, the profit curve shifts to *profit'* and rents curve to *rents''* and point C describes the new equilibrium. To sum up, based on this theory, the discovery of natural resources should have a negative impact on entrepreneurship in corrupt environments and a positive or at least zero impact on entrepreneurship in case of minimal corruption.

However, this theory does not fully take the resource curse into account, meaning that it does not entirely consider the potential negative effect of natural resources on economic growth and entrepreneurship. It only takes low institutional quality into account by relating it to corruption and opportunities for rent-seeking (Mehlum et al., 2006), but disregards possible negative effects of the Dutch disease (Sachs & Warner, 1995) or price volatility (Van Der Ploeg & Poelhekke, 2009). Taking the resource curse into account, it is likely that natural resources have a negative relation with entrepreneurship and that this relation is even more negative in corrupt environments. Therefore, the following hypothesis is formulated:

H3: Corruption strengthens the negative relation of rents per capita of natural resources with entrepreneurship.

3. Data

This study combines six datasets. First, the Global Entrepreneurship Monitor (GEM) provides information on entrepreneurship across countries. It consists of two surveys: the Adult Population Survey (APS) and the National Expert Survey. APS includes the share of the population participating in entrepreneurship, which is the main variable of interest for this study. GEM conducts APS annually since 1999 and its latest published data is of 2017. Starting in 2004, a team of experts professionally control the data to ensure its reliability. Therefore, this study uses data from 2004 up to 2018. The specific countries and the number of countries included in APS varies per year due to the dependency of GEM on national teams to collect financing for conducting the surveys. A large number of countries are excluded from the dataset because they did not meet the required number of three observations for the Arellano-Bond estimation which will be used in this study (see Chapter 4). In the end, 72 countries have sufficient observations for the analysis. Second, World Bank provides data on the rents of natural resources as a share of Gross Domestic Product (GDP). These rents consist of oil, gas, mineral, and forest rents. The data is based on staff estimates that use sources and methods described in the World Bank's *The Changing Wealth of*

Nations (2018). Rents per capita is obtained by dividing the absolute value of rents by the population. This study includes countries that have a non-zero value (and excludes negative values) of the natural logarithm of rents per capita, even if the country is a net-importer or the share of GDP related to natural resources is small. Due to data availability of APS, the natural resources rents per capita match the years 2004 up to 2018. Third, corruption is measured by Transparency International in their Corruption Perceptions Index (CPI). This index ranks countries by their perceived levels of public sector corruption according to experts and businesspeople. Each country receives a score on a scale from zero to 100, where zero is highly corrupt and 100 highly incorrupt. To improve simplicity of interpretation of the results, corruption levels used in the analysis are calculated by subtracting the CPI score from 100. This results in a scale where zero is highly incorrupt and 100 highly corrupt.

Fourth, World Development Indicators of World Bank provide data on GDP per capita per country. This variable is included because it is considered as an important predictor of entrepreneurial activity. Noorderhaven et al. (2004), Bjørnskov and Foss (2008) and Wennekers et al. (2007) find that GDP per capita reduces entrepreneurial activity. Fifth, World Development Indicators provide information on the population between the ages 15 to 64 as a percentage of the total population. Population includes all residents regardless of legal status or citizenship. Lévesque and Minniti (2011) show that countries with populations that are excessively skewed towards old or young cohorts are likely to experience low levels of entrepreneurship. Last, United Nations Development Reports provide data on the average number of years of education received by people ages 25 and older. The level of education is a predictor for entrepreneurial activity. Several studies show that the level of education has a positive effect on self-employment (Bates, 1995; Reynolds, 1997; Robnsson & Sexton, 1994). We include these three control variables because they reflect two major indicators for the level of entrepreneurship which are the economic development of a country and population characteristics, such as human capital and age structure. The abovementioned studies show that these indicators are closely related to the level of entrepreneurship and are therefore useful control variables. Moreover, these variables are commonly used as control variables in other research on entrepreneurship. It must be said there are potentially more variables that reflect country's characteristics and are related to entrepreneurship. The limitations of not including additional control variables are discussed in Chapter 7.

4. Methodology

The three main approaches to panel data analysis are pooled ordinary least squares, fixed effects model and random effects model. The pooled ordinary least squares method assumes that all the

observations within groups are independent of one another. This strong assumption does not hold for the data of this study and therefore we do not consider this method. Whether to use fixed or random effects model can be determined by performing a Hausman test. The null hypothesis of the test is that the preferred model is random effects and the alternative hypothesis is that the fixed effects model is preferred. The null hypothesis is rejected with a p-value of 0.000, making the fixed effects model the preferred option.

The following dynamic panel data model is used to estimate productive entrepreneurship:

$$H_{kt} = \beta_0 + \beta_1 H_{kt-1} + \beta_2 \ln(\text{Rent}_{kt}) + \beta_3 \text{Corruption}_{kt} + \beta_4 \ln(\text{Rent}_{kt}) * \text{Corruption}_{kt} + \beta_x Z_{kt} + C_k + \varepsilon_{kt}$$

H_{kt} is the share of productive entrepreneurs out of the adult population in country k in year t and H_{kt-1} is its lagged value. It is likely that the dependent variable, H_{kt} , has a dynamic relationship with its lagged value over time, therefore the lagged value of the share of entrepreneurs is included. $\ln(\text{Rent}_{kt})$ is the natural log of the rents per capita of natural resources. Corruption is the perceived level of corruption in country k in year t . $\ln(\text{Rent}_{kt}) * \text{Corruption}_{kt}$ describes the interaction term between rents per capita of natural resources and corruption. Z_{kt} are the observed characteristics of country k in year t . C_k controls for all characteristics of country k that are fixed over time. Although most of these characteristics are not fixed in the long run, it is assumed that for the relatively small period of 14 years they remain fixed. Examples of fixed characteristics are time-constant demographic characteristics, history, traditions and social norms. ε_{kt} is the independently distributed residual.

The dependent variable is the share of entrepreneurs out of the adult population. Entrepreneurship is based on a variable used in APS named ANYBUS, stating that an entrepreneur satisfies at least one of the following three criteria:

- you are involved in nascent business (new firm start-up), defined as active, expect to be a full or part owner, and no salaries or wages paid for over three months; or
- you are involved as owner and manager in new firms for which salaries or wages have been paid between 3 and 42 months; or
- you are involved in established firm as owner and manager for which salaries or wages have been paid for more than 42 months.

If the entrepreneur satisfies multiple criteria, it will still be counted as one active person.

Including the lagged value of the share of entrepreneurs causes bias due to endogeneity from country fixed effects (Nickell, 1981). Arellano and Bond (1991) came up with a method to

instrument for lagged values of the dependent variable. First, it takes the data in deviations with respect to future means in order to remove fixed effects. Second, to extract exogenous variation in entrepreneurship rates, each deviation in entrepreneurship rates is projected period-by-period on the available history of past entrepreneurship rates. Last, we find the Arellano and Bond estimate as the pooled regression coefficient of the forward deviations of outcomes on the predicted entrepreneurship rates. This Arellano-Bond estimator is used in this study to estimate the regression and correct for the endogeneity problem. This estimator is commonly used in research. For example, Feki and Mnif (2016) use it to investigate the relationship between entrepreneurship, technological innovation and economic growth. Moreover, Albulescu and Matei (2016) explores the impact of foreign direct investment on the entrepreneurial activity by applying this estimator.

An interaction term between rents per capita and corruption is used as an independent variable to analyse whether interacting corruption with rents per capita has an effect on entrepreneurship. In addition, corruption and rents per capita are included as separate independent variables. Other observable country characteristics that are included as control variables are GDP per capita, percentage of the population between the ages 15 to 64, average years of education of the population and dummy variables for all years.

To check the robustness of the results, we perform the same analysis using different GEM indicators to measure entrepreneurship. The used dependent variables are:

- TEA: the percentage of all respondents involved in a nascent firm or young firm or both;
- TEA OPP: the percentage of all respondents involved in TEA and reporting opportunity as major motive to start a business;
- TEA JOB: the percentage of respondents within TEA expecting 10 or more jobs 5 years after the business has started;
- TEA CS: the percentage of respondents within TEA reporting that their product is new to all customers.

TEA is used to see whether the results specifically apply to nascent and young firm entrepreneurs, and excludes the already long established entrepreneurs. TEA OPP makes a distinction between the motives of a person to become an entrepreneurs and refers specifically to opportunity entrepreneurship. The person can either start a business because of an perceived opportunity, or start because of a lack of job opportunities. TEA JOB is variable that can be used to see which entrepreneurs are growth oriented. TEA CS sees on the innovate power of the entrepreneur. All these variables reflect different aspects of entrepreneurship, especially aspects that are

considered as relevant for economic performance, and are therefore informative to see whether the results of the main dependent variable remain robust.

To sum up, the interaction effect between natural resources rents and corruption on entrepreneurship is analysed by using Arellano-Bond estimations with country fixed effects.

5. Results

Table 1 presents the summary statistics of the data. Countries with the lowest entrepreneurship rate are Hungary, Russian Federation and Belgium. The highest entrepreneurship rates can be found in Ghana, Uganda and Burkina Faso. Natural resources rents per capita are the lowest in Jordan, South Korea and Japan, and the highest in Qatar, United Arab Emirates and Saudi Arabia. Both GDP per capita and rents per capita have a large variation across countries. Hence, the natural logarithm of the variables are used to normalize the data.

Table 1 Summary statistics

	Mean	Std. dev.	Min	Max
Entrepreneurship rate	18.87	10.93	3.87	70.02
ln (Natural resources rents per capita)	5.11	1.77	0.61	10.42
ln (Oil rents per capita)	4.54	2.30	0.09	10.20
ln (Gas rents per capita)	3.42	1.95	0.02	8.87
ln (Coal rents per capita)	3.01	1.49	0.10	7.30
ln (Mineral rents per capita)	3.30	1.59	0.06	8.05
ln (Forest rents per capita)	2.82	1.21	0.06	5.85
Corruption index	51.20	20.63	4	85
ln (GDP per capita)	9.14	1.29	5.69	11.69
Education level	9.35	2.64	1.3	14.1
Share population 15-65 years old	65.16	5.83	48.22	86.40

Note. Entrepreneurship rate shows the share of entrepreneurs out of the adult population of a country. An entrepreneur is someone who is involved as owner and manager in a nascent business, a new firm or an established firm. Natural resources rents per capita represents annual profits from natural resources rents per capita. Natural resources rents per capita can be subdivided in rents per capita of oil, gas, coal, mineral and forest. Corruption index measures the level of corruption in a country, where zero is highly incorrupt and 100 highly corrupt. GDP per capita is the GDP of a country divided by the population. Education level is measured in average years of schooling. Share population 15-65 years old represents the share of the population that is between 15 and 65 years old. The sample contains 14 years (2004-2017) of data on 72 countries.

Table 2 shows the results of the Arellano Bond estimations with country fixed effects when using rents per capita of natural resources. None of the coefficients are significant. The analysis of column (1) is included to see what the relation is of rents per capita and corruption with entrepreneurship when the interaction effect is excluded. After including the interaction effect

between rents per capita and corruption in column (2), the rents per capita and corruption variables remain insignificant. Moreover, the interaction term is not significant. Including dummy variables of the years 2004-2017 in column (3) and (4) does not change the insignificance of the results. Furthermore, the results remain robust if we apply a fixed effects estimation that excludes the lagged value of entrepreneurship (see Appendix K).

The first hypothesis states that rents per capita of natural resources has a negative relation with entrepreneurship. We cannot reject the null hypothesis as none of the coefficients for rents per capita are significant. The second hypothesis suggests that corruption has a negative relation with entrepreneurship. No significant coefficient are found for corruption and therefore we cannot reject the null hypothesis. Lastly, the third hypothesis states that corruption strengthens the negative relation of rents per capita of natural resources with entrepreneurship. The estimates for the interaction term in Table 2 are not significant, meaning that we cannot reject the null hypothesis. To sum up, none of the estimates can function as evidence in favour of the first, second or third hypothesis.

Table 2 The effect of rents of natural resources and corruption on entrepreneurship; Arellano Bond estimations with country fixed effects.

Variable	(1)	(2)	(3) Incl. year dummies	(4) Incl. year dummies
L. entrepreneurship	-0.131 (0.072)	-0.132 (0.073)	0.078 (0.072)	0.078 (0.072)
ln (Rentspercapita)	0.570 (0.430)	0.955 (0.979)	-0.601 (0.774)	-0.611 (1.184)
Corruption	-0.079 (0.069)	-0.033 (0.128)	-0.021 (0.078)	-0.023 (0.140)
ln (Rentspercapita) x Corruption		-0.009 (0.020)		0.000 (0.022)
L. ln (GDP per capita)	1.649 (1.226)	1.709 (1.234)	-1.762 (2.215)	-1.674 (2.255)
Education	0.649 (0.740)	0.605 (0.748)	0.141 (1.040)	0.156 (1.041)
Share population 15-65	-0.163 (0.314)	-0.180 (0.318)	-0.001 (0.390)	-0.005 (0.399)
Constant	9.617 (22.437)	8.563 (22.571)	34.203 (25.177)	33.600 (25.439)
Observation	421	421	421	421
Number of countries	72	72	72	72

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. Rents per capita represents the rents per capita obtained from natural resources. For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data on 72 countries. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded. Column (3) and (4) include dummy variables for the years 2004-2017. These are not presented in Table 2 to reduce the size of the table. Appendix A provides the extensive version of Table 2; * $p < 0.05$, ** $p < 0.01$.

Natural resources is a generic term of multiple specific types of resources. It might therefore be the case that the insignificant results of Table 2 do not apply to specific types of natural resources. Table 3 shows the results of rents per capita of natural resources and corruption relating to the specific types of resources rents of oil, gas, coal, mineral and forest. None of the coefficients for the variables rents per capita of natural resources or corruption are significant. Moreover, the results remain robust if we apply a fixed effects estimation that excludes the lagged value of entrepreneurship (see Appendix J). Table 4 shows the same analysis but includes the interaction term between rents per capita of natural resources and corruption. None of the coefficients of the interaction term are significant. The results remain robust if we apply a fixed effects estimation that excludes the lagged value of entrepreneurship (see Appendix K).

The insignificant results of Table 3 and Table 4 lead to the same conclusions as for the results of Table 2. We cannot reject the null hypothesis of the first, second and third hypothesis. To sum up, none of the estimates can function as evidence in favour of the first, second or third hypothesis.

Table 3 The effect of specific types of natural resources rents and corruption on entrepreneurship; Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
L. entrepreneurship	0.078 (0.072)	0.131 (0.078)	0.123 (0.078)	0.029 (0.082)	0.118 (0.078)	0.061 (0.071)
ln (Rentspercapita)	-0.601 (0.774)	-0.053 (0.845)	-0.669 (0.770)	-0.703 (1.607)	0.080 (0.573)	-0.407 (1.362)
Corruption	-0.021 (0.078)	-0.023 (0.099)	-0.087 (0.096)	0.041 (0.112)	0.048 (0.107)	-0.001 (0.080)
L. ln (GDP per capita)	-1.762* (2.215)	-5.437 (2.624)	-7.090** (2.572)	-7.718* (2.979)	-1.261 (2.941)	-2.400 (2.222)
Education	0.141 (1.040)	0.009 (1.310)	0.673 (1.256)	-0.228 (1.765)	-0.050 (1.334)	0.119 (1.054)
Share population 15-65	-0.001 (0.390)	0.709 (0.540)	0.819* (0.414)	0.041 (0.608)	-0.070 (0.541)	-0.137 (0.389)
Constant	34.203 (25.177)	17.844 (32.452)	24.039 (31.855)	86.812 (44.666)	29.830 (33.534)	46.913 (25.377)
Observation	421	280	254	175	254	399
Number of countries	72	48	42	29	48	67

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 29 to 72 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded; All columns include dummy variables for the years 2004-2017. These are not presented in Table 3 to reduce the size of the table. Appendix B provides the extensive version of Table 3 * $p < 0.05$, ** $p < 0.01$

Table 4 The effect of specific types of natural resources rents and corruption on entrepreneurship; Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies
L. entrepreneurship	0.078 (0.072)	0.132 (0.078)	0.117 (0.081)	0.030 (0.083)	0.118 (0.079)	0.063 (0.071)
ln (Rentspercapita)	-0.611 (1.184)	-0.121 (0.978)	-0.407 (1.194)	-0.177 (2.051)	0.590 (0.969)	0.025 (2.454)
Corruption	-0.023 (0.140)	-0.037 (0.130)	-0.063 (0.136)	0.066 (0.133)	0.090 (0.123)	0.024 (0.139)
ln (Rentspercapita) x Corruption	0.000 (0.022)	0.003 (0.020)	-0.009 (0.026)	-0.010 (0.025)	-0.012 (0.019)	-0.009 (0.040)
L. ln (GDP per capita)	-1.674 (2.255)	-5.448* (2.653)	-6.614* (2.638)	-7.967** (3.021)	-1.184 (2.950)	-2.445 (2.233)
Education	0.156 (1.041)	0.021 1.312	0.827 (1.255)	-0.395 (1.831)	0.054 (1.348)	0.114 (1.058)
Share population 15-65	-0.005 (0.399)	0.724 (0.549)	0.802 (0.414)	0.012 (0.611)	-0.124 (0.553)	-0.125 (0.390)
Constant	33.600 (25.439)	17.168 (32.457)	18.733 (33.529)	91.471* (45.305)	30.059 (33.585)	45.342 (26.982)
Observation	421	280	254	175	254	399
Number of countries	72	48	42	29	48	67

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. Rents per capita correspond to the specific type of natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 29 to 72 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded. All columns include dummy variables for the years 2004-2017. These are not presented in Table 4 to reduce the size of the table. Appendix C provides the extensive version of Table 4; * $p < 0.05$, ** $p < 0.01$.

Table 5 show the results of the analysis where all specific types of natural resources and interaction effects are included in one Arellano Bond estimation. The results are different compared to Table 3 and Table 4. As shown in column (1) of Table 5, the rents per capita of coal and mineral are significant ($p < 0.05$), but have an opposite sign. The coefficient of rents per capita of coal is positive, implying that doubling rents per capita of coal increases entrepreneurship by 6.940 percentage points on average. On the contrary, the coefficient of rents per capita of mineral is negative, implying that doubling rents per capita of mineral reduces entrepreneurship by 5.921 percentage points on average. The lagged value of GDP per capita has a significant negative effect on entrepreneurship.

Interestingly, the interaction terms between rents per capita of coal and corruption, and between rents per capita of mineral and corruption are significant ($p < 0.05$), but have an opposite sign. The former has a negative coefficient, suggesting that the higher the rents per capita of coal, the more negative the relation of corruption with entrepreneurship. Vica versa, the higher corruption, the more negative the relation of rents per capita of coal with entrepreneurship. The opposite interpretation applies to the positive coefficient of the interaction term between rents per capita of mineral and corruption. The higher the rents per capita of mineral, the more positive the relation of corruption with entrepreneurship. Similarly, the higher the corruption, the more positive the relation of rents per capita of mineral with entrepreneurship.

A possible reason for the difference in significance is the number of observations and countries. The estimates in Table 3 and 4 are obtained using 175 to 399 observations of 29 to 67 countries, whereas Table 5 only includes 78 observations and 16 countries. The Arellano-Bond estimation requires a minimum of 3 observations for every included natural resource. Therefore, when including all natural resources in one analysis, only the countries remain that have a minimum of 3 observations for oil, gas, coal, mineral and forest rents per capita. Another factor that calls the reliability of the results of Table 5 into question is that when including natural resources in column (2) of Table 5, only rents per capita of coal and the interaction effect of coal remain significant. To sum up, it is highly uncertain how reliable the results of Table 5 are due to the low number of countries and observations. Therefore, no hard evidence is found in favour of the any of the hypotheses.

Table 5 The effect of natural resources, oil, gas, coal, mineral and forest rents and corruption on entrepreneurship; Arellano Bond estimations with country fixed effects.

Variable	(1)	(2)	(3)	(4)
L. entrepreneurship	0.135 (0.128)	-0.015 (0.141)	0.123 (0.126)	-0.021 (0.144)
ln (Rents Natural Resources per capita)			7.109 (3.664)	-0.745 (15.807)
ln (Rents Oil per capita)	1.36 (3.170)	3.358 (4.850)	0.013 (3.199)	4.405 (10.021)
ln (Rents Gas per capita)	0.986 (1.754)	0.912 (3.502)	-0.213 (1.835)	1.199 (3.933)
ln (Rents Coal per capita)	0.991 (2.521)	6.940* (3.401)	0.811 (2.484)	7.224* (3.502)
ln (Rents Mineral per capita)	0.098 (1.526)	-5.921* (2.870)	0.094 (1.503)	-3.931 (3.243)
ln (Rents Forest per capita)	0.001 (3.281)	0.025 (9.480)	0.010 (3.232)	-1.962 (9.990)
Corruption	-0.082 (0.246)	0.266 (0.683)	-0.250 (0.257)	-0.329 (1.096)
ln (Rents Nat Resources per cap) x Corruption				0.118 (0.264)
ln (Rents Oil per cap) x Corruption		-0.090 (0.081)		-0.111 (0.160)
ln (Rents Gas per cap) x Corruption		0.010 (0.076)		-0.012 (0.082)
ln (Rents Coal per cap) x Corruption		-0.126* (0.050)		-0.137* (0.055)
ln (Rents Mineral per cap) x Corruption		0.122* (0.058)		0.074 (0.068)
ln (Rents Forest per cap) x Corruption		-0.011 (0.156)		0.026 (0.163)
L. ln (GDP per capita)	-16.809* (6.494)	-23.765** (7.365)	-15.364* (6.440)	-22.595** (7.529)
Education	-2.211 (3.709)	-5.732 (4.317)	-2.828 (3.667)	-6.386 (4.517)
Share population 15-65	-0.881 (1.308)	-0.922 (1.472)	-1.398 (1.316)	-1.407 (1.561)
Constant	239.999* (117.209)	332.012* (152.152)	244.555 (115.469)*	367.473* (166.056)
Observation	78	78	78	78
Number of countries	16	16	16	16

Note Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data on 16 countries. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded.

Column (1) and (2) include dummy variables for the years 2004-2017. These are not presented in Table 5 to reduce the size of the table. Appendix D provides the extensive version of Table 5; * $p < 0.05$, ** $p < 0.01$.

An interesting finding is the insignificance of the lagged value of the dependent variable in all analyses. This variable is included to control for any dynamic relationship in entrepreneurship over time. The insignificance of the coefficients suggests that there is no dynamic relationship in entrepreneurship.

The results of the robustness check using TEA, TEA JOB, TEA OPP and TEA CS as indicators of entrepreneurship confirm the results of Table 2, 3 and 4. The estimates for natural resources rents, corruption and their interaction effect are not significant (see Appendix E-I). This means that analyses on different indicators of entrepreneurship result in the same findings as when the dependent variable is the share of entrepreneurs out of the adult population of a country.

Based on the results of the previously discussed analyses, there are no significant within-country effects of natural resources rents, corruption and their interaction effect. However, it could be the case that there are between-country effects, which for example could imply that countries with high natural resources rents have low levels of entrepreneurship. We use a pooled ordinary least squares estimation with standard errors clustered at country level to see whether these effects are present. The results in Table 6 show that there are some significant between-country effects for the variables natural resources rents, corruption and their interaction effect. Natural resources rents of coal has a significant positive relation with entrepreneurship and its interaction with corruption has a significant negative relation with entrepreneurship. This implies that countries with high levels of natural resources rents of coal have a higher level of entrepreneurial activity compared to countries with low levels of natural resources rents of coal. Moreover, corruption for the specific natural resource forest has a significant negative relation with entrepreneurship and its interaction with natural resources rents of forest has a significant positive relation with entrepreneurship. This implies that, if only looking at the natural resource forest, countries with high levels of corruption have lower levels of entrepreneurial activity compared to countries with low levels of corruption. Lastly, the estimation of the lagged dependent variable entrepreneurship is significant in all estimations, which implies that countries with higher rates of entrepreneurship in one year tend to have higher rates of entrepreneurship in the next year.

Table 6 The effect of specific types of natural resources rents and corruption on entrepreneurship; pooled ordinary least squares with standard errors clustered at country level.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies
L. entrepreneurship	0.817** (0.038)	0.819** (0.041)	0.807** (0.041)	0.792** (0.058)	0.811** (0.053)	0.830** (0.036)
ln (Rentspercapita)	0.170 (0.190)	-0.109 (0.203)	-0.197 (0.162)	0.833* (0.336)	0.545 (0.359)	-0.376 (0.242)
Corruption	-0.034 (0.034)	-0.057 (0.033)	-0.086* (0.034)	0.033 (0.029)	0.024 (0.039)	-0.064* (0.031)
ln (Rentspercapita) x Corruption	0.001 (0.004)	0.004 (0.004)	0.007 (0.004)	-0.022* (0.008)	-0.011 (0.008)	0.013* (0.006)
L. ln (GDP per capita)	-0.961* (0.421)	-0.872 (0.526)	-1.184* (0.557)	-0.571 (0.647)	-0.454 (0.674)	-0.882* (0.428)
Education	-0.252 (0.152)	-0.244 (0.205)	-0.462* (0.199)	-0.196 (0.272)	-0.350 (0.267)	-0.221 (0.154)
Share population 15-65	-0.077 (0.081)	0.018 (0.096)	0.026 (0.099)	0.071 (0.129)	-0.085 (0.127)	-0.087 (0.091)
Constant	20.080** (7.245)	13.793 (8.414)	19.996 (10.107)	4.471 (9.218)	15.230 (10.872)	21.363** (7.518)
Observation	524	350	312	216	328	491
Number of countries	79	53	45	30	55	72

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. Rents per capita represents the rents per capita obtained from natural resources. For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data on 30 to 72 countries. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.

6. Discussion

This study investigates to what extent the interaction between natural resources and corruption affects entrepreneurship. The analysis also includes the distinct roles of natural resources and corruption on entrepreneurship. No convincing evidence is found to support the theory that corruption strengthens the negative relation of rents per capita of natural resources with entrepreneurship

No direct significant relationship is found for rents per capita of natural resources, corruption and their interaction term in relation to entrepreneurship. A possible explanation for the insignificant results could be the offsetting pattern between positive and negative effects of both natural resources and corruption on entrepreneurship. As shown in literature, natural resources can have a positive effect on entrepreneurial activity (Majbouri, 2016), however others argue that entrepreneurship can be negatively affected due to the resource curse (Mehlum et al., 2006; Sachs

& Warner, 1995; Torvik, 2002; Van Der Ploeg & Poelhekke, 2009; Warner, 2001). It could be the case that both effects offset each other and therefore cause insignificant results. The same applies to corruption, where both negative and positive effects on entrepreneurship can be distinguished in the literature. The positive effects found by Méon and Weill (2008), Keita and Laurila (2016) and Dreher and Gassebner (2013) could offset the negative effects found by Bologna and Ross (2015), Dutta and Sobel (2016) and Anokhiz and Schulze (2009). These offsetting pattern could also potentially explain the lack of significance for the interaction term between resources and corruption with entrepreneurship.

Moreover, the insignificant results can possibly be explained by nonincluded time varying factors. The Arellano Bond estimation makes use of country fixed effects, which controls for any feature of a country that is constant over time. These time-invariant factors do not cause bias. However, there might still be nonincluded time-varying factors that are country specific and correlated with rents per capita or corruption and entrepreneurship. These omitted variables can cause bias and might partly explain the insignificant results. Moreover, the assumption that in a period of 14 years no significant changes are made to these fixed characteristics might not hold. If so, these characteristics are time-varying and have to be included to not cause bias.

The results on specific types of resources are contradictory to the findings of Majbouri (2016). Majbouri finds that more rents per capita of oil and gas reduces entrepreneurship only in corrupt environments. The results of this study cannot support this finding as none of the estimates for oil or gas is significant. The difference in significance could be explained by the sample size and the observed years. Majbouri (2016) includes 27 countries, 58 observations and data of the years 2004-2008. Whereas this paper uses data of 42 and 48 countries, 280 and 254 observations of the years 2004-2017 for oil and gas. It could be the case that sample size bias is reduced by the bigger sample and that this explains why Majbouri (2016) found significant results and this study did not find significant results. Another factor that has to be taken into account is the global financial crisis that started in 2008. Whereas Majbouri (2016) only considers the years up to 2008, this study also incorporates the year 2008 up to 2018. It is likely that the crisis has had a big impact on the demand for natural resources and entrepreneurial activity. Therefore, this could be a factor that potentially can explain the insignificant results.

It is possible that the economic theory that explains the relationship between natural resources, corruption and entrepreneurship does not reflect contemporary economic practice. On the one hand, a way to discuss the results is to explain why they are insignificant and not in line with the theory. On the other hand, it is important to remain critical on the theory itself, as it is possible

that the results are not inaccurate but the theory is outdated or nonapplicable. Theories can be oversimplified and make use of too strong assumptions. For example, the assumption that potential entrepreneurs can engage in productive entrepreneurship or rent-seeking is too strong. One may forget that a person can also choose to become a paid employee of a company. Moreover, the assumption that governments profit from natural resources through taxes does not reflect contemporary practise. Large multinational often try to structure their organisation in a way that results in the lowest amount of payable taxes and try to shift their profits to island tax havens in order to evade taxation (Bergin & Bouso, 2020). This behaviour is seen as one of the major problems of contemporary global tax law and on the fifth of June 2021 the G7 countries (Canada, France, Germany, Italy, Japan, the UK and the USA) have come to an agreement on a plan to enforce a minimum effective tax rate of fifteen per cent. This would mean that multinationals will have to pay a minimum tax rate on the turnover made by selling natural resources. All in all, it is important to remain critical on the theory and keep in mind that theories are not infallible.

Further research could focus on other factors that can be of relevance to the relation between natural resources and entrepreneurship. For example, instead of using corruption, one could interact natural resources with a variable that indicates the government form. It is not unthinkable that natural resources have a different effect on entrepreneurial activity in autocratic countries compared to democratic countries. The governmental power of an autocratic country is in the hands of a limited number of people and therefore it is more prone to corruption compared to a democratic country where the power is less concentrated and controlled by independent institutions. This research could further expand the study of Collier (2010), who investigates the relation between natural resources and political systems. Another factor that could be further investigated is education. It is possible that a country with a highly educated population has a higher increase in entrepreneurship if natural resources are discovered compared to a low educated population. Therefore, interacting natural resources with education can be informative for the level of entrepreneurial activity, as several studies already show that the level of education has a positive effect on entrepreneurship (Bates, 1995; Reynolds, 1997; Robinsson & Sexton, 1994). Lastly, it would be interesting to further investigate the actual ownership of the companies that profit from natural resources to see whether they are government or privately owned companies. This distinction can be of importance as privately owned companies can shift taxes to tax havens in order to evade the tax that otherwise would have been paid to the government. It is possible that countries where all natural resources are exploited by private companies do not benefit from the profits because of this tax evading behaviour and therefore do not experience the positive effects that natural resources can have on entrepreneurial activity.

7. Limitations

The findings of this study have to be seen in light of some limitations. One of the main limitations of this study is the lack of data on entrepreneurship rates per country for consecutive years. GEM is dependent on national teams to perform the surveys. Each national team is responsible for its own fundraising for GEM activities in their country. Common sponsors of GEM national teams are academic institutions, local and national governments, foundations, aid agencies and banks. This high dependency on external sources can lead to intermittent data extraction. The initial data on entrepreneurship rates constructed for this study contained 116 countries. However, due to the required number of three observations for the Arellano-Bond estimation, 45 countries were excluded, leaving only 72 countries in the dataset. Most of the excluded countries were developing countries or countries in war. Therefore, the exclusion of these countries could lead to an overrepresentation of developed countries and cause sample bias.

Moreover, a limitation of this study is the assumption that if a person is a productive entrepreneur, he or she cannot be a rent-seeker. This assumption is too strict as entrepreneurs can perform both entrepreneurial and rent-seeking activities. It is even plausible that being an entrepreneur and owning a business facilitates rent-seeking behaviour. Connecting with governments and finding legal loopholes might be easier with the resources of an entrepreneur. The data retrieved from GEM does not take this into account and therefore overestimates the actual share of entrepreneurs that wants to contribute to the economy.

There are also limitations regarding the independent and control variables used in this study. It is possible that there are variables that have a dynamic relationship with their lagged value over time. For example, GDP per capita and the level of education are likely to have a dynamic relationship with their lagged values. It can be seen as a limitation of this study that these lagged values are not included in the analysis. Moreover, instead of using GDP per capita, it might be more informative to use GDP growth per capita, as this would reflect more accurately the growth in opportunities for entrepreneurship within the country. In addition, in order to obtain more accurate results additional control variables which may change over time and affect entrepreneurship can be added, such as the country's sector structure, regulations on entrepreneurship or changes in the institutional structure of a country. Another improvement to this study can be made by running additional tests to check whether we used the right estimation model. This study only makes use of the Hausman test to see whether the fixed or random effects model is the most appropriate method.

Furthermore, research is limited on the question whether the interaction between natural resources and corruption affects entrepreneurship. Future research could apply different variables or databases to measure entrepreneurship. For example, the World Bank Group Entrepreneurship Survey captures formal business registration as a way to measure entrepreneurship. An important difference between GEM and World Bank data is that World Bank data tend to report significant lower levels of early-stage entrepreneurship in developing countries as it only measures formal business registrations (Acs, Desai & Klapper, 2008).

In addition, more accurate results can be obtained by measuring the actual inflow of rents to the government instead of measuring the total rents of a resource in a country. Governments of highly privatised countries will have a relatively small inflow of rents from natural resources. Rent-seeking behaviour will be less attractive in these countries and it is likely that the impact of corruption in relation to natural resources will be smaller compared to countries where governments own the natural resources.

Lastly, it is important to understand that the dependent variable in this study only measures the share of entrepreneurs out of the adult population of a country. One must remain critical on how this variable relates to economic performance and growth, which is one of the major objectives of economic policy. The theory by Majbouri (2016) and van der Ploeg (2011) implies that entrepreneurship is a positive act and rent-seeking can be seen as negative behaviour. This would mean that countries with a high level of entrepreneurship can be seen as well performing and countries with low levels as poorly performing. However, this reasoning does not reflect the contemporary economic situation of countries. Countries with the highest entrepreneurship rates are developing countries and have one of the lowest GDP per capita. The vast majority of entrepreneurs in developing countries are involved in micro and small enterprises, often informal, contributing little to poverty alleviation and growth (Naudé, 2010). Therefore, the dependent variable used in this study might not be the best proxy for measuring entrepreneurship that has a positive effect on economic growth. Further research could use different variables to measure entrepreneurship, for example the ones used for the robustness check in this study, that possibly have a more direct relationship with economic growth.

8. Conclusion

This study investigates to what extent the interaction between natural resources and corruption affects entrepreneurship and examines whether the relation also holds for specific types of natural resources. Economic theory predicts that the negative effect of natural resources on entrepreneurship is stronger in environments with relatively high levels of corruption. The

results of Arellano-Bond estimations with country fixed effects show no significant estimates for rents per capita of natural resources, corruption and their interaction effect. Therefore, no evidence is found to support the theory that corruption strengthens the negative relation of rents per capita of natural resources with entrepreneurship. Nor do the results indicate that rents per capita of natural resources has a significant negative relation with entrepreneurship, or that corruption has a significant negative relation with entrepreneurship. The results of the analysis on specific types of natural resources also show no significant estimates for the rents per capita of specific types of resources, corruption, or interaction effect between these variables. A contrary result is found for the analysis where all specific types of natural resources are combined, as we find that the interaction effects between coal and corruption and mineral and corruption are significant. However, it is likely that these results are not reliable due to the small sample size and the contradictory findings of other analyses. Therefore, we cannot say that we found convincing evidence in support of the theory that corruption strengthens the negative relation of rents per capita of specific natural resources with entrepreneurship. Nor did we find convincing evidence that rents per capita of specific natural resources has a significant negative relation with entrepreneurship, or that corruption has a significant negative relation with entrepreneurship.

The many limitations of this study give rise to a need for further research. A possible differentiation to this study is the usage of different variables or databases to measure entrepreneurship. Moreover, the accuracy of the results could be improved by using the actual inflow of rents of natural resources to the government instead of measuring the total rents of natural resources in a country. A possible way to further extend the research on this field is to include renewable resources as solar, wind and hydro power to the analysis. Governments tend to get more and more involved in these resources and they might in the future partly replace conventional natural resources. Another extension to this study can be made by focussing on other factors that can be of relevance to the relation between natural resources and entrepreneurship, such as government form or education. The insignificant results of this study do not give rise to required policy changes. All in all, more research is necessary to understand the interrelation of natural resources, corruption and entrepreneurship.

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Appendix A

Table 7 The effect of rents of natural resource and corruption on entrepreneurship; Arellano Bond estimations with country fixed effects.

Variable	(1)	(2)	(3)	(4)
L. entrepreneurship	-0.131 (0.072)	-0.132 (0.073)	0.078 (0.072)	0.078 (0.072)
ln (Rentspercapita)	0.570 (0.430)	0.955 (0.979)	-0.601 (0.774)	-0.611 (1.184)
Corruption	-0.079 (0.069)	-0.033 (0.128)	-0.021 (0.078)	-0.023 (0.140)
ln (Rentspercapita) x Corruption		-0.009 (0.020)		0.000 (0.022)
L. ln (GDP per capita)	1.649 (1.226)	1.709 (1.234)	-1.762 (2.215)	-1.674 (2.255)
Education	0.649 (0.740)	0.605 (0.748)	0.141 (1.040)	0.156 (1.041)
Share population 15-65	-0.163 (0.314)	-0.180 (0.318)	-0.001 (0.390)	-0.005 (0.399)
Year 2006			0.058 (0.925)	0.049 (0.933)
Year 2007			1.202 (1.053)	1.181 (1.066)
Year 2008			3.022* (1.268)	2.990* (1.291)
Year 2009			2.740 (1.438)	2.690 (1.476)
Year 2010			2.329 (1.331)	2.286 (1.352)
Year 2011			3.588* (1.470)	3.537* (1.490)
Year 2012			2.559 (1.672)	2.497 (1.699)
Year 2013			3.303 (1.714)	3.242 (1.743)
Year 2014			3.444 (1.836)	3.374 (1.870)
Year 2015			2.797 (1.961)	2.726 (2.014)
Year 2016			2.049 (1.855)	1.991 (1.916)
Year 2017			2.238 (1.884)	2.177 (1.937)
Constant	9.617 (22.437)	8.563 (22.571)	34.203 (25.177)	33.600 (25.439)
Observation	421	421	421	421
Number of countries	72	72	72	72

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. Rents per capita represents the rents per capita obtained from natural resources. For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data on 72 countries. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded; * $p < 0.05$, ** $p < 0.01$

Appendix B

Table 8 The effect of specific types of natural resources rents and corruption on entrepreneurship;
Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
L. entrepreneurship	0.078 (0.072)	0.131 (0.078)	0.123 (0.078)	0.029 (0.082)	0.118 (0.078)	0.061 (0.071)
ln (Rentspercapita)	-0.601 (0.774)	-0.053 (0.845)	-0.669 (0.770)	-0.703 (1.607)	0.080 (0.573)	-0.407 (1.362)
Corruption	-0.021 (0.078)	-0.023 (0.099)	-0.087 (0.096)	0.041 (0.112)	0.048 (0.107)	-0.001 (0.080)
L. ln (GDP per capita)	-1.762* (2.215)	-5.437 (2.624)	-7.090** (2.572)	-7.718* (2.979)	-1.261 (2.941)	-2.400 (2.222)
Education	0.141 (1.040)	0.009 (1.310)	0.673 (1.256)	-0.228 (1.765)	-0.050 (1.334)	0.119 (1.054)
Share population 15-65	-0.001 (0.390)	0.709 (0.540)	0.819* (0.414)	0.041 (0.608)	-0.070 (0.541)	-0.137 (0.389)
Year 2006	0.058 (0.925)	0.840 (1.152)	1.050 (1.100)	0.512 (1.349)	-0.228 (1.477)	-0.131 (0.936)
Year 2007	1.202 (1.053)	2.093 (1.348)	2.950* (1.280)	0.708 (1.828)	1.432 (1.779)	1.070 (1.128)
Year 2008	3.022* (1.268)	4.767** (1.607)	4.742** (1.518)	5.357 (3.069)	3.637 (1.988)	2.959* (1.361)
Year 2009	2.740 (1.438)	4.457* (1.869)	4.361* (1.733)	3.842 (2.176)	2.890 (2.321)	3.044* (1.528)
Year 2010	2.329 (1.331)	4.586** (1.653)	4.115* (1.606)	3.162 (2.377)	2.647 (2.215)	2.347 (1.515)
Year 2011	3.588* (1.470)	5.903** (1.818)	6.009** (1.800)	4.665 (2.621)	3.247 (2.506)	3.561* (1.608)
Year 2012	2.559 (1.672)	5.403** (2.050)	5.877** (2.043)	4.764* (2.277)	1.803 (2.792)	2.881 (1.816)
Year 2013	3.303 (1.714)	6.454** (2.134)	6.942** (2.130)	3.679 (2.287)	2.687 (2.758)	3.589 (1.901)
Year 2014	3.444 (1.836)	6.271** (2.259)	7.529** (2.239)	5.322 (2.480)	3.750 (2.859)	3.757 (2.097)
Year 2015	2.797 (1.961)	5.991* (2.545)	6.455** (2.372)	3.735 (2.879)	3.163 (2.926)	3.382 (2.108)
Year 2016	2.049 (1.855)	5.516* (2.453)	5.284* (2.286)	3.463 (2.706)	1.951 (2.773)	2.924 (2.047)
Year 2017	2.238 (1.884)	4.792* (2.366)	4.413* (2.240)	2.526 (2.631)	2.054 (2.830)	2.636 (2.156)
Constant	34.203 (25.177)	17.844 (32.452)	24.039 (31.855)	86.812 (44.666)	29.830 (33.534)	46.913 (25.377)
Observation	421	280	254	175	254	399
Number of countries	72	48	42	29	48	67

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. Rents per capita correspond to the natural resource

being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 29 to 72 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded; * $p < 0.05$, ** $p < 0.01$

Appendix C

Table 9 The effect of specific types of natural resources rents and corruption on entrepreneurship;
Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
L. entrepreneurship	0.078 (0.072)	0.132 (0.078)	0.117 (0.081)	0.030 (0.083)	0.118 (0.079)	0.063 (0.071)
ln (Rentspercapita)	-0.611 (1.184)	-0.121 (0.978)	-0.407 (1.194)	-0.177 (2.051)	0.590 (0.969)	0.025 (2.454)
Corruption	-0.023 (0.140)	-0.037 (0.130)	-0.063 (0.136)	0.066 (0.133)	0.090 (0.123)	0.024 (0.139)
ln (Rentspercapita) x Corruption	0.000 (0.022)	0.003 (0.020)	-0.009 (0.026)	-0.010 (0.025)	-0.012 (0.019)	-0.009 (0.040)
L. ln (GDP per capita)	-1.674 (2.255)	-5.448* (2.653)	-6.614* (2.638)	-7.967** (3.021)	-1.184 (2.950)	-2.445 (2.233)
Education	0.156 (1.041)	0.021 (1.312)	0.827 (1.255)	-0.395 (1.831)	0.054 (1.348)	0.114 (1.058)
Share population 15-65	-0.005 (0.399)	0.724 (0.549)	0.802 (0.414)	0.012 (0.611)	-0.124 (0.553)	-0.125 (0.390)
Year 2006	0.049 (0.933)	0.840 (1.155)	0.991 (1.103)	0.516 (1.356)	-0.364 (1.493)	-0.150 (0.948)
Year 2007	1.181 (1.066)	2.099 (1.355)	2.807* (1.293)	0.621 (1.842)	1.283 (1.794)	1.012 (1.174)
Year 2008	2.990* (1.291)	4.748** (1.608)	4.565** (1.522)	5.283 (3.084)	3.409 (2.019)	2.895 (1.422)
Year 2009	2.690 (1.476)	4.479* (1.905)	4.110* (1.739)	3.879 (2.190)	2.601 (2.357)	2.991 (1.581)
Year 2010	2.286 (1.352)	4.578** (1.658)	3.897* (1.604)	3.149 (2.388)	2.434 (2.235)	2.285 (1.577)
Year 2011	3.537* (1.490)	5.872** (1.817)	5.806** (1.793)	4.707 (2.640)	3.047 (2.521)	3.526 (1.652)
Year 2012	2.497 (1.699)	5.366** (2.049)	5.635** (2.032)	4.871* (2.306)	1.588 (2.809)	2.861 (1.851)
Year 2013	3.242 (1.743)	6.424** (2.134)	6.673** (2.118)	3.793 (2.316)	2.458 (2.779)	3.567 (1.940)
Year 2014	3.374 (1.870)	6.245** (2.261)	7.199** (2.228)	5.472* (2.519)	3.497 (2.887)	3.739 (2.138)
Year 2015	2.726 (2.014)	6.052* (2.652)	6.056* (2.374)	3.943 (2.932)	2.813 (2.978)	3.368 (2.146)
Year 2016	1.991 (1.916)	5.611* (2.620)	4.815* (2.343)	3.664 (2.752)	1.614 (2.826)	2.902 (2.083)
Year 2017	2.177 (1.937)	4.850* (2.462)	4.000 (2.267)	2.725 (2.682)	1.681 (2.891)	2.629 (2.180)
Constant	33.600 (25.439)	17.168 (32.457)	18.733 (33.529)	91.471* (45.305)	30.059 (33.585)	45.342 (26.982)
Observation	421	280	254	175	254	399
Number of countries	72	48	42	29	48	67

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 29 to 71 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded; * $p < 0.05$, ** $p < 0.01$

Appendix D

Table 10 The effect of natural resources, oil, gas, coal, mineral and forest rents and corruption on entrepreneurship; Arellano Bond estimations with country fixed effects.

Variable	(1)	(2)	(3)	(4)
L. entrepreneurship	0.135 (0.128)	-0.015 (0.141)	0.123 (0.126)	-0.021 (0.144)
ln (Rents Natural Resources per capita)			7.109 (3.664)	-0.745 (15.807)
ln (Rents Oil per capita)	1.36 (3.170)	3.358 (4.850)	0.013 (3.199)	4.405 (10.021)
ln (Rents Gas per capita)	0.986 (1.754)	0.912 (3.502)	-0.213 (1.835)	1.199 (3.933)
ln (Rents Coal per capita)	0.991 (2.521)	6.940* (3.401)	0.811 (2.484)	7.224* (3.502)
ln (Rents Mineral per capita)	0.098 (1.526)	-5.921* (2.870)	0.094 (1.503)	-3.931 (3.243)
ln (Rents Forest per capita)	0.001 (3.281)	0.025 (9.480)	0.010 (3.232)	-1.962 (9.990)
Corruption	-0.082 (0.246)	0.266 (0.683)	-0.250 (0.257)	-0.329 (1.096)
ln (Rents Nat Resources per cap) x Corruption				0.118 (0.264)
ln (Rents Oil per cap) x Corruption		-0.090 (0.081)		-0.111 (0.160)
ln (Rents Gas per cap) x Corruption		0.010 (0.076)		-0.012 (0.082)
ln (Rents Coal per cap) x Corruption		-0.126* (0.050)		-0.137* (0.055)
ln (Rents Mineral per cap) x Corruption		0.122* (0.058)		0.074 (0.068)
ln (Rents Forest per cap) x Corruption		-0.011 (0.156)		0.026 (0.163)
L. ln (GDP per capita)	-16.809* (6.494)	-23.765** (7.365)	-15.364* (6.440)	-22.595** (7.529)
Education	-2.211 (3.709)	-5.732 (4.317)	-2.828 (3.667)	-6.386 (4.517)
Share population 15-65	-0.881 (1.308)	-0.922 (1.472)	-1.398 (1.316)	-1.407 (1.561)
Year 2006	0.303 (2.718)	2.040 (2.797)	-0.386 (2.701)	1.297 (2.896)
Year 2007	-0.797 (4.164)	1.066 (4.256)	-1.716 (4.129)	-0.056 (4.424)
Year 2008	2.918 (5.556)	9.410 (5.988)	0.268 (5.640)	6.056 (6.557)
Year 2009	5.520 (4.768)	11.593* (5.315)	6.200 (4.710)	11.209* (5.417)

Year 2010	1.632 (5.309)	10.488 (6.060)	0.162 (5.283)	7.763 (6.446)
Year 2011	4.192 (6.162)	16.018* (7.285)	1.531 (6.223)	12.342 (7.834)
Year 2012	5.956 (6.299)	19.286* (7.775)	4.204 (6.269)	15.990 (8.219)
Year 2013	7.917 (6.358)	20.777** (7.849)	6.695 (6.294)	17.627* (8.287)
Year 2014	10.436 (6.413)	23.840** (8.133)	9.519 (6.334)	20.711* (8.601)
Year 2015	11.774 (6.885)	21.809** (8.227)	13.378 (6.831)	21.591* (8.470)
Year 2016	11.636 (7.008)	20.268* (8.399)	13.641 (6.979)	20.775* (8.572)
Year 2017	8.580 (6.324)	18.549* (7.712)	9.702 (6.256)	18.261* (7.878)
Constant	239.999* (117.209)	332.012* (152.152)	244.555 (115.469)*	367.473* (166.056)
Observation	78	78	78	78
Number of countries	16	16	16	16

Note Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. L is the lag operator. For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data on 16 countries. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded; * $p < 0.05$, ** $p < 0.01$.

Appendix E

Table 11 The effect of natural resources rents and corruption on entrepreneurship measured by Total Early-Stage Entrepreneurial Activity indicators; Arellano Bond estimations with country fixed effects.

Variable	TEA	TEA OPP	TEA JOB	TEA CS
	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies
L. entrepreneurship	-0.113 (0.070)	-0.153* (0.072)	0.095 (0.071)	0.137 (0.084)
ln (Rentspercapita)	-0.823 (0.750)	-1.270 (0.720)	-2.559 (1.976)	1.567 (2.298)
Corruption	-0.105 (0.100)	-0.144 (0.086)	-0.111 (0.215)	-0.081 (0.252)
ln (Rentspercapita) x Corruption	0.018 (.015)	0.023 (0.013)	0.037 (0.034)	-0.002 (0.039)
L. ln (GDP per capita)	2.011* (0.973)	-1.273 (1.377)	-1.210 (3.541)	0.469 (4.387)
Education	1.191* (0.570)	0.256 (0.616)	0.609 (1.659)	-0.149 (1.944)
Share population 15-65	0.090 (0.257)	0.629** (0.237)	0.237 (0.692)	-0.679 (0.748)
Constant	-20.970 (17.745)	-17.765 (15.379)	11.358 (48.930)	52.000 (54.759)
Observation	363	363	313	313
Number of countries	63	63	63	63

Note. Standard errors are in parentheses; the dependent variable in Column (1) is the percentage of all respondents involved in a nascent firm or young firm or both (TEA). The dependent variable in Column (2) is the percentage of all respondents involved in Total Early-Stage Entrepreneurial Activity and reporting opportunity as major motive to start a business (TEA OPP). The dependent variable in Column (3) is the percentage of respondents within Total Early-Stage Entrepreneurial Activity expecting 10 or more jobs 5 years after the business has started (TEA JOB). ; The dependent variable in Column (4) is the percentage of respondents within Total Early-Stage Entrepreneurial Activity reporting that their product is new to all customers (TEA CS). L is the lag operator. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 63 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.

Appendix F

Table 12 The effect of specific types of natural resources rents and corruption on entrepreneurship measured by Total Early-Stage Entrepreneurial Activity ; Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies
L. entrepreneurship	-0.113 (0.070)	-0.009 (0.077)	-0.000 (0.082)	-0.128 (0.097)	0.081 (0.086)	-0.078 (0.068)
ln (Rentspercapita)	-0.823 (0.750)	-0.174 (0.853)	-0.972 (0.922)	-0.001 (1.533)	-0.740 (0.728)	-0.089 (1.703)
Corruption	-0.105 (0.100)	-0.091 (0.092)	-0.116 (0.102)	-0.113 (0.103)	-0.045 (0.099)	-0.092 (0.098)
ln (Rentspercapita) x Corruption	0.018 (.015)	0.012 (0.015)	0.003 (0.020)	0.012 (0.018)	0.008 (0.015)	0.018 (0.028)
L. ln (GDP per capita)	2.011* (0.973)	-3.303 (2.139)	-0.351 (2.314)	-6.285 (2.428)	-3.013 (2.209)	-2.001 (1.637)
Education	1.191* (0.570)	-0.486 (0.936)	-0.021 (0.915)	0.014 (1.513)	-0.329 (1.021)	-0.669 (0.744)
Share population 15-65	0.090 (0.257)	0.754 (0.419)	0.438 (0.325)	0.114 (0.526)	0.909 (0.421)	0.493 (0.284)
Constant	-20.970 (17.745)	-3.137 (25.038)	-8.612 (25.194)	64.614 (40.408)	-17.862 (26.051)	4.550 (19.304)
Observation	363	253	231	162	221	353
Number of countries	63	43	36	27	42	62

Note. Standard errors are in parentheses; the dependent variable is the percentage of all respondents involved in a nascent firm or young firm or both. L is the lag operator. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 27 to 63 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.

Appendix G

Table 13 The effect of specific types of natural resources rents and corruption on entrepreneurship measured by Total Early-Stage Entrepreneurial Activity with opportunity as major motive to start a business; Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies
L. entrepreneurship	-0.153* (0.072)	-0.119 (0.079)	-0.060 (0.084)	-0.192 (0.106)	-0.083 (0.089)	-0.153 (0.072)
ln (Rentspercapita)	-1.270 (0.720)	-0.064 (0.714)	-0.439 (0.773)	0.729 (1.260)	-0.465 (0.604)	0.859 (1.416)
Corruption	-0.144 (0.086)	-0.028 (0.078)	-0.020 (0.086)	-0.099 (0.088)	0.026 (0.082)	-0.081 (0.082)
ln (Rentspercapita) x Corruption	0.023 (0.013)	0.006 (0.012)	-0.003 (0.016)	0.014 (0.015)	0.001 (0.012)	0.016 (0.023)
L. ln (GDP per capita)	-1.273 (1.377)	-1.264 (1.754)	0.616 (1.957)	-2.381 (1.970)	-2.397 (1.775)	-0.843 (1.351)
Education	0.256 (0.616)	0.273 (0.769)	0.496 (0.762)	0.894 (1.264)	0.202 (0.838)	0.161 (0.620)
Share population 15-65	0.629** (0.237)	0.754* (0.349)	0.543* (0.273)	0.156 (0.435)	0.847* (0.348)	0.439 (0.238)
Constant	-17.765 (15.379)	-33.361 (21.002)	-37.360 (21.560)	11.281 (33.110)	-28.993 (20.897)	-15.678 (16.015)
Observation	363	253	231	162	221	353
Number of countries	63	43	36	27	42	62

Note. Standard errors are in parentheses; the dependent variable is percentage of all respondents involved in Total Early-Stage Entrepreneurial Activity and reporting opportunity as major motive to start a business. L is the lag operator. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 27 to 63 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.

Appendix H

Table 14 The effect of specific types of natural resources rents and corruption on entrepreneurship measured by Total Early-Stage Entrepreneurial Activity with high job expectations; Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies
L. entrepreneurship	0.095 (0.071)	0.064 (0.078)	0.040 (0.076)	0.005 (0.083)	-0.029 (0.069)	0.087 (0.072)
ln (Rentspercapita)	-2.559 (1.976)	-0.182 (1.684)	-1.525 (1.963)	-6.724 (3.657)	-0.544 (1.285)	4.535 (3.879)
Corruption	-0.111 (0.215)	0.023 (0.192)	0.035 (0.215)	0.186 (0.242)	-0.022 (0.172)	0.389 (0.218)
ln (Rentspercapita) x Corruption	0.037 (0.034)	0.017 (0.032)	0.026 (0.043)	0.000 (0.046)	0.010 (0.028)	-0.123 (0.064)
L. ln (GDP per capita)	-1.210 (3.541)	1.667 (4.190)	-1.359 (4.607)	5.809 (4.574)	1.936 (3.474)	-0.339 (3.560)
Education	0.609 (1.659)	1.515 (2.091)	2.011 (2.079)	5.687 (3.434)	1.432 (1.788)	0.745 (1.666)
Share population 15-65	0.237 (0.692)	0.035 (0.905)	-0.098 (0.755)	1.945 (1.223)	0.421 (0.739)	0.145 (0.697)
Constant	11.358 (48.930)	-21.914 (60.543)	13.023 (65.078)	214.173* (93.663)	-41.279 (51.935)	-14.722 (51.309)
Observation	313	218	196	128	194	305
Number of countries	63	43	35	27	42	62

Note. Standard errors are in parentheses; the dependent variable is the percentage of respondents within Total Early-Stage Entrepreneurial Activity expecting 10 or more jobs 5 years after the business has started. L is the lag operator. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 27 to 63 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.

Appendix I

Table 15 The effect of specific types of natural resources rents and corruption on entrepreneurship measured by Total Early-Stage Entrepreneurial Activity with products that are new to all customers; Arellano Bond estimations with country fixed effects.

Variable	Natural Resources	Oil	Gas	Coal	Mineral	Forest
	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies	Incl. year dummies
L. entrepreneurship	0.137 (0.084)	0.138 (0.096)	0.203 (0.104)	0.106 (0.099)	0.146 0.103	0.090 (0.086)
ln (Rentspercapita)	1.567 (2.298)	0.023 (1.802)	1.381 (2.099)	-1.184 (3.457)	0.171 (1.676)	-2.684 (4.137)
Corruption	-0.081 (0.252)	-0.306 (0.223)	-0.200 (0.244)	-0.262 (0.236)	-0.285 (0.233)	-0.443 (0.239)
ln (Rentspercapita) x Corruption	-0.002 (0.039)	0.039 (0.036)	-0.013 (0.047)	-0.017 (0.044)	0.030 (0.037)	0.133 (0.069)
L. ln (GDP per capita)	0.469 (4.387)	-0.180 (5.323)	2.737 (5.299)	9.440 (5.342)	-1.094 (5.294)	1.630 (4.212)
Education	-0.149 (1.944)	-0.260 (2.175)	-0.301 (2.104)	-6.064 (3.428)	-0.889 (2.394)	-0.026 (1.910)
Share population 15-65	-0.679 (0.748)	0.412 (1.059)	0.307 (0.775)	0.405 (1.173)	-1.055 (1.032)	-0.858 (0.740)
Constant	52.000 (54.759)	-3.674 (64.875)	-17.925 (71.785)	-21.984 (90.555)	116.653 (69.207)	69.689 (53.978)
Observation	313	218	196	142	194	305
Number of countries	63	43	35	27	42	62

Note. Standard errors are in parentheses; the dependent variable is the percentage of respondents within Total Early-Stage Entrepreneurial Activity reporting that their product is new to all customers. L is the lag operator. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 27 to 63 countries are included. Countries that do not meet the required number of three observations for the Arellano-Bond estimation are excluded. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.

Appendix J

Table 16 The effect of specific types of natural resources rents and corruption on entrepreneurship; fixed effects estimation.

Variable	Natural Resources Incl. year dummies	Oil Incl. year dummies	Gas Incl. year dummies	Coal Incl. year dummies	Mineral Incl. year dummies	Forest Incl. year dummies
ln (Rentspercapita)	0.657 (0.676)	-0.266 (0.837)	-1.400 (0.716)	0.461 (1.131)	0.723 (0.522)	0.225 (1.079)
Corruption	0.026 (0.057)	-0.028 (0.074)	-0.144 (0.076)	-0.049 (0.086)	0.017 (0.081)	0.043 (0.061)
L. ln (GDP per capita)	-3.220* (1.336)	-4.879** (1.589)	-3.149 (1.721)	-6.483** (1.848)	-2.826 (1.685)	-3.444* (1.385)
Education	-0.309 (0.680)	0.569 (0.880)	-0.134 (0.860)	-0.612 (1.108)	-0.261 (0.893)	-0.397 (0.712)
Share population 15-65	0.135 (0.229)	0.424 (0.332)	0.324 (0.289)	-0.072 (0.409)	0.080 (0.310)	0.141 (0.249)
Constant	35.908* (14.600)	30.296 (20.031)	36.071 (20.959)	86.820** (27.106)	37.373 (19.569)	40.590** (15.563)
Observation	658	439	387	260	423	609
Number of countries	85	57	49	32	58	78

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 32 to 85 countries are included. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.

Appendix K

Table 17 The effect of specific types of natural resources rents and corruption on entrepreneurship; fixed effects estimation.

Variable	Natural Resources Incl. year dummies	Oil Incl. year dummies	Gas Incl. year dummies	Coal Incl. year dummies	Mineral Incl. year dummies	Forest Incl. year dummies
ln (Rentspercapita)	-0.168 (0.999)	-0.574 (1.030)	-0.103 (1.046)	0.070 (1.419)	-1.150 (0.921)	-1.134 (1.847)
Corruption	-0.075 (0.107)	-0.058 (0.095)	-0.022 (0.105)	-0.078 (0.106)	-0.128 (0.100)	-0.038 (0.108)
ln (Rentspercapita) x Corruption	0.019 (0.017)	0.008 (0.016)	-0.036 (0.021)	0.009 (0.020)	0.044 (0.018)	0.027 (0.030)
L. ln (GDP per capita)	-3.335* (1.339)	-4.914** (1.592)	-2.539 (1.753)	-6.538** (1.855)	-2.723 (1.674)	-3.532* (1.388)
Education	-0.324 (0.679)	0.554 (0.881)	0.006 (0.862)	-0.448 (1.166)	-0.330 (0.887)	-0.445 (0.714)
Share population 15-65	0.155 (0.229)	0.448 (0.336)	0.345 (0.289)	-0.083 (0.410)	0.170 (0.310)	0.098 (0.254)
Constant	39.797** (15.002)	30.096 (20.055)	23.145 (22.245)	87.725** (27.229)	37.344 (19.428)	48.615** (17.902)
Observation	658	439	387	260	423	609
Number of countries	85	57	49	32	58	78

Note. Standard errors are in parentheses; the dependent variable is the share of the population that actively participates in entrepreneurship. Rents per capita correspond to the natural resource being analysed (natural resources, oil, gas, coal, mineral and forest). For description and summary statistics of the variables, please see Table 1. The sample contains 14 years (2004-2017) of data and 32 to 85 countries are included. All columns include dummy variables for the years 2004-2017; * $p < 0.05$, ** $p < 0.01$.