

RESEARCH ARTICLE

Fertile soil for intrapreneurship: impartial institutions and human capital

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Abstract

Intrapreneurs, entrepreneurial employees, constitute an important force behind innovations in the economy. Yet, what factors that promote intrapreneurship at the country level are an underdeveloped research area. This paper provides an important contribution regarding the methodological approach and the broad set of potential explanatory factors studied. Based on machine-learning techniques (Least Absolute Shrinkage and Selection Operator (LASSO) and Extreme Bounds Analysis (EBA)), we investigate the influence of over 60 factors capturing institutional, demographic, cultural, and developmental factors. We find that the quality of government measured as impartiality, i.e. that the public institutions treat the citizens in a non-discriminatory fashion and do not favor some groups or individuals, and the level of human capital, measured as the average years of schooling, are the most important factors predicting the level of intrapreneurship across countries. Instrumental variable results support a causal interpretation. The findings emphasize the importance of policy to establish well-functioning and impartial institutions as well as to promote higher education.

Key words: Intrapreneurship; impartial institutions; human capital; machine learning

1. Introduction

Innovation is at the core of economic growth. Entrepreneurship – the function of introducing new products or better processes for delivering them – is an essential part of innovation. Entrepreneurship research has received an increasing amount of attention, both within the management and economics literatures. As a result, distinct strands of entrepreneurship theory have evolved, often building on insights from Joseph Schumpeter, Israel Kirzner, or Frank Knight (see Foss and Klein, 2015). For a long time, the literature equated entrepreneurship with (new) small or family firms or self-employment. However, the bulk of all small firms and self-employed persons are not innovative; most small firms are ordinary mom-and-pop stores or livelihood firms (Delmar and Wennberg, 2010; Santarelli and Vivarelli, 2007; Shane, 2009).

Seeing entrepreneurship as a function associated with innovation and not a specific organizational form or occupational choice makes it clear that entrepreneurship can be performed by employees within existing companies as well. These employees are called *intrapreneurs* and have until recently largely been overlooked by researchers within economics.¹ The exclusion of intrapreneurship from entrepreneurship may be one reason why it has been hard to establish a relationship between entrepreneurship and growth empirically (see, e.g. Stam, 2013; Stam and van Stel, 2011; van Stel *et al.*, 2005). Including

¹Within the business management literature, extensive research analyzes how to make established firms, including their employees, more entrepreneurial. Examples include both articles (e.g. Carrier, 1994; Miles and Covin, 2002; Zahra, 1991) and books (e.g. Burns, 2017; Morris *et al.*, 2018). The importance of business culture and a well-developed corporate business strategy is often highlighted. However, this literature lacks an analysis from a societal perspective.

intrapreneurs in the measure of entrepreneurship gives more adequate coverage of entrepreneurial behavior in society. It may also explain why countries with a low share of independent entrepreneurs, i.e. owner-managers of independent firms, score high on international innovation activity measures.

Studies analyzing the prevalence of independent entrepreneurship between countries, and what (institutional) factors that might explain these differences are plentiful (see, e.g. Bjørnskov and Foss, 2008; Dheer, 2017; Nikolaev *et al.*, 2018; Thai and Turkina, 2014). But what institutions that promote entrepreneurial employees, and if these factors are possible to influence through policy, are, on the other hand, a truly under-analyzed question.

A priori, it may be reasonable to posit that entrepreneurial endeavors – independent of form – are affected by the same factors. The literature often, explicitly or implicitly, assumes that both independent entrepreneurs and intrapreneurs respond in the same way to the institutional framework. This need not be maintained as an assumption, however, but should be studied empirically.

From a national policy perspective, promoting intrapreneurs can be as important as stimulating independent entrepreneurs which often is the main focus of current national policies. Research suggests that intrapreneurs can be as important as independent entrepreneurs when it comes to innovation activity as well as employment and economic growth (see Stam, 2013).

To analyze intrapreneurship using quantitative methods at the national level, one needs data on intrapreneurship that is comparable across countries. Until recently, no such measure was available, but from 2014, the intrapreneurship level has been measured coherently within the Global Entrepreneurship Monitoring (GEM) project, making a quantitative analysis possible. Intrapreneurship activity differs substantially between countries. The average share of intrapreneurs in the labor force between 2014 and 2017 was, e.g. 11% in Denmark, whereas it was 0.3% in Panama.

Studies of cross-national differences in intrapreneurship are scarce. The earlier research has *ex ante* restricted the analysis to a particular set of variables or areas that the scholars deem to be most important. Examples include human capital (Stam, 2013), employment protection legislation (Liebregts and Stam, 2019), trust (Elert *et al.*, 2019), or a sub-set of institutional factors (Bosma *et al.*, 2018). This approach makes strong assumptions about what does *not* matter without examining the evidence.

The purpose of this paper is to analyze in which environments intrapreneurship flourishes using a less restrictive approach than previous work. Instead of focusing on a small subset of potential explanatory factors, we impose much weaker *ex ante* assumptions on what matters. We study many national-level factors covering a wide set of different areas that the literature has linked to entrepreneurial activity. We extend the analysis using instrumental variables, which provide stronger causal evidence.

Our results suggest that intrapreneurship thrives predominantly in two environments. First, impartial institutions are crucial because they are the foundation for well-functioning and non-corrupt public institutions. The second factor is human capital. The higher the level of education, the greater is the rate of intrapreneurship. Both factors are squarely in the domain of public policy.²

The paper makes an important contribution by studying the intrapreneurship rate, a within economics sparsely studied yet important part of entrepreneurship, with novel methods applied to a wide set of factors. Methodologically, we advance the literature by using machine-learning techniques to isolate the most important factors where intrapreneurship flourishes.³ Cross-country analyses have, as described above, tended to focus on a handful of variables deemed important *ex ante*, where we consider around 60 factors.

The paper proceeds in section 2 with a background related to the main factors we consider in the analysis grouped into four areas. We proceed to describe the data used in the analysis in section 3, and section 4 describes the econometric method used. Section 5 presents the main results, and section 6 concludes.

²We include factors within and outside of the realm of public policy to examine whether the most important factors are part of the former category.

³Machine-learning techniques have until now rarely been used within entrepreneurship research but it is highlighted as an emerging topic (Obschonka and Audretsch, 2020). New papers using this method to analyze entrepreneurship-related questions include Coad and Srhoj (2020), Obschonka *et al.* (2020), and Prüfer and Prüfer (2020).

2 Literature review

2.1 Independent entrepreneurs versus intrapreneurs

Most of the entrepreneurial research within economics does not explicitly discuss intrapreneurship, but entrepreneurship that excludes, explicitly or implicitly, intrapreneurs. They may also discuss innovation in general terms. Factors that affect incentives, regulation of employment, and attitudes toward entrepreneurial aspiration could all influence not only potential independent entrepreneurs but also intrapreneurs. For example, the rule of law may make it possible to write enforceable contracts. This may secure material payoffs for innovators, both those who are independent and those employed by existing firms. The absence of rule of law could expose both kinds of innovator to theft or coercion, which may not bolster innovation. High trust may also make it easier for innovators to benefit from their work, and low trust may decrease the desire to innovate if innovators believe they will be taken advantage of.

A priori, it seems reasonable that the same factors might affect the presence of entrepreneurial endeavors, independently of functional form (as an owner-manager in an independent business or as an employee in an established firm). But this need not be the case; factors could have differential effects on independent and employed entrepreneurs. Rule of law could, for example, be more important for independent entrepreneurs as they may need to engage in numerous contracts with agents outside the firm to bring the innovation to market. For intrapreneurs, it could be more important with trust, as the innovation is embedded in an existing firm where the innovative process is characterized more by relational contracts in the firm rather than formal contracting. Furthermore, some factors might influence the entrepreneurial activities in opposite ways. Generous social security systems and strict employment protection laws may discourage people from working as self-employed and instead encourage individuals to work as intrapreneurs. It is an empirical question to determine what factors influence the intrapreneurship level in a country.

2.2 Institutions and other factors

The entrepreneurship literature has examined a wide range of factors that might influence entrepreneurial activity and potentially explain cross-national differences. We consider both formal and informal institution, including cultural measures, as well as developmental and geographical factors. The section reviews all variables used in the analysis summed up under the four headings *formal institutional, labor market and demographic, cultural and attitudinal*, and, finally, *developmental and geographical* factors. The areas are partly overlapping but give an overview of earlier studies.

2.2.1 Formal institutional factors

North (1990) highlights the role of institutions as vital for shaping the incentive structure in society. Boettke and Coyne (2009), inspired by Baumol (1990, 1993), conclude that the institutional framework influences the profitability of opportunities and willingness of individuals to become independent entrepreneurs. Elert *et al.* (2017) and Elert and Henrekson (2020) give an overview of how institutions may influence entrepreneurial activity and how politicians can spur entrepreneurship through institutional reforms. Harper (2018) gives an overview of innovation and institutions. The literature has stressed several aspects of the institutional framework in a country that might affect entrepreneurial activity.

Well-functioning public institutions, e.g. absence of corruption, political stability, and high regulatory quality, are often highlighted as important for a well-functioning economy and productive entrepreneurship. Examples include Boudreaux and Nikolaev (2019), Chowdhury *et al.* (2018), Dau and Cuervo-Cazurra (2014), Estrin *et al.* (2013), Olthaar *et al.* (2017), and Urbano *et al.* (2019), who all emphasize the importance of good institutions. Nistotskaya *et al.* (2015) have highlighted the importance of quality of governance in terms of impartial public institutions that are free from corruption. In the same vein, the importance of economic freedom has been stressed several times in the entrepreneurship literature. Bjørnskov and Foss (2008, 2013), Boudreaux (2014), Gohmann (2012), McMullen

et al. (2008), Murtazashvili (2017), and Nyström (2008) have all in different aspects found that institutions supporting economic freedom, including well-defined and stable property rights, spur entrepreneurial experimentation and activity. A historical example from Ancient Greece includes Bitros and Karayiannis (2008).⁴

2.2.2 Labor market and demographic factors

The organization of labor markets is an important topic in the entrepreneurship literature. Van Stel *et al.* (2007) find, e.g. that extensive labor market regulation resulting in rigidity of employment influences entrepreneurial activity negatively. The extent and design of the social insurance system may make it less rewarding to change employer or start a new business (see, e.g. Koellinger and Minniti, 2009). The design of the social security system may also benefit employment relative to self-employment, causing entrepreneurial individuals to be intrapreneurs (Elert *et al.*, 2019). Employment protections can have the same effect (Liebregts and Stam, 2019).

Demographic factors include the total or female labor force participation rates as well as age and life expectancy (see, e.g. Bosma *et al.*, 2012a; Liang *et al.*, 2018). The literature also points to the effects of ethnicity, diversity, immigration, and fractionalization of the labor force. Entrepreneurship might, e.g. be more pronounced among some ethnic groups (see, e.g. Smallbone *et al.*, 2010). Ethnic diversity might, further, stimulate or dampen innovations as a result of increased or decreased interaction (see Awaworyi Churchill, 2017; Greve and Salaff, 2003; Sobel *et al.*, 2010).

Research has also highlighted the relevance of human capital for successful entrepreneurship (e.g. Marvel *et al.*, 2016; Unger *et al.*, 2011). Stam (2013) has shown that intrapreneurship at the country level is positively related to human capital investments. Many entrepreneurial endeavors, within or outside established companies, are facilitated by a high level of individual human capital.

2.2.3 Cultural and attitudinal factors

Customs, traditions, and norms are often stressed as important examples of *informal institutions* influencing behavior. How these factors affect individual behavior have been discussed widely in the economic literature (see, e.g. Mulligan, 1997).

Hofstede (1991) and Hofstede *et al.* (2010) have identified five cultural dimensions across nations, and in Hofstede *et al.* (2004), the authors elaborate on how these cultural traits may affect entrepreneurship. The importance of cultural traits as drivers of innovation and entrepreneurship has been analyzed extensively in the literature (see, e.g. Dheer, 2017; Hechavarria and Reynolds, 2009; Mueller and Thomas, 2000; Taylor and Wilson, 2012).

Many studies, including Colombier and Masclat (2008) and Lindquist *et al.* (2015), have found that having a parent who is (or have been) an entrepreneur strongly correlates with the probability of being an entrepreneur of your own. The preference and priorities of your parents and their values passed on to their children might hence be important determinants for one's potential entrepreneurial career.

General trust for other individuals is highlighted in the entrepreneurship literature. High trust facilitates the flow of information (across groups) in society and increases the perception of entrepreneurial opportunities (Kwon and Arenius, 2010; Mickiewicz and Rebmann, 2020). Empirical support for the importance of trust has been found in, e.g. Kodila-Tedika and Agbor (2016). Later research has also stressed the importance of trust for intrapreneurship (Elert *et al.*, 2019). The possible influence of religion and religious beliefs is debated (see, e.g. Dana, 2010; Henley, 2017).

2.2.4 Developmental and geographical factors

Some characteristics of a country that might influence the entrepreneurial activity include economic development and geographical factors together with historical traits. The entrepreneurial and intrapreneurial activities differ substantially across countries depending on economic development. Many rich

⁴Another branch of research analyzes institutional entrepreneurship, i.e. when entrepreneurs influence the institutional framework (see, e.g. Elert and Henrekson, 2017; Henrekson and Sanandaji, 2011).

countries have, e.g. a much higher share of intrapreneurs compared to developing countries (Bosma *et al.*, 2012b).

The communist regimes have a lingering suppressive effect on entrepreneurial activities. According to Wyrwich (2012) and Fritsch and Wyrwich (2016), the communist regime in East Germany (the German Democratic Republic, GDR) triggered, e.g. a mentality at odds with entrepreneurship.

Geographical and historical traits of a country might be deeper and more fundamental causes explaining economic development and entrepreneurial activities (Spolaore and Wacziarg, 2013). Several articles have documented a strong link between various aspects of geography and historical traits on the one hand, and how the economy is organized and progress on the other (see, e.g. Hibbs and Olsson, 2004; Olsson and Hibbs, 2005).

3. Data

3.1 Intrapreneurship

Intrapreneurs are entrepreneurship carried out by employees. The formal definition of intrapreneurship has varied considerably over time and there are still distinct terminology differences in the literature across academic disciplines.⁵ In order to work with intrapreneurship from an empirical perspective, an operational definition must be used.

In 1999, a consortium denoted GEM started to collect data consistently about independent entrepreneurship. In 2011, they collected survey data about intrapreneurship for the first time and from 2014 and onwards they have collected annual data on intrapreneurship in a consistent manner.⁶

GEM counts a person as an intrapreneur if (s)he during the last 3 years with a leading role has been involved in the development of new activities for the main employer. We measure the intrapreneurship level as the proportion of intrapreneurs in the working-age (18–64 years) population. It is GEM's so-called broad definition of intrapreneurship that we use in our analysis.⁷ We compute country averages across the GEM waves in 2014, 2015, 2016, and 2017. Time averaging reduces measurement errors in any given year and provides a better measure of the persistent level of intrapreneurship. There are 87 countries from across the world in the sample (although not all countries have data on all the institutional measures).⁸ Figure 1 illustrates the variation across countries. Intrapreneurship is highest in Denmark, Norway, and Australia. It is lowest in Panama, South Africa, and Georgia.

3.2 Explanatory and instrumental variables

This section contains an overview of the explanatory and instrumental variables used, and Table 1 presents common summary statistics and a correlation matrix among the variables our variable selection methods select as 'strong factors'. In total, we study about 60 potential influences, encompassing both formal and informal institutions, on intrapreneurship. Online Appendix 1 describes the sources used and the data in more detail.⁹

3.2.1 Formal institutional factors

To account for the influence of public institutional factors, we include the functioning of the public sector, the rule of law, government involvement in markets, as well as the stability and openness of

⁵See Sharma and Chrisman (1999) for an extensive list of different definitions and Antoncic and Hisrich (2003) for a topical discussion from a management perspective.

⁶In 2008, a smaller pilot study with 11 countries was also conducted (see Bosma *et al.*, 2010).

⁷The narrow definition requires that the intrapreneur must be currently involved in an intrapreneurship activity and is a subset of the intrapreneurs defined according to the broad definition. See Bosma *et al.* (2012a) for a further discussion about how GEM measures intrapreneurship. The correlation between the different intrapreneurship measures is high (see Stam and Stenkula, 2017).

⁸The data are available at <http://gemconsortium.org/data>.

⁹The online Appendix is available at: <https://1drv.ms/b/s!Aj3kGVvDCC7ngY9Rr3GfKGHza8IgUw?e=uYUMRf>.

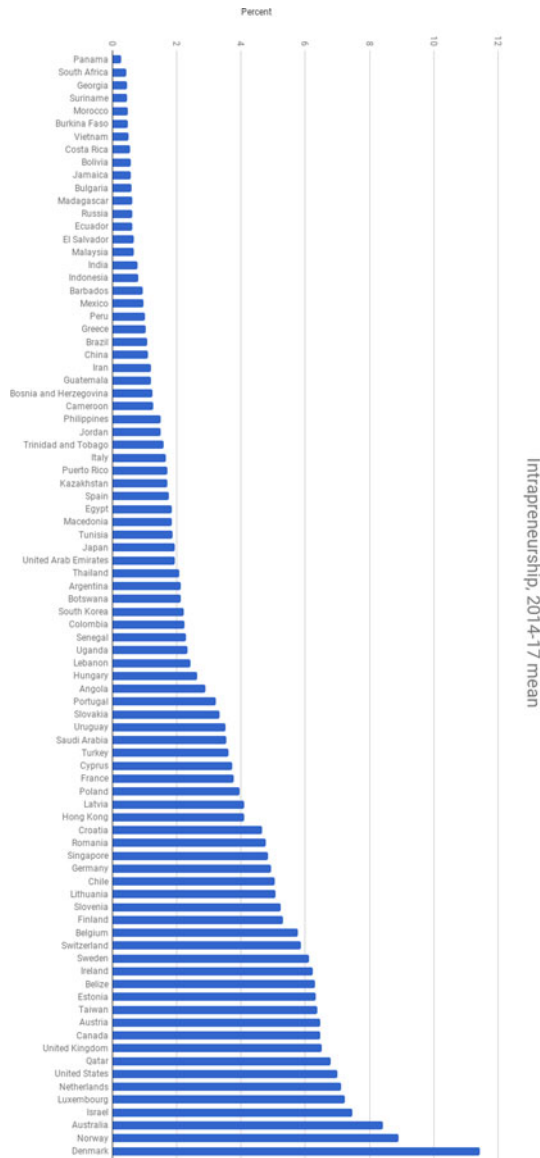


Figure 1. Intrapreneurship rates across the world.

political institutions. We measure the level of democracy as well as the constraints on the decision-making power of the executive branch.

For economic freedom, we use a total aggregate index as well as its five components (measured in 1995): (1) the size of government, (2) legal structure and security of property rights, (3) access to sound money, (4) freedom to trade internationally, and (5) regulation of credit, labor, and business.

Finally, we consider impartiality and professionalism. Impartiality measures if government officials treat everybody in the same situation in a similar manner. A high value of this measure indicates that those executing political power do not favor some groups or individuals. Professionalism captures that people get public positions by competence, not due to personal contacts.

Table 1. Summary statistics and correlations of the main variables

Variable	Mean	Std. Dev.	Correlations			
			Intrapreneur.	Impartiality	Schooling	Power dist.
Intrapreneurship	3.09	2.51	1.00			
Impartiality	4.35	1.13	0.85	1.00		
Years of schooling (1985–95 average)	7.55	2.18	0.67	0.62	1.00	
Power distance (Hofstede)	0.61	0.21	−0.72	−0.63	−0.54	1.00
GDP per capita (log), 1995	8.84	0.90	0.70	0.74	0.64	−0.64
Life expectancy (at birth)	71.8	8.08	0.62	0.74	0.53	−0.47
IQ	90.5	10.2	0.50	0.60	0.56	−0.31
Non-religious fraction (in 1970)	0.08	0.15	−0.10	−0.05	0.13	0.17
Female labor force participation	43.3	13.2	0.38	0.28	0.35	−0.20
Labor force participation (working age)	55.2	10.3	0.19	0.08	0.00	0.01
Rigidity of employment (WDI)	29.5	18.0	−0.40	−0.26	−0.35	0.27
Mandatory minimum wage	0.75	0.43	−0.50	−0.46	−0.28	0.63
Employment laws index	0.50	0.18	0.02	0.16	0.09	−0.01
Unemployment benefits index	0.55	0.37	0.36	0.41	0.55	−0.38
Social security laws index	0.61	0.20	0.44	0.44	0.56	−0.43
Old age, disability, and death benefit index	0.60	0.12	0.39	0.36	0.23	−0.28
Labor union power index	0.45	0.18	−0.06	−0.05	0.19	0.01
Democracy (polity2)	6.08	5.83	0.36	0.33	0.55	−0.42
Communist regime (in 1970)	0.20	0.40	−0.16	−0.20	0.14	0.25
Constraints on the executive	4.79	1.90	0.64	0.58	0.54	−0.74
Professionalism	4.16	0.98	0.68	0.77	0.38	−0.46
Control of corruption (WBGi)	0.43	1.03	0.81	0.87	0.58	−0.72
Government efficiency (WBGi)	0.52	0.96	0.79	0.85	0.63	−0.72
Rule of law (WBGi)	0.36	0.93	0.79	0.85	0.58	−0.73
Regulatory quality (WBGi)	0.48	0.86	0.74	0.80	0.62	−0.69
Political stability (WBGi)	0.21	0.91	0.70	0.77	0.59	−0.60
Voice and accountability (WBGi)	0.37	0.89	0.68	0.71	0.67	−0.70
Economic Freedom Index (EFI), 1995	6.61	1.16	0.55	0.56	0.35	−0.54
EFI component 1 (size of government)	5.74	1.80	−0.39	−0.40	−0.30	0.38
EFI component 2 (property rights)	6.55	1.68	0.76	0.77	0.51	−0.74
EFI component 3 (access to sound money)	7.11	2.64	0.45	0.47	0.21	−0.45
EFI component 4 (freedom to trade)	7.47	1.52	0.66	0.72	0.63	−0.65
EFI component 5 (regulation)	6.14	1.18	0.46	0.39	0.27	−0.43
	4.40	0.76	0.32	0.34	0.25	−0.25

(Continued)

Table 1. (Continued.)

Variable	Mean	Std. Dev.	Correlations			
			Intrapreneur.	Impartiality	Schooling	Power dist.
Luck (<i>versus</i> effort) determines outcomes						
Competition is harmful (<i>versus</i> good)	3.68	0.55	0.14	0.27	0.19	-0.004
Gov't ownership over firms (more <i>versus</i> less)	5.12	0.84	-0.62	-0.57	-0.54	0.69
Government should take more responsibility	5.86	0.94	-0.61	-0.53	-0.42	0.53
Zero-sum wealth views	4.61	0.65	0.17	0.23	0.23	-0.02
Trust	1.71	0.17	-0.53	-0.43	-0.27	0.48
Individualism (Hofstede)	0.43	0.23	0.59	0.54	0.59	-0.68
Masculinity (Hofstede)	0.48	0.19	-0.33	-0.34	-0.17	0.14
Uncertainty avoidance (Hofstede)	0.66	0.23	-0.39	-0.26	-0.07	0.33
Long term orientation (Hofstede)	0.47	0.24	0.03	0.18	0.24	0.02
Gini of income	40.3	10.0	-0.51	-0.48	-0.45	0.40
Ethnic fractionalization	0.39	0.25	-0.36	-0.37	-0.34	0.25
Religious fractionalization	0.60	0.25	0.00	-0.05	-0.27	-0.06
Genetic diversity	0.72	0.03	0.27	0.25	0.23	-0.35
Independence	0.49	0.15	0.35	0.22	0.12	-0.32
Hard work	0.49	0.23	-0.55	-0.48	-0.25	0.58
Feeling of responsibility	0.70	0.12	0.19	0.34	0.17	-0.16
Imagination	0.19	0.08	0.43	0.40	0.19	-0.34
Tolerance and respect	0.67	0.11	0.50	0.63	0.32	-0.44
Thrift	0.35	0.13	-0.34	-0.26	-0.20	0.42
Determination and perseverance	0.34	0.11	0.08	0.22	0.22	0.00
Religious faith	0.36	0.24	-0.40	-0.44	-0.53	0.41
Unselfishness	0.31	0.12	0.00	-0.02	-0.15	0.09
Obedience	0.36	0.16	-0.46	-0.43	-0.63	0.42
Distance to equator	0.35	0.19	0.57	0.56	0.64	-0.58
Latitude	23.7	26.9	0.46	0.41	0.45	-0.35
Average temperature	16.0	8.6	-0.53	-0.55	-0.74	0.48
Average precipitation	90.1	58.0	-0.13	-0.10	-0.26	0.26
Landlocked	0.13	0.34	0.14	0.12	0.17	-0.37
Years since Neolithic revolution (log)	8.42	0.59	-0.04	-0.06	-0.08	0.16
Percent risk of malaria	0.12	0.28	-0.32	-0.41	-0.39	0.41
State history year 1500	0.50	0.24	0.04	0.08	-0.16	-0.06
Population density year 1500	1.94	1.18	0.32	0.37	0.11	-0.27

3.2.2 Labor market and demographic factors

We include labor force participation (total and female) and rigidity of employment measures. Additional aspects include the mandatory minimum wage, and indices over employment laws, unemployment benefits, social security laws, and labor union power.

To cover human capital aspects and the quality of the labor force, we use the average years of schooling from 1985 to 1995, data on IQ, and life expectancy. Also, we consider four dimensions of diversity: income, ethnic, religious, and genetic.

3.2.3 Cultural and attitudinal factors

As empirical measures of cultural influences, we use the five cultural dimensions in Hofstede *et al.* (2010), namely, uncertainty avoidance, individualism, long-term orientation, masculinity, and power distance.

To measure trust, we use the standard formulation about generalized trust. Further, we use five questions on economic attitudes and the government's role in the economy included in the European Values Study and World Values Survey (EVS/WVS).

We cover potential influences from parents. The EVS/WVS survey asks individuals their opinion on which values parents ought to encourage children to learn. The 10 priorities span a wide range of values (including 'hard work' and 'imagination'). We also include the share of non-religious in the year 1970.

3.2.4 Developmental and geographical factors

Our measure of economic development is GDP per capita. To measure the influence of communism, we use a variable, which takes the value one if the country's regime was communist in 1970.

More long-term historical variables measure the years since the Neolithic revolution (in logs), the percent at risk of malaria, population density in the year 1500, and state history (experience with an organized authority) in the year 1500. Geographical attributes of the countries included are the distance from the equator, latitude (measured from the North Pole), average temperature, and average precipitation. There is an indicator of the country being landlocked.

3.2.5 Instrumental variables

To strengthen a causal interpretation of our result, we complement our analysis by using instrumental variables (see section 5.4 for motivation and discussion of the instrument). The main instrumental variable is historical pathogens. We use historical constraints on the executive (an average across the years 1600–1850) as an additional instrument.

4. Method

Our main specifications are ordinary least squares (OLS) regressions of the following form:

$$\text{Intrapreneurship}_i = \beta_0 + \beta_1 X_i + \varepsilon_i \quad (1)$$

Intrapreneurship_{*i*} captures the intrapreneurship rate in country *i*. A vector of independent variables is captured by X_i . We use robust standard errors to account for heteroscedasticity.

As we study a wide array of potential influences, model selection is crucial. The number of factors is too large to estimate the complete model meaningfully. It is in part because of issues with degrees of freedom, and also due to the difficulty of interpreting the estimates in a model with many conditioning variables. We apply two mechanical model selection methods: first, a Least Absolute Shrinkage and Selection Operator (LASSO) model and second an Extreme Bounds Analysis (EBA). The first approach is global; it examines which factors are most important for explaining intrapreneurship while considering all influences. The second approach examines many limited or local models as it examines all possible combinations of up to four factors.

We use the two methods to rank the variables. The highest ranked variables are included in OLS models, one set of estimates for each method. The significant factors in those models are our strongest and most robust predictors of intrapreneurship.

4.1 LASSO

The first approach is a machine-learning method called the LASSO. It adds a term to the usual sum of squared deviations objective in OLS. The added penalty term is the sum of the absolute values of the estimated coefficients (β). The parameter λ gives the weight of the penalty term.

The LASSO problem is to choose coefficients β such that

$$\min_{\{\beta\}} \sum_{i=1}^N \left(y_i - \beta_0 - \sum_{j=1}^p x_{ij} \beta_j \right)^2 + \lambda \sum_{j=1}^p |\beta_j|$$

where i denotes observations and j the explanatory variables. N is the sample size and p the number of variables in the model, and $|\beta_j|$ denotes the absolute value of β_j .

The absolute values in the penalty term introduce corners in the optimization problem. Given a sufficiently high λ , only one coefficient will be assigned a non-zero value. By assigning zero to some coefficients, the LASSO shrinks the model.¹⁰ The first non-zero value is assigned to the factor that most contributes to explaining the outcome. When reducing λ , the model will select more factors. The added factors are those that most contribute to explain the outcome. LASSO ranks variables by the order they are selected (assigned a non-zero coefficient) when λ is changed from high to low values. For a thorough discussion of the method consult, for example, Hastie *et al.* (2009).

4.2 Extreme Bounds Analysis

The second approach, EBA, differs from the first model as it examines lots of partial models. For each variable, all combinations of up to three of the other factors are estimated in an OLS model. The share of such combinations in which the variable is significant at the 5% level is the basis of our ranking. We give the highest rank to the variable that most frequently is significant in all combinations of up to three additional variables. For each variable, there are over 41,000 such combinations. In total, we examined over 2.6 million combinations.

The partial approach in EBA may assign a high rank to several variables that are strongly correlated, while LASSO's global approach would tend to pick one variable (the most important for explaining the outcome) among several highly correlated candidates.

5. Results

5.1 LASSO

Table 2 presents the results from the LASSO selection. Models start with the most important variable in the first specification, and we add the other high ranked variables in subsequent specifications.¹¹ The five most important factors, in the order selected by LASSO, are impartiality, power distance, control of corruption, years of schooling, and property rights (EFI component 2).

Impartiality is positive and strongly significant in all specifications. The large explanatory power of impartiality reflects the high correlation noticed in Table 1.¹² Power distance, a cultural value toward

¹⁰OLS usually assigns non-zero coefficients to all factors.

¹¹The models are estimated on the same set of countries. Results are similar if each model is estimated on the full sample with available data.

¹²Not only impartiality but also control of corruption, property rights (EFI component 2), rule of law, government effectiveness, and regulatory quality explain over half the intrapreneurship variation in a univariate model. Impartiality's high R^2 is

Table 2. Determinants of intrapreneurship: LASSO selected variables

Dependent variable: Entrepreneurial Employee Activity					
	(1)	(2)	(3)	(4)	(5)
Impartiality	1.885 (0.205)***	1.482 (0.228)***	0.978 (0.350)***	0.785 (0.333)**	0.798 (0.353)**
Power distance (Hofstede)		-3.222 (1.489)**	-2.433 (1.518)	-2.116 (1.323)	-2.107 (1.346)
Control of corruption			0.737 (0.359)**	0.611 (0.332)*	0.484 (0.551)
Years of schooling (1985–95 avg)				0.273 (0.096)***	0.267 (0.093)***
Property rights (EFI component 2)					0.081 (0.247)
Constant	-5.091 (0.870)***	-1.384 (1.722)	-0.009 (1.904)	-1.366 (1.895)	-1.842 (2.999)
R^2	0.603	0.645	0.665	0.697	0.698
Observations	58	58	58	58	58

Notes: The dependent variable is Entrepreneurial Employee Activity, averaged across the 2014, 2015, 2016, and 2017 survey waves of the Global Entrepreneurship Monitor. Robust standard errors in parenthesis. Significance stars, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

accepting hierarchies, is negative and significant in the second specification but loses significance when we include the next set of factors. Control of corruption, an institutional measure closely related to impartiality, is significant and positive in the third model, yet loses significance as we include additional factors. Human capital, as captured by the average years of schooling, is positive and strongly significant in all specifications. Property rights, as measured by the second component of the Economic Freedom Index, are positive but insignificant in the last specification.¹³ Results are similar when accounting for log GDP per capita, the labor force participation rate, the population share aged 65 and over, and the industry's share of GDP (see online Appendix 2, Table A1). All the added controls are insignificant.

Impartiality is a quantitatively significant factor. Increasing impartiality by one standard deviation corresponds to increasing intrapreneurship by 2.1 percentage points in the univariate model, compared to the average intrapreneurship rate of 3.1%. The effect also amounts to 0.85 of a standard deviation of intrapreneurship. The effect size is 0.36 in the richer models.¹⁴ The point estimate of human capital indicates that if the average years of schooling in a country increase with one year, the average intrapreneurship level will increase by about 0.3 percentage point. The effect size of human capital is 0.25 in the richer model (column 5 of Table 2) and 0.67 in a univariate model.¹⁵ Both of the strongest predictors have quantitatively significant estimates, which make the results policy relevant.

5.2 Extreme Bounds Analysis

Table 3 presents the estimates with the EBA-selected variables. The most frequently significant variables are impartiality, years of schooling, power distance, control of corruption, and the rule of law. Of these variables, three capture institutional quality: impartiality, control of corruption, and the rule of law.¹⁶ The LASSO model selected two of these variables: impartiality and control of corruption. The other variables selected by both approaches are human capital and power distance.

The results are similar to the previous table: impartiality and human capital are the strongest predictors of intrapreneurship, and the effect size is about the same as in the previous table. Power distance and control of corruption lose significance as we include more factors. The last column reports that impartiality and human capital are significant at the 5% level in 99.6% and 98.4%, respectively, of all model combinations indicating a very high stability. Sign stability of the estimated coefficients is higher still, as seen in column 7. When accounting for log GDP per capita, the labor force participation rate, the population share aged 65 and over, and the industry's share of GDP, the estimates on the added controls are insignificant, while the estimates on impartiality and years of education do not change much (see online Appendix 2, Table A2).

5.3 Discussion

Both methods select impartial institutions as one of the strongest predictors, but it is strongly related to several other institutional measures. Although impartial institutions are the stronger influence, it is hard to distinguish it from the control of corruption measure.¹⁷

shared with several other institution measures, further supporting the importance of good institutions for flourishing intrapreneurship.

¹³Variance inflation factors (VIFs) do not raise concerns of multicollinearity as they are below the usual threshold of 10.

¹⁴The effect size is sometimes referred to as β coefficients. It is computed as the estimate multiplied by the standard deviation of that variable as a fraction of the standard deviation of the dependent variable.

¹⁵The univariate model with years of schooling yields a point estimate of 0.768.

¹⁶VIFs are all below the threshold 10 in models 1 through 4 in Table 3. In model 5, the VIFs for control of corruption and rule of law increase above 10, raising concerns of multicollinearity between these variables. However, the point estimates in models 4 and 5 are very similar for impartiality, years of schooling, and power distance indicating that the collinearity does not affect those results.

¹⁷Impartiality and control of corruption are highly correlated with a correlation coefficient of 0.87. Yet, when both are included in the model, impartiality is the strongly significant predictor of intrapreneurship. The correlations of impartiality

Table 3. Determinants of intrapreneurship: EBA-selected variables

Dependent variable: Entrepreneurial Employee Activity	Across all EBA combinations						
	(1)	(2)	(3)	(4)	(5)	Significance rate (%)	Sign stability (%)
Impartiality	1.858 (0.196)***	1.443 (0.223)***	1.154 (0.217)***	0.758 (0.319)**	0.775 (0.316)**	99.6	99.9
Years of schooling (1985–95 avg)		0.332 (0.102)***	0.292 (0.100)***	0.269 (0.095)***	0.284 (0.096)***	98.4	99.8
Power distance (Hofstede)			−2.802 (1.325)**	−2.159 (1.314)	−2.215 (1.345)	96.3	99.6
Control of corruption				0.622 (0.329)*	1.094 (0.723)	96.0	99.7
Rule of law					−0.604 (0.789)	89.7	97.8
Constant	−4.953 (0.820)***	−5.651 (0.848)***	−2.402 (1.591)	−1.189 (1.799)	−1.297 (1.785)		
R ²	0.609	0.658	0.690	0.703	0.706		
Observations	59	59	59	59	59		

Notes: The dependent variable is Entrepreneurial Employee Activity, averaged across the 2014, 2015, 2016, and 2017 survey waves of the Global Entrepreneurship Monitor. Robust standard errors in parenthesis. Significance stars, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Column 6 reports the share of all model combinations of the EBA in which the variable is significant at the 5% level. Column 7 reports the share of all model combinations in the EBA in which the sign is the same as displayed in the table. The EBA examines over 2.6 million combinations.

This point also comes back when we use the Elastic Net method as an additional robustness check. It is adjacent to the LASSO method that adds the penalty from ridge regression to the model, that is, it adds the sum of the squared coefficients (β) to the objective function (and the parameter α assigns the weight to the LASSO penalty and $1-\alpha$ is the weight of the ridge regression penalty). The LASSO tends to pick one factor among several highly correlated factors, while the Elastic Net may include several of the highly correlated factors. The Elastic Net selects impartial institutions as the most important factor but also includes control of corruption among the most important influences (using $\alpha = 0.9$), indicating that both institutional factors are important.

Besides impartial institutions, both LASSO and EBA select human capital (average years of schooling) as an important predictor of the intrapreneurship rate in a country. The importance of human capital supports the view in Stam (2013) that intrapreneurship at the country level is positively related to human capital investments, albeit based on a very limited dataset. Our analysis substantiates its importance with newer data and another method. It is also well in line with microdata research analyzing the willingness or probability of a person to become an intrapreneur (e.g. Bager and Schött, 2011; Bosma *et al.*, 2010, 2011, 2012a; Nyström, 2012; Parker, 2011). A high level of individual human capital facilitates the recognition of entrepreneurial opportunities.

Power distance is a third factor that both methods rank high. It is also significant when first included indicating a certain level of robustness, although not as robust as impartiality and human capital. The findings indicate that cultural differences may also contribute to intrapreneurship and innovation more generally.

Power distance expresses the degree to which the less powerful members of a society accept and expect an unequal distribution of power. The fundamental issue here is how a society handles inequalities among people. People in societies exhibiting a large degree of power distance accept a hierarchical order where everybody has a place and which needs no further justification. In societies with low power distance, people strive to equalize the distribution of power and demand justification for inequalities of power. This factor might capture the idea that a low power distance in the society might spur job autonomy among employees in the firms, which enhances intrapreneurship (see Elert *et al.*, 2019; Stam and Stenkula, 2017).

As a point of comparison to intrapreneurship, Nikolaev *et al.* (2018) study entrepreneurship using an EBA-like approach. They find that some aspects of economic freedom such as stable monetary policy and low corruption, and less income inequality, are associated with higher levels of entrepreneurship. They find no evidence of effects from cultural values or human capital, underscoring that several pertinent factors that affect entrepreneurship may differ from intrapreneurship.

5.3.1 Causality

To interpret the estimates causally, one must believe the relationships estimated are not due to endogeneity. Such guarantees can never be made. Yet, our approach can relieve some concerns. First, the explanatory variables predate the intrapreneurship measure used. Second, by considering a wide set of factors as well as many facets of related factors, such as a dozen measures of formal institutions, we reduce the concern that we do not include important factors in the analysis. Third, the explanatory factors examined are all taken from sources that have collected them for different reasons than to explain intra- or entrepreneurship. The factors are not constructed to explain intrapreneurship, which could introduce endogeneity. The next section offers further evidence on causality.

5.4 Instrumental variables

What have shaped institutions across the world? The growth literature has found geography and, in particular, the microbiota (germs such as bacteria, viruses, fungi, etc.) in different locations, an

with two other institutional factors selected by LASSO or EBA, property rights (0.77) and rule of law (0.85), are also high but impartiality turns out to be the strong predictor compared to these institutional measures as well.

Table 4. Instrumenting for impartiality: historical pathogens

Dependent variable: Entrepreneurial Employee Activity				
	(1)	(2)	(3)	(4)
Impartiality	2.333 (0.272)***	2.283 (0.544)***	2.197 (0.492)***	2.266 (0.517)***
Latitude		0.003 (0.010)	0.001 (0.010)	-0.001 (0.011)
Distance to the equator		0.910 (2.195)	1.641 (2.270)	2.734 (2.193)
State history (year 1500)		1.168 (1.116)	1.108 (1.003)	1.355 (1.098)
Population density (year 1500)		-0.067 (0.031)**	-0.066 (0.026)**	-0.070 (0.027)***
Years since Neolithic revolution (log)		0.053 (0.712)	0.308 (0.648)	0.216 (0.645)
UK legal origin			1.127 (0.699)	1.184 (0.691)*
French legal origin			-0.062 (0.536)	0.107 (0.508)
Malaria risk				2.018 (1.333)
Constant	-7.103 (1.236)***	-7.665 (6.615)	-9.836 (5.864)*	-10.034 (5.659)*
F-stat for exclusion of instrument	66.06	11.26	10.62	10.88
R ²	0.625	0.671	0.707	0.710
Observations	54	54	54	54

Notes: The dependent variable is Entrepreneurial Employee Activity, averaged across the 2014, 2015, 2016, and 2017 survey waves of the Global Entrepreneurship Monitor. Impartiality is instrumented with historical pathogens. Second stage estimates from the two-stage least squares model presented. Robust standard errors in parenthesis. Significance stars, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

important factor (see, e.g. Diamond, 1997). Locations more hospitable to people, with fewer pathogens, shape better institutions in the sense that the institutions promote economic development. More pathogens tend to make societies more insular and to decrease the economic and social interaction between groups, which does not promote development. The effect of geography on development works only through institutions (see Acemoglu *et al.*, 2001; Easterly and Levine, 2003; Rodrik *et al.*, 2004).

Historical pathogens are a plausible instrument for impartiality, our measure of institutional quality. Historical pathogens are strongly related to current institutional quality, as verified in the analysis below. The growth literature, referenced in the previous paragraph, finds that pathogens only affect development through institutions, supporting the exclusion restriction. Instrumental variable estimates could provide more convincing evidence of a causal effect of impartiality on intrapreneurship.¹⁸

Table 4 presents the second stage estimates of an instrumental variable (two-stage least squares) model. The first stage is strong, as indicated by the *F*-statistic of 66 for the exclusion of the instrument in the first stage.¹⁹ The point estimate on impartiality is 2.3 and strongly significant. The point estimate does not change noticeably as geographical and historical controls are added to the model in columns 2 through 4.²⁰ The first stage is not as strong, as pathogens correlate strongly with

¹⁸Two studies that relate pathogens to innovation and inequality are Bennett and Nikolaev (2021) and Nikolaev *et al.* (2017).

¹⁹The first stage estimates are presented in online Appendix 2, Table A3.

²⁰We include controls that are pre-determined as potentially endogenous controls could bias the results.

geographical variables, in particular distance to the equator, but stay above the frequent threshold for the F -statistic of 10.

To further examine the evidence against the exclusion restriction, we add historical constraints on the executive as an instrument (in addition to historical pathogens). Online Appendix 2, Table A4 presents the second stage results. The point estimate on impartiality in column 1 here is very similar to the estimate in Table 4. With two instruments, we test the overidentifying restriction. The p -value on the Hansen J -test does not present any evidence against the exclusion restriction. Neither do the models 2 through 4, providing further evidence in favor of a causal effect of impartiality on intrapreneurship.

6. Conclusion

This paper has analyzed a wide range of factors, based on earlier literature, that might influence the level of *intrapreneurship* at the country level using machine-learning technique. We find that impartial institutions and human capital are the two strongest and most robust predictors of intrapreneurship based on LASSO and EBA methods. By examining a broad set of potential determinants, we provide robustness in terms of allowing many facets of society to influence intrapreneurship. The LASSO approach considers the full set of influences and selects the most influential factors. The EBA method is a brute force method as it considers all combinations of smaller sets of influences. As both approaches yield the same strongest factors, it alleviates concerns that the results are due to one particular method. We use an instrumental variable approach to strengthen a causal interpretation of the results.

Impartiality could capture the quality of government more broadly as an important factor determining the level of intrapreneurship in a country.²¹ The importance of impartiality for entrepreneurial activity has been found in earlier empirical work by political scientists in Nistotskaya *et al.* (2015). Specifically, they argue that entrepreneurial activities often require costly asset-specific investments and complex transactions. This idea may also apply to intrapreneurship, although they do not consider it in their analysis.

Treating citizens in a non-discriminatory fashion encourages entrepreneurial activity as it facilitates the estimation of expected return on investments and reduces the uncertainty in economic activities. Impartiality may also promote a market for innovations. This market could involve services to help with commercializing innovations or other inputs in the innovative process, and a market for trading innovations at different stages of development. Thicker markets for inputs into innovation and commercialization, as well as markets for trading innovations, may in turn raise the expected value of innovations, further fueling a virtuous cycle of innovation and market thickness.

From a policy perspective, our paper stresses the importance of supporting both a high quality of the government, with an emphasis on impartiality, and a high level of human capital to promote intrapreneurship. It may indeed be one channel through which institutions affect economic growth, i.e. impartial institutions promote intrapreneurship that generates growth.

Public policy may be important to develop the market for innovations. Measures may include setting up dispute and arbitration mechanisms to settle conflicts between innovators on the one hand, and service providers and innovation buyers, on the other hand, such that they can impartially settle disputes. These mechanisms could be run by or monitored by the government. The government could also help with reducing information asymmetries, for example, by setting up hubs informing about the actors in the innovations market, facilitating reputation building (by rating or certifying actors in the market), and possibly by matching innovators with service providers. Many of these policy measures would not only be helpful for intrapreneurs but also entrepreneurs.

²¹Six different institutional measures explain over half the variation in intrapreneurship when considered individually. The six measures are highly correlated, and all indicate that good institutions promote intrapreneurship. Among these measures, impartiality stands out as the most important factor. This is not due to a lack of closely related alternatives, there are five highly correlated alternative measures, but because impartiality has the strongest relationship with intrapreneurship.

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References

- Acemoglu, D., S. Johnson and J. Robinson (2001), 'The Colonial Origins of Comparative Development: An Empirical Investigation', *American Economic Review*, **91**(5): 1369–1401.
- Antonic, B. and R. Hisrich (2003), 'Clarifying the Intrapreneurship Concept', *Journal of Small Business and Enterprise Development*, **10**(1): 7–24.
- Awaworyi Churchill, S. (2017), 'Fractionalization, Entrepreneurship, and the Institutional Environment for Entrepreneurship', *Small Business Economics*, **48**(3): 577–597.
- Bager, T. and T. Schött (2011), 'Entrepreneurial Work by Employees and Independent Entrepreneurs: Understanding Nordic, Anglo-Saxon and Continental Countries', in *Entrepreneurial Work by Employees in Enterprises – Studied via Global Entrepreneurship Monitor in Denmark*, Kolding, Denmark: University of Southern Denmark and GEM, pp. 121–129.
- Baumol, W. J. (1990), 'Entrepreneurship: Productive, Unproductive, and Destructive', *Journal of Political Economy*, **98**(5): 893–921.
- Baumol, W. J. (1993), *Entrepreneurship, Management and the Structure of Payoffs*, Cambridge, MA: MIT Press.
- Bennett, D. L. and B. Nikolaev (2021), 'Historical Disease Prevalence, Cultural Values, and Global Innovation', *Entrepreneurship Theory and Practice*, **45**(1): 145–174.
- Bitros, G. and A. D. Karayiannis (2008), 'Values and Institutions as Determinants of Entrepreneurship in Ancient Athens', *Journal of Institutional Economics*, **4**(2): 205–230.
- Bjørnskov, C. and N. J. Foss (2008), 'Economic Freedom and Entrepreneurial Activity: Some Cross-country Evidence', *Public Choice*, **134**(3–4): 307–328.
- Bjørnskov, C. and N. J. Foss (2013), 'How Strategic Entrepreneurship and the Institutional Context Drive Economic Growth', *Strategic Entrepreneurship Journal*, **7**(1): 50–69.
- Boettke, P. and C. J. Coyne (2009), 'Context Matters: Institutions and Entrepreneurship', *Foundations and Trends in Entrepreneurship*, **5**(3): 135–209.
- Bosma, N. S., E. Stam and S. Wennekers (2010), 'Intrapreneurship – An International Study', EIM research report H201005, Zoetermeer: EIM.
- Bosma, N. S., E. Stam and S. Wennekers (2011), 'Intrapreneurship versus Independent Entrepreneurship: A Cross-national Analysis of Individual Entrepreneurial Behavior', Utrecht School of Economics Tjalling C. Koopmans Research Institute Discussion Paper Series 11-04.
- Bosma, N. S., E. Stam and S. Wennekers (2012a), 'Entrepreneurial Employee Activity: A Large Scale International Study', Utrecht School of Economics Tjalling C. Koopmans Research Institute Discussion Paper Series 12-12.
- Bosma, N. S., S. Wennekers and J. E. Amorós (2012b), *Global Entrepreneurship Monitor, 2011 Extended Report: Entrepreneurial Employees Across the Globe*, Babson Park, MA: Babson College.
- Bosma, N. S., J. Content, M. Sanders and E. Stam (2018), 'Institutions, Entrepreneurship, and Economic Growth in Europe', *Small Business Economics*, **51**(2): 483–499.
- Boudreaux, C. (2014), 'Jumping Off of the Great Gatsby Curve: How Institutions Facilitate Entrepreneurship and Intergenerational Mobility', *Journal of Institutional Economics*, **10**(2), 231–255.
- Boudreaux, C.J. and B. Nikolaev (2019), 'Capital is Not Enough: Opportunity Entrepreneurship and Formal Institutions', *Small Business Economics Journal*, **53**(3): 709–738.
- Burns, P. (2017), *Corporate Entrepreneurship: Innovation and Strategy in Large Organizations*, New York: Palgrave MacMillan.
- Carrier, C. (1994), 'Intrapreneurship in Large Firms and SMEs: A Comparative Study', *International Small Business Journal*, **12**(3): 54–61.
- Chowdhury, F., D. B. Audretsch and M. Belitski (2018), 'Institutions and Entrepreneurship Quality', *Entrepreneurship Theory and Practice*, **43**(1): 51–81.
- Coad, A. and S. Srhoj (2020), 'Catching Gazelles with a Lasso: Big Data Techniques for the Prediction of High-growth Firms', *Small Business Economics*, **55**(3): 541–565.
- Colombier, N. and D. Masclat (2008), 'Intergenerational Correlation in Self-employment: Some Further Evidence from French ECHP Data', *Small Business Economics*, **30**(4): 423–437.
- Dana, L.-P. (ed.) (2010), *Entrepreneurship and Religion*, Cheltenham, UK: Edward Elgar.
- Dau, L. A. and A. Cuervo-Cazurra (2014), 'To Formalize or not to Formalize: Entrepreneurship and Pro-market Institutions', *Journal of Business Venturing*, **29**(5): 668–686.

- Delmar, F. and K. Wennberg (2010), *Knowledge Intensive Entrepreneurship: The Birth, Growth and Demise of Entrepreneurial Firms*, Cheltenham: Edward Elgar Publishing.
- Dheer, R. J. S. (2017), 'Cross-national Differences in Entrepreneurial Activity: Role of Culture and Institutional Factors', *Small Business Economics*, **48**(4): 813–842.
- Diamond, J. (1997), *Guns, Germs, and Steel: The Fates of Human Societies*, New York: Norton.
- Easterly, W. and R. Levine (2003), 'Tropics, Germs, and Crops: How Endowments Influence Economic Development', *Journal of Monetary Economics*, **50**(1): 3–39.
- Elert, N. and M. Henrekson (2017), 'Entrepreneurship and Institutions: A Bidirectional Relationship', *Foundations and Trends in Entrepreneurship*, **13**(3): 191–263.
- Elert, N. and M. Henrekson (2020), 'Collaborative Innovation Blocs and Antifragility', *Journal of Institutional Economics*, **16**(4): 537–552.
- Elert, N., M. Henrekson and M. Stenkula (2017), *Institutional Reform for Innovation and Entrepreneurship – An Agenda for Europe*, Cham: Springer International Publishing.
- Elert, N., E. Stam and M. Stenkula (2019), 'Intrapreneurship and Trust', IFN Working Paper No. 1280, Stockholm: Research Institute of Industrial Economics (IFN).
- Estrin, S., T. Mickiewicz and U. Stephan (2013), 'Entrepreneurship, Social Capital, and Institutions: Social and Commercial Entrepreneurship Across Nations', *Entrepreneurship Theory and Practice*, **37**(3): 479–504.
- Foss, N. J. and P. G. Klein (2015), 'Introduction to a Forum on the Judgment-based Approach to Entrepreneurship: Accomplishments, Challenges, New directions', *Journal of Institutional Economics*, **11**(3): 585–599.
- Fritsch, M. and M. Wyrwich (2016), 'Entrepreneurship in the East German Transition Process: Lessons for the Korean Peninsula', *Historical Social Research*, **41**(3): 256–280.
- Gohmann, S. F. (2012), 'Institutions, Latent Entrepreneurship, and Self-employment: An International Comparison', *Entrepreneurship Theory and Practice*, **36**(2): 295–321.
- Greve, A. and J. W. Salaff (2003), 'Social Networks and Entrepreneurship', *Entrepreneurship Theory and Practice*, **28**(1): 1–22.
- Harper, D. A. (2018), 'Innovation and Institutions from the Bottom Up: An Introduction', *Journal of Institutional Economics*, **14**(6): 975–1001.
- Hastie, T., R. Tibshirani and J. Friedman (2009), *The Elements of Statistical Learning* (2nd edn), New York: Springer.
- Hechavarria, D.M. and P. D. Reynolds (2009), 'Cultural Norms & Business Start-Ups: The Impact of National Values on Opportunity and Necessity Entrepreneurs', *International Entrepreneurship and Management Journal*, **5**(4): 417–437.
- Henley, A. (2017), 'Does Religion Influence Entrepreneurial Behaviour?', *International Small Business Journal*, **35**(5): 597–617.
- Henrekson, M. and T. Sanandaji (2011), 'The Interaction of Entrepreneurship and Institutions', *Journal of Institutional Economics*, **7**(1): 47–75.
- Hibbs Jr. D. and O. Olsson (2004), 'Geography, Biogeography, and Why Some Countries are Rich and Others are Poor', *Proceedings of the National Academy of Sciences*, **101**(10): 3715–3720.
- Hofstede, G. (1991), *Cultures and Organizations: Software of the Mind*, Maidenhead, UK: McGraw-Hill.
- Hofstede, G., G. J. Hofstede and M. Minkov (2010), *Cultures and Organizations: Software of the Mind*, New York: McGraw-Hill.
- Hofstede, G., N. G. Noorderhaven, A. R. Thurik, L. M. Uhlander, A. R. M. Wennekers and R. E. Wildeman (2004), 'Culture's Role in Entrepreneurship: Self-employment Out of Dissatisfaction', in T. E. Brown and J. Uljin (eds), *Innovation, Entrepreneurship and Culture: The Interaction between Technology, Progress and Economic Growth*, Cheltenham, UK: Edward Elgar, pp. 162–203.
- Kodila-Tedika, O. and J. Agbor (2016), 'Does Trust Matter for Entrepreneurship: Evidence from a Cross-Section of Countries', *Economics*, **4**(1): 1–17.
- Koellinger, P. and M. Minniti (2009), 'Unemployment Benefits Crowd Out Entrepreneurial Activity', *Economics Letters*, **103**(2): 96–98.
- Kwon, S.-W. and P. Arenius (2010), 'Nations of Entrepreneurs: A Social Capital Perspective', *Journal of Business Venturing*, **25**(3): 315–330.
- Liang, J., H. Wang and E. Lazear (2018), 'Demographics and Entrepreneurship', *Journal of Political Economy*, **126**(S1): 140–196.
- Liebrechts, W. and E. Stam (2019), 'Employment Protection Legislation and Entrepreneurial Activity', *International Small Business Journal*, **37**(6): 581–603.
- Lindquist, M., J. Sol and M. Van Praag (2015), 'Why Do Entrepreneurial Parents Have Entrepreneurial Children?', *Journal of Labor Economics*, **33**(2): 269–296.
- Marvel, M., J. David and C. Sproul (2016), 'Human Capital and Entrepreneurship Research: A Critical Review and Future Directions', *Entrepreneurship Theory and Practice*, **40**(3): 599–626.
- McMullen, J. S., D. R. Bagby and L. E. Palich (2008), 'Economic Freedom and the Motivation to Engage in Entrepreneurial Action', *Entrepreneurship Theory and Practice*, **32**(5): 875–895.
- Mickiewicz, T. and A. Rebmann (2020), 'Entrepreneurship as Trust', *Foundations and Trends in Entrepreneurship*, **16**(3): 244–309.

- Miles, M. P. and J. G. Covin (2002), 'Exploring the Practice of Corporate Venturing: Some Common Forms and Their Organizational Implications', *Entrepreneurship Theory and Practice*, **26**(3): 21–40.
- Morris, M., D. Kuratko and J. Covin (2018), *Corporate Entrepreneurship & Innovation*, Mason, OH: South Western Educational Publishing.
- Mueller, S. L. and A. S. Thomas (2000), 'Culture and Entrepreneurial Potential: A Nine Country Study of Locus of Control and Innovativeness', *Journal of Business Venturing*, **16**(1): 51–75.
- Mulligan, C. (1997), *Parental Priorities and Economic Inequality*, Chicago and London: University of Chicago Press.
- Murtazashvili, I. (2017), 'Institutions and the Shale Boom', *Journal of Institutional Economics*, **13**(1): 189–210.
- Nikolaev, B. N., C. J. Boudreaux and L. Palich (2018), 'Cross-country Determinants of Early-stage Necessity and Opportunity-motivated Entrepreneurship: Accounting for Model Uncertainty', *Journal of Small Business Management*, **56**(Supp. 1): 243–280.
- Nikolaev, B., C. Boudreaux and R. Salahodjaev (2017), 'Are Individualistic Societies Less Equal? Evidence from the Parasite Stress Theory of Values', *Journal of Economic Behavior & Organization*, **138**(2017): 30–49.
- Nistotzskaya, M., N. Charron and V. Lapuente (2015), 'The Wealth of Regions: Quality of Government and SMEs in 172 European Regions', *Environment and Planning C: Politics and Space*, **33**(5): 1125–1155.
- North, D. C. (1990), *Institutions, Institutional Change and Economic Performance*, New York, NY: Cambridge University Press.
- Nyström, K. (2008), 'The Institutions of Economic Freedom and Entrepreneurship: Evidence from Panel Data', *Public Choice*, **136**(3–4): 269–282.
- Nyström, K. (2012), 'Entrepreneurial Employees: Are They Different from Independent Entrepreneurs?', Swedish Entrepreneurship Forum Working paper 2012:10.
- Obschonka, M. and D. B. Audretsch (2020), 'Artificial Intelligence and Big Data in Entrepreneurship: A New Era has Begun', *Small Business Economics*, **55**(3): 529–539.
- Obschonka, M., N. Lee, A. Rodríguez-Pose, J. C. Eichstaedt and T. Ebert (2020), 'Big Data Methods, Social Media, and the Psychology of Entrepreneurial Regions: Capturing Cross-county Personality Traits and Their Impact on Entrepreneurship in the USA', *Small Business Economics*, **55**(3): 567–588.
- Olsson, O. and D. Hibbs (2005), 'Biogeography and Long-run Economic Development', *European Economic Review*, **49**(4): 909–938.
- Olthaar, M., W. Dolfsma, C. Lutz and F. Noseleig (2017), 'Markets and Institutional Swamps: Tensions Confronting Entrepreneurs in Developing Countries', *Journal of Institutional Economics*, **13**(2): 243–269.
- Parker, S. (2011), 'Intrapreneurship or Entrepreneurship?', *Journal of Business Venturing*, **26**(1): 19–34.
- Prüfer, J. and P. Prüfer (2020), 'Data Science for Entrepreneurship Research: Studying Demand Dynamics for Entrepreneurial Skills in the Netherlands', *Small Business Economics*, **55**(3): 651–672.
- Rodrik, D., Subramanian, A. and F. Trebbi (2004), 'Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development', *Journal of Economic Growth*, **9**(2): 131–165.
- Santarelli, E. and M. Vivarelli (2007), 'Entrepreneurship and the Process of Firms' Entry, Survival and Growth', *Industrial and Corporate Change*, **16**(3): 455–488.
- Shane, S. (2009), 'Why Encouraging More People to Become Entrepreneurs is Bad Public Policy', *Small Business Economics*, **33**(2): 141–149.
- Sharma, P. and J. J. Chrisman (1999), 'Toward a Reconciliation of the Definitional Issues in the Field of Corporate Entrepreneurship', *Entrepreneurship: Theory & Practice*, **23**(3): 11–27.
- Smallbone, D., J. Kitching and R. Athayde (2010), 'Ethnic Diversity, Entrepreneurship and Competitiveness in a Global City', *International Small Business Journal*, **28**(2): 174–190.
- Sobel, R. S., N. Dutta and S. Roy (2010), 'Does Cultural Diversity Increase the Rate of Entrepreneurship?', *The Review of Austrian Economic*, **23**(3): 269–286.
- Spolaore, E. and R. Wacziarg (2013), 'How Deep Are the Roots of Economic Development?', *Journal of Economic Literature*, **51**(2): 325–369.
- Stam, E. (2013), 'Knowledge and Entrepreneurial Employees: A Country Level Analysis', *Small Business Economics*, **41**(4): 887–898.
- Stam, E. and M. Stenkula (2017), 'Intrapreneurship in Sweden: An International Perspective', FIRES working paper 17-02.
- Stam, E. and A. van Stel (2011), 'Types of Entrepreneurship and Economic Growth', in A. Szirmai, W. Naudé and M. Goedhuys (eds), *Entrepreneurship, Innovation, and Economic Development*, Oxford, UK: Oxford University Press, pp. 78–95.
- Taylor, M. Z. and S. Wilson (2012), 'Does Culture Still Matter? The Effects of Individualism on National Innovation Rates', *Journal of Business Venturing*, **27**(2): 234–247.
- Thai, M. T. T. and E. Turkina (2014), 'Macro-level Determinants of Formal Entrepreneurship versus Informal Entrepreneurship', *Journal of Business Venturing*, **29**(4): 490–510.
- Unger, J., A. Rauch, M. Frese and N. Rosenbusch (2011), 'Human Capital and Entrepreneurial Success: A Meta-Analytical Review', *Journal of Business Venturing*, **26**(3): 341–358.

- Urbano, D., S. Aparicio and D. Audretsch (2019), 'Twenty-five Years of Research on Institutions, Entrepreneurship, and Economic Growth: What Has Been Learned?', *Small Business Economics*, **53**(1): 21–49.
- van Stel, A., M. Carree and R. Thurik (2005), 'The Effect of Entrepreneurial Activity on National Economic Growth', *Small Business Economics*, **24**(3): 311–321.
- van Stel, A., D. Storey and R. Thurik (2007), 'The Effect of Business Regulations on Nascent and Young Business Entrepreneurship', *Small Business Economics*, **28**(2–3): 171–186.
- Wyrwich, M. (2012), 'Regional Entrepreneurial Heritage in a Socialist and a Post-Socialist Economy', *Economic Geography*, **88**(4): 423–445.
- Zahra, S. A. (1991), 'Predictors and Financial Outcomes of Corporate Entrepreneurship: An Exploratory Study', *Journal of Business Venturing*, **6**(4): 259–285.