The Impact of Human Capital on Entrepreneurship Quality and Quantity at the Aggregate Level

Bao Hoang
Southern Arkansas University

Bruce Walters
Louisiana Tech University

John Kirk Ring
Louisiana Tech University

Based on human capital theory and entrepreneurship literature, we propose that a country's capital profiles including education level, industry experience, entrepreneurial experience, and immigration experience are positively related to its entrepreneurship quality. On the contrary, we hypothesize that these four dimensions are negatively associated with the quantity of entrepreneurship. These hypotheses are empirically examined on a sample of 86 countries obtained from Global Entrepreneurship Monitor (GEM) and 1,858,444 participants in a 10-year period, from 2007 to 2016. We utilize the Generalized Estimating Equations (GEEs) for the main hypothesis testing and the Random Effects Model for robustness analysis. The findings support most of the hypotheses. We then discuss theoretical implications drawn from the study and provide suggestions for policy makers. Our paper emphasizes that the investment in human capital may not simultaneously result in both high entrepreneurship quality and high entrepreneurship quantity at the aggregate level.

Keywords: human capital, entrepreneurship quality, entrepreneurship quantity, education level, immigration experience

INTRODUCTION

Entrepreneurship is considered the source of job creation and an engine to boost economic growth across countries (Bradley and Klein 2016; Hitt et al. 2011; Mair, Marti, and Ventresca 2012). Boosting entrepreneurship is, therefore, an urgent and crucial mission of any government in order to improve social welfare and advance economic development. Researchers and policy-maker communities have especially paid attention to the role of the population's human capital in promoting entrepreneurship entry and new venture growth (Amaral, Baptista, and Lima 2011; Baptista, Karaoz, and Mendonca 2014; Estrin, Mickiewicz, and Stephan 2016). Human capital policies toward entrepreneurship are often based on scholarship that considers how individuals' human capital profiles such as education level, work experience, business ownership experience, and managerial experience affect their likelihood of being

involved in entrepreneurial endeavors and their outcomes (Martin, McNally, and Kay 2013; Marvel, Davis, and Sproul 2016; Wright et al. 2007). Studies in this area contend that human capital is positively associated with entrepreneurship, including entrepreneurship entry and entrepreneurial success (Dimov and Shepherd 2005; Easley 2016; Hatak and Zhou 2021; Marvel and Lumpkin 2007; Unger et al. 2011). In other words, human capital is positively related to entrepreneurial success or entrepreneurship quality (Giotopoulos, Kontolaimou, and Tsakaikas 2017; Hessels, Gelderen, and Thurik 2008).

Although human capital is one of the most crucial factors underpinning the entrepreneurship of a country (Baptista, Karaoz, and Mendonca 2014; Estrin, Mickiewicz, and Stephan 2016), the effects of human capital on entrepreneurship at the aggregate level are much more nuanced and subtler than popular belief. Nevertheless, numerous countries have hastily invested significant resources in entrepreneurial programs in order to enrich their population' human capital. The assumption is that these investments encourage more entrepreneurship as individuals' human capital leads them to become effective entrepreneurs which influences economic growth. Yet many countries experience negative effects of entrepreneurship on economic growth (Stel, Carree, and Thurik 2005; Williams and Huggins 2013; Zaki and Rashid 2016), and their economic development is stagnant.

This reality implies that human capital policy may not effectively generate expected outcomes, reflecting shortcomings in theory that is guiding public policies related to human capital in various countries around the world. First, extant entrepreneurship scholarship mostly concerns the role of human capital in boosting entrepreneurship entry and entrepreneurial success at the individual level. Second, when studying entrepreneurship at the national level, researchers pay less attention to entrepreneurship's multifaceted nature, and are less likely to separate entrepreneurship entry from entrepreneurial outcomes (Dimov and Shepherd 2005; Easley 2016; Hatak and Zhou 2021; Marvel and Lumpkin 2007; Unger et al. 2011). Entrepreneurship entry reflects startup rates or the numbers of new ventures established in a country in a specific time period, referred to as entrepreneurship quantity (Chowdhury, Audretsch, and Belitski 2019). Entrepreneurial outcomes include new ventures' innovation and growth, referred to as entrepreneurship quality (Chowdhury, Audretsch, and Belitski 2019; Giotopoulos, Kontolaimou, and Tsakaikas 2017; Hessels, Gelderen, and Thurik 2008). To alleviate these shortcomings, our study seeks answers to two research questions. First, do a country's human capital profiles affect its entrepreneurship quality and quantity? Second, are the effects of a country's human capital profiles on entrepreneurship quantity different from those on entrepreneurship quality?

To answer these questions, we rely on the theory of human capital and entrepreneurship literature. Human capital theory suggests that people's knowledge and skills affect their productivity via education and training (Becker 1975; Becker 1993). Incorporating this theory into entrepreneurship research, scholars argue that entrepreneurs' capital profiles are related to entrepreneurship entry and its outcomes (Eesley 2016; Lima 2011; Unger et al. 2011). Our sample data include 86 countries and 1,858,444 participants in a 10-year period, from 2007 to 2016. We use Generalized Estimated Equations to test the hypotheses and use random effects models for robustness checks.

Our study's contributions to the literature are threefold. First, the study extends the theory of human capital into entrepreneurship research (Amaral, Baptista, and Lima 2011; Baptista, Karaoz, and Mendonca 2014; Dimov and Shepherd 2005; Estrin, Mickiewicz and Stephan 2016; Hatak and Zhou 2021). We contend that individuals' human capital profiles crucially affect entrepreneurship entry and entrepreneurial success even at the national level. Second, our study informs the literature on the role of human capital in entrepreneurship at the aggregate level by pointing out that the effects of human capital on entrepreneurship quantity and quality may not be similar to those at the individual level. Third, our study draws vital implications for research and policy-making communities. We suggest that researchers devote more effort in investigating how the population's capital profiles in a country impacts its entrepreneurship quantity and quality. Additionally, governments should be more vigilant about the efficacy of their entrepreneurship policy related to human capital. Policy makers should be aware that the impacts of a population's human capital on entrepreneurship quantity and quality may be mixed.

CONCEPTUAL BACKGROUND

Entrepreneurship Quantity and Quality

In recent years, researchers have devoted attention to the role of entrepreneurship in promoting economic growth (Bosma et al. 2018; Urbano, Aparicio, and Audretsch 2019). Countries' policy makers have been optimistic that the investment in entrepreneurship would lead to economic growth. However, very few country-level studies have conveyed to the practitioner community that entrepreneurship is a multifaced construct. Indeed, entrepreneurship is often equated to the number of entrepreneurship entries or startup rates (Acs, Desai, and Hessels 2008; Anokhin and Schulze 2009). This quantitative aspect describes entrepreneurship as the number of new ventures or startups established in a period such as one year (i.e., entrepreneurship quantity, Chowdhury et al., 2020). The qualitative aspect, however, usually describes the outcomes of entrepreneurship, or entrepreneurship quality (Chowdhury, Audretsch, and Belitski 2019; Hessels, Gelderen, and Thurik 2008). Measuring entrepreneurship quantity is not a challenging task, but capturing the quality of entrepreneurship appears to be quite complicated. In order to measure this qualitative aspect of entrepreneurship, researchers tend to quantify it by using indicators such as new job creation (Praag and Versloot 2007), national innovations (Anokhin and Schulze 2009), or productivity (Sobel 2008). Our study follows Giotopoulos and colleagues (2017) by measuring entrepreneurship quality based on three dimensions: innovation, growth aspiration, and internationalization.

Human Capital and Entrepreneurship

Human capital is defined as individuals' stock of knowledge and skills (Becker 1964; Wright et al. 2007). The argument is that individuals' productivities and job performance can be attributed to their education, knowledge, and skills (Becker 1975; Becker 1993). Incorporating this theory into entrepreneurship research, researchers content that entrepreneurship entry and entrepreneurial outcomes can be affected by entrepreneurs' human capital profiles (Martin, McNally, and Kay 2013; Marvel, Davis, and Sproul 2016; Wright et al. 2007). According to this research, entrepreneurs' human capital profiles include education, employment experience, business ownership, and entrepreneurial experience (Dimov and Shepherd 2005; Easley 2016; Hatak and Zhou 2021). Indeed, people with high education levels and extensive work experience are likely to develop cognitive structures conducive to the process of recognizing and evaluating entrepreneurial opportunities (Eckhardt and Shane 2003; Shane and Venkataraman 2000). Past experience helps entrepreneurs assemble the acquired concepts and seemingly unrelated information to produce new business ideas (Baron 2006; Baron and Ensley 2006). Entrepreneurs with managerial experience or business ownership are usually rich in social and financial capital that they can utilize in the process of pursuing their entrepreneurial endeavors (Amaral, Baptista, and Lima 2011).

Education Level and Entrepreneurship Quality and Quantity

By investing in education, people increase their stock of general knowledge and skills (Dimov and Shepherd 2005; Easley 2016; Hatak and Zhou 2021), which can be transferred across economic settings (Becker 1993). Research suggests that educational institutions are significant sources of knowledge people can convert into entrepreneurship and innovation (Wright et al. 2007). Education in areas such as science, management, and economics has been positively linked to graduates' entrepreneurial success (Colombo and Piva 2020). The stock of knowledge and skills obtained from education are instrumental for entrepreneurial opportunity recognition and exploitation (Eckhardt and Shane 2003; Shane and Venkataraman 2000). The cognitive frames of educated people tend to be flexible and receptive to clues related to gaps in industry structure and customers' unmet needs (Shane and Venkataraman 2000; Venkataraman 1997). Such individuals are capable of gathering fragmented knowledge and processing unrelated information in order to evaluate the potential of new business opportunities (Baron 2006; Baron and Ensley 2006; Urbano, Aparicio, and Audretsch 2019). As a result, people with higher education are more likely to identify promising entrepreneurial opportunities and deliver novel innovations.

Studies have pointed out that education level positively affects entrepreneurs' growth aspiration and innovation (Estrin, Mickiewicz, and Stephan 2016; Marvel, Davis, and Sproul 2016; Marvel and Lumpkin

2007), determining entrepreneurship quality (Giotopoulos, Kontolaimou, and Tsakaikas 2017). People with high levels of education have likely accumulated a wide social network from which they can extract resources (Hoang and Antoncic 2003). These resources in turn can be utilized not only in order to serve the exploitation of new business opportunities but also to facilitate the growth of the new ventures. Research has also identified situations in which entrepreneurs are prone to non-innovative and low-growth ventures because they are short in resources. These individuals are called necessity-driven entrepreneurs (Acs, Desai, and Hessels 2008; Baptista, Karaoz, and Mendonca 2014). In short, individuals' education level is an informative indicator of their stock of knowledge, skills, and other resources that are positively related to the entrepreneurial success, suggesting the following hypothesis:

Hypothesis 1: The population's education level is positively related to the entrepreneurship quality of a country.

However, we believe that the relationship between human capital and entrepreneurship at the aggregate level is more nuanced and complicated. The macro environment includes different types of value-added business and economic activities. To earn a living and advance their professional careers, individuals do not necessarily become entrepreneurs. The more education people have, the more opportunities are open to them (Hendel, Shapiro, and Willen, 2005). They are often targeted for recruitment by established firms (Hendel, Shapiro, and Willen, 2005) with abundant resources. These firms are well aware that educated individuals' knowledge and skills are vital for their organizational success. Many educated people have chosen to work for such organizations instead of taking the risks inherent in becoming entrepreneurs, despite the fact that at least some of these individuals could be ideal entrepreneurs. The decision to become entrepreneurs is affected by various factors. People often calculate the cost and benefit before actually entering entrepreneurship (Douglas and Shepherd 2002; Easley 2016). People with high levels of education normally are provided with lofty and stable salaries; as a result, the chance of their becoming entrepreneurs is smaller as compared to lower-skilled individuals, so the relationship between education levels and new venture establishment is inverse (Ucbasaran, Westhead, and Wright 2008). Thus, we propose that the higher a country's education level, the less likely its people become entrepreneurs.

Hypothesis 2: The population's education level is negatively related to the entrepreneurship quantity of a country.

Employment Experience and Entrepreneurship Quality and Quantity
The theory of human capital also indicates that work experience, as general human capital, is likely to affect people's productivity and job performance (Becker 1993; Urbano, Aparicio, and Audretsch 2019). During the time employees spend working in industry, they have the opportunity to accumulate knowledge and skills related to their role, industry, and the market in general. This stock of knowledge and expertise helps people develop adaptive capabilities (Davidsson and Honig 2003). In other words, they can transfer this stock of knowledge and skills to other professions if they would like to change their career trajectory (Baptista, Karaoz, and Mendonca 2014; Ucbasaran, Westhead, and Wright 2008). This stock of knowledge contains information about their former firms' industries, products and services, and market niches, and plays a vital role in the process of recognizing entrepreneurial opportunities (Baron 2006; Dimov and Shepherd 2005; Shane and Venkataraman 2000; Venkataraman 1997). People rich in work experience may be more likely to identify entrepreneurial opportunities (Baron and Ensley 2006).

Human capital is represented in part by the stock of knowledge and skills people have accumulated through their employment experience (Becker 1993; Urbano, Aparicio, and Audretsch 2019). Knowledge and skills are used to evaluate the potential of a new business idea that could satisfy customers' wants and needs (Shane 2000; Ucbasaran, Westhead, and Wright 2008). In other words, the knowledge from previous industries, products, services, and markets becomes vital inputs for their product or service innovations (Wright et al. 2007). Such innovations, whether incremental or radical (Wright et al. 2007), may be more likely to be accepted by customers, thereby increasing the odds for successful new ventures. Furthermore,

the skills developed in previous managerial positions are helpful for assembling founding teams and orchestrating resources to exploit business opportunities and grow their new ventures (Ucbasaran, Westhead, and Wright 2008; Unger et al. 2011). The aforementioned arguments suggest that employment experience positively affects new ventures' outcomes, including innovation and growth.

Hypothesis 3: The population's employment experience is positively associated with the entrepreneurship quality of a country.

Given that people with more industry experience have higher stocks of knowledge and skills that could help them detect business opportunities (Baron 2006; Dimov and Shepherd 2006) as well as have sufficient resources to exploit these opportunities, they may be ideally qualified to enter entrepreneurship. But they are also desirable to current and prospective employers. Moreover, mature firms have become increasingly aware of the need to renew themselves by promoting inside innovation or corporate entrepreneurship. These firms allow employees to be "intrapreneurs" in order to generate value-added innovations inside their organizations. In other words, entrepreneurs can be innovators even inside their current organizations. As a result, using employment experience to predict the possibility of entrepreneurship entry can be misleading (Lima 2011). Moreover, people usually calculate risks and benefits of their entrepreneurial endeavors (Douglas and Shepherd 2002; Easley 2016), and research suggests that the initial earnings and earnings growth of entrepreneurs are less than those of paid employees (Hamilton 2000). Based on these arguments, we postulate that if a country has more established firms, it would have fewer entrepreneurs.

Hypothesis 4: The population's employment experience is negatively associated with the entrepreneurship quantity of a country.

Business Ownership and Entrepreneurship Quality and Quantity

If education and industry experience represent general human capital, business ownership experience is considered specific human capital. Owning a business tremendously enriches people's knowledge and skills (Becker 1993; Dimov and Shepherd 2005). Experience with business ownership exposes entrepreneurs to different sources of information (Ucbasaran, Westhead, and Wright 2008). This can be related to industry, market, customers and so on. Entrepreneurs can make use of this information to identify and evaluate new business opportunities (Baron 2006; Shane and Venkataraman 2000; Shane 2000; Venkataraman 1997). Business ownership sharpens individuals' well-rounded leadership skills. These skills are important for entrepreneurs as they often serve in a wide variety of capacities simultaneously. In addition, business ownership experience exposes people to successes and failures so they can learn from mistakes and make better subsequent decisions, enhancing the likelihood of future business successes.

Former business ownership not only enhances stocks of knowledge and skills, but also helps entrepreneurs build broad connections with suppliers, potential customers, and investors that become crucial sources of resources in establishing and growing new ventures (Lima 2011; Westhead, Ucbasaran, and Wright 2009). Innovative and high-growth ventures are especially likely to consume tremendous resources. People cannot be committed to high-quality entrepreneurship if they do not have necessary resources (Hoang and Antoncic 2003). Business ownership aids in the accumulation of resources that lead to innovative and high-growth subsequent ventures. Based on these arguments, we suggest the following:

Hypothesis 5: The population's business ownership experience is positively related to the entrepreneurship quality of a country.

However, experience with business ownership may expose entrepreneurs to the notion that entrepreneurship is only one alternative path for them to earn an income. Entrepreneurship requires individuals to take more responsibility, bear a higher degree of uncertainty, and take more risks (Ucbasaran, Westhead, and Wright 2008; Westhead, Ucbasaran, and Wright 2009). Individuals have to wear various hats if they decide to become entrepreneurs, and the challenges of entrepreneurship are difficult to fathom

until people are actually engaged in it. In addition, a large percentage of startups cannot survive the first several years (Lai and Lin 2015). As a result, reentering entrepreneurship may be a difficult option for these individuals. Entrepreneurs often consider going back to established companies if their endeavors have failed (Shah, Agarwall, and Echambadi 2019). Based on these conceptual arguments, we suppose that a country with higher business ownership experience is likely to have lower entrepreneurship quantity.

Hypothesis 6: *The population's business ownership experience is negatively related to the entrepreneurship quantity of a country.*

Immigration Experience and Entrepreneurship Quality and Quantity

In addition to education, employment experience, and business ownership experience, immigration experience is considered a vital component of human capital (Hatak and Zhou 2021; Schultz 1961). Experience with different cultures increases not only individuals' stock of knowledge and skills but also their quality. Research indicates that immigrants are likely to invest in their human capital in order to advance their career in host countries because they face less opportunity costs to do so (Duleep and Regets 1999). In recent years, immigrants tend to be more highly skilled and educated, and they desire knowledge-based jobs in the host countries. This is in contrast with the previous trend of immigrants seeking jobs abroad primarily for survival means. Research suggests immigrants have generated positive externalities for the host countries' economic development (Ehrlich and Kim 2015), including entrepreneurship and innovations (Hsu, Roberts, and Eesley 2006; Vissak and Zhang 2014).

In addition to the quantity of immigrants' stock of knowledge and skills, research has addressed the qualitative aspect of their knowledge and cognition. Immigrants usually experience cognitive dissonance when they move outside their home countries (Hinojosa et al. 2017), requiring efforts to adapt to the new culture (Bajaba et al. 2022). This process results in biculturalism (Pirhadi and Feyzbakhash 2021). According to extant research, bicultural people tend to develop metacognitive intelligence (Pirhadi and Feyzbakhash 2021). In other words, they are more creative and innovative than native-born people. These cognitive properties are conducive to innovation and entrepreneurship. In addition, the immigrants are likely to identify business opportunities because they can combine their previous knowledge of customers and markets with their current knowledge of these in the host countries (Ehrlich and Kim 2015; Vissak and Zhang 2014). As a result, countries with high immigrations rates are likely to have high-quality entrepreneurship.

Hypothesis 7: *The population's immigration experience is positively related to the entrepreneurship quality of a country.*

Studies regarding the likelihood of immigrants to become entrepreneurs (e.g., Bajaba et al. 2022; Hsu et al. 2006) have investigated this phenomenon at the individual level. Yet the influence of a country's immigrants on entrepreneurship quantity at the aggregate level is still nuanced. Researchers contend that people with immigration experience are rich in human capital, having high education and strong skill sets (Duleep and Regets 1999). Their metacognitive intelligence resulting from biculturalism is conducive to creativity and innovation (Dheer 2018; Hinojosa et al. 2006; Pirhadi and Feyzbakhash 2021). They are likely to be recruited by established firms that are desperate for strategy renewal and innovation. These established organizations can provide stable jobs and high salaries, so these people have less need to form small businesses and remain connected to their ethnic enclaves as previous generations of immigrants (Dheer 2018; Hunt 2010). Immigration policy appears to increase a country's quality of entrepreneurship not the quantity of entrepreneurial ventures. Numerous countries attract few immigrants and yet have very high startup rates. In contrast, some developed countries with a high percentage of immigrants have quite low startup rates (Acs, Desai, and Hessels 2008). Based on these conceptual arguments, we propose that a country's immigration experience is likely to have a low level of entrepreneurial activities.

Hypothesis 8: *The population's immigration experience is negatively associated with the entrepreneurship quantity of a country.*

METHODOLOGY

Sample and Data

We obtained the sample of countries from the Global Entrepreneurship Monitor (GEM) Adult Population Survey's databases (Acs, Desai, and Hessels 2008; Anokhin and Schulze 2009; Estrin, Korosteleva, and Mickiewicz 2013). This survey is considered the most comprehensive work related to entrepreneurial activities in the global scale. We intentionally chose the most current sample from the GEM databases. Data for some variables used in the study have been reported up to 2017. In addition, we lagged the dependent variables 1 year in order to mitigate the reverse causality common with panel data (Certo and Semadeni 2006). Considering these factors, we chose the sample spanning over the 10-year period from 2007 to 2016. The final sample includes 86 countries with 1,858,444 participants over 10 years. Country descriptive statistics are shown in Table 1 and Table 2.

TABLE 1
DESCRIPTIVE STATISTICS BY COUNTRY (MEAN VALUES)

Country	N	Entrepreneurship Quality	Startup Rates	Educational Level	Employment Experience	Business Ownership Experience	Immigration Experience
Algeria	12911	51.52	9.90	31.80	2	4.13	.70
Angola	10323	56.41	26.15	6.38	3	7.37	.36
Argentina	20529	54.40	15.88	76.21	2	10.70	4.43
Australia	9493	73.57	11.76	118.6	9	13.53	27.21
Austria	15650	71.61	7.59	80.14	1	8.07	15.42
Barbados	8972	46.87	14.72	65.43	5	3.84	11.81
Belgium	8972	72.95	4.51	79.43	1.12	3.82	9/47
Bolivia	8113	48.97	31.94	81.00	7.96	14.96	1.22
Bosnia and Herz	14038	58.88	7.83	83.00	19.25	5.91	1.08
Botswana	8553	64.52	28.96	29.26	38.62	4.33	6.30
Brazil	43997	19.78	16.30	39.48	.18	14.78	.32
Burkina Faso	7500	35.04	28.33	5.23	4.50	.29	3.89
Cameroon	7048	89.10	30.10	15.24	3.50	13.18	1.56
Canada	10467	82.06	14.17	65.54	10.13	8.36	21.17
Chile	52554	87.05	20.56	72.29	1.32	7.63	2.30
China	31941	47.17	15.46	32.27	.17	10.85	.06
Colombia	46877	93.40	22.43	40.40	.17	8.97	.27
Costa Rica	6101	45.22	13.27	47.96	.19	3.56	14.58
Croatia	19610	89.59	7.39	75.20	5.62	3.80	13.33
Denmark	14227	99.31	4.61	77.00	14.55	4.72	8.73
Dominican Republic	6105	64.84	18.21	48.63	8.54	9.05	4.07
Ecuador	16241	50.09	26.85	40.76	5.22	16.11	2.03
Egypt	12913	60.66	9.93	79.20	.31	5.13	.43
El Salvador	5692	37.66	16.33	40.93	12.84	11.21	.67
Estonia	10113	86.73	13.22	72.63	61.29	6.70	15.98
Finland	20095	53.75	6.17	91.86	13.70	8.28	4.56
France	17981	79.41	5.01	82.22	8.90	3.01	11.36
Germany	42988	64.60	4.72	83.44	7.92	5.28	14.14
Ghana	2000	30.23	32.10	11.52	.12	33.06	1.39
Greece	6757	50.52	7.01	91.10	2.37	13.66	11.18
Guatemala	19962	43.67	17.89	19.37	5.43	6.15	.45

Hong Kong	5870	91.34	7.68	78.45	20.75	4.87	39.50
Hungary	20004	70.38	8.01	76.70	.46	5.97	4.18
Iceland	7693	82.10	11.14	74.52	25.52	8.06	9.20
India	16867	44.80	9.65	76.17	.43	7.75	.45
Indonesia	19104	22.06	17.87	32.66	2.20	16.39	.13
Iran	28796	36.49	12.55	54.42	.45	10.37	3.65
Ireland	17940	92.71	7.99	75.84	1.03	7.81	15.44
Israel	16701	82.14	7.82	64.59	6.87	3.95	26.82
Italy	19154	55.22	4.13	77.88	.67	4.73	8.72
Jamaica	15661	37.98	15.06	25.93	9.60	9.48	.87
Japan	15386	58.61	4.14	80.38	2.04	7.38	1.62
Kazakhstan	8290	57.39	11.06	77.00	.44	4.50	20.19
Latvia	18012	95.20	10.89	71.79	38.95	7.17	15.28
Lebanon	7200	82.94	22.09	69.33	.15	18.02	24.02
Lithuania	8006	86.94	10.43	76.94	7.69	2.33	5.15
Luxembourg	8119	95.34	8.80	79.75	4.64	3.14	38.04
Malaysia	16073	27.73	5.18	39.65	3.14	6.04	8.26
Mexico	20189	40.74	14.30	65.29	.11	4.08	.79
Morocco	5566	47.30	8.58	53.23	.39	9.30	.23
Netherlands	28666	61.01	8.03	71.58	.86	8.71	11.04
Nigeria	7335	52.97	36.63	10.17	.11	14.26	.58
North Macedonia	11997	67.31	8.10	77.67	38.92	7.62	6.28
Norway	18073	53.42	6.93	74.89	3.82	6.43	10.17
Pakistan	60009	54.21	9.91	74.00	.33	4.19	2.32
Panama	140243	46.82	14.79	44.71	.74	3.95	4.33
Peru	20573	57.63	24.26	71.13	.70	7.64	8.32
Philippines	6000	41.14	18.02	34.88	.26	6.67	.22
Poland	11627	74.36	9.46	70.48	.22	6.26	1.65
Portugal	16055	66.83	8.03	64.62	.46	6.73	7.46
Puerto Rico	10114	57.67	8.04	90.77	22.63	1.74	8.15
Romania	18340	92.25	7.64	69.43	.36	4.33	.78
Russia	24100	42.59	4.40	76.51	.30	2.82	7.95
Saudi Arabia	8030	68.83	8.50	82.33	.53	3.41	29.53
Serbia	6797	58.34	7.02	48.84	10.98	8.22	9.20
Singapore	8005	95.27	9.95	83.94	8.88	3.38	42.62
Slovakia	12010	69.15	10.63	52.99	14.91	6.83	2.89
Slovenia	23736	88.77	5.70	84.43	3.11	5.30	11.43
South Africa	28244	87.95	8.07	63.54	.64	2.43	4.21

South Korea	16002	58.12	7.60	98.20	3.67	9.86	1.85
Spain	249333	49.58	5.72	78.96	7.32	7.65	12.09
Sweden	21544	65.80	6.37	67.67	7.56	5.69	14.98
Switzerland	19035	80.81	6.93	77.56	3.04	9.30	26.67
Taiwan	14029	77.21	8.00	65.67	1.04	8.82	8.65
Thailand	16173	33.86	19.61	50.21	.87	27.76	4.88
Trinidad and Tobago	10192	40.45	17.35	67.00	60.00	8.50	3.61
Tunisia	8001	56.15	7.62	35.37	.57	7.15	.42
Turkey	47359	84.23	10.04	89.12	.36	7.53	2.17
Uganda	11828	20.69	32.29	4.21	2.37	30.59	1.74
United Arab Emirates	10049	98.12	8.39	70.50	1.21	3.42	80.52
United Kingdom	106185	77.95	7.34	57.90	2.93	6.13	11.66
United States	39952	77.63	11.22	89.11	1.41	7.54	14.00
Uruguay	19689	64.54	13.79	55.77	23.93	5.98	2.29
Venezuela	5487	67.07	18.08	79.52	.20	4.49	4.20
Vietnam	6000	30.50	14.77	28.33	.74	19.35	.07
Zambia	6278	26.49	38.00	4.13	.15	9.98	1.08

TABLE 2
DESRCIPTIVE STATISTICS AND CORRELATION MATRIX

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Entrepreneurship Quality	64.11	23.31													
2. Startup Rates	11.83	7.60	-.23												
3. Population (log)	16.81	1.59	-.30	.06											
4. Foreign Investment	5.02	8.99	.17	-.08	-.22										
5. Per Capita GDP (log)	3.87	.35	-.15	.62	-.17	-.06									
6. Policy Supportiveness	2.56	.47	.18	-.14	.08	.12	-.23								
7. Social Supportiveness	4.72	.76	.02	.19	.14	.11	.00	.30							
8. Entrepreneurial-Self Efficacy	50.3	15.24	-.21	.71	-.14	-.08	.66	-.25	.03						
9. Opportunity Recognition	41	16.40	-.12	.61	-.04	.01	.56	.03	.30	.59					
10. Fear of Failure	34.52	9.14	.09	-.40	.20	-.06	-.51	.10	.01	-.53	-.36				
11. Education Level	65.67	24.04	.27	-.45	-.17	.03	-.32	.00	-.05	-.39	-.40	.20			
12. Employment Experience	7.95	23.93	.10	.00	-.44	.02	.05	.00	.14	.03	.07	-.05	.09		
13. Business Ownership Experience	3.84	3.73	.38	-.37	-.37	.28	-.17	.10	.12	-.22	.04	-.02	.14	.34	
14. Immigration Experience	8.65	10.31	.40	-.27	-.28	.23	-.16	.22	.22	-.20	-.07	.21	.26	.03	.34

N = 551. Correlations greater than .12 significant at .01 level, r's greater than .10 significant at .05 level.

Panel data have been increasingly used by management scholars in recent years (Bliese et al. 2020; Zyphur et al. 2020). Panel data have some advantages compared to cross-sectional data. Panel data are less likely to face multicollinearity among variables in comparison with cross-sectional data (Certo and Semadeni 2006). The use of panel data allows researchers to test hypotheses in both static and dynamic conditions (Certo and Semadeni 2006) and propositions related to the different within and between entities (Certo, Withers, and Semadeni 2017). However, panel data pose some serious issues including autocorrelation, heteroskedasticity, and reverse causality (Bliese et al. 2020; Leszczensky and Wolbring 2022). We employ various techniques to address these problems in order to avoid our findings being biased.

Dependent Variables

Entrepreneurship Quantity

To measure a country's entrepreneurship quantity, we use startup rates measured by the Total Entrepreneurial Activity (TEA). Numerous studies have used TEA as a proxy for a country's startup rates or entrepreneurship quality (Acs, Desai, and Hessels 2008; Anokhin and Schulze 2009; Stel, Carree, and Thurik 2005). TEA is the percentage of individuals in the nations, ages from 18 to 64, engaging in entrepreneurship activities. They are either nascent entrepreneurs or young business owners (Lepoutre et al. 2013). Nascent entrepreneurs are individuals who were involved in starting or running new ventures in the past 12 months. Young business owners are individuals who have managed or owned a young firm for less than 42 months (Stel, Carree, and Thurik 2005).

Entrepreneurship Quality

Following Giotopoulos and colleagues (2017), we measure entrepreneurship quality based on three dimensions: innovativeness, high growth, and export orientation. However, we do not measure the dimensions separately but we normalize them so they are in the same range and then sum them up into a single index. Researchers have used these three dimensions to measure opportunity or productive entrepreneurship (Chowdhury, Audretsch, and Belitski 2019). We contend that opportunity entrepreneurship and productive entrepreneurship have some commonalities. These types of entrepreneurship are usually innovative and high-growth, supporting our rationale for using innovativeness, high growth, and export orientation to measure a country's entrepreneurship quality. The data for these variables are obtained from GEM databases.

Independent Variables

Education Level

We measure a country's education level based on the percentage of the country's population who complete tertiary education. This measure has been used in various studies investigating the effects of a country's education levels on entrepreneurship (Arshed, Rauf, and Bukhari 2021; Belitski and Korosteleva 2010; Garcia 2014). Tertiary education plays a crucial role in people's cognitive development, social network enrichment, and career preparation. Therefore, tertiary education is deemed to affect the possibility that people enter entrepreneurship as well as commit to innovative and high growth ventures. Data are collected from the World Bank database.

Employment Experience

Employment experience is also called industry experience. Researchers usually use the status of employment as a proxy for work experience (Campbell et al. 2012; Marshall 2015; Rocha, Carneiro, and Varum 2018; Vroome and Tubergen 2010). The commonality of these studies is that they focus on individuals' industry experience or work experience in corporations (Campbell et al. 2012; Rocha, Carneiro, and Varum 2018). At the aggregate level, we suggest that the more corporations or mature companies a country has, the more likely these will provide employment for the country's citizens and the more industry experience the population should have. We divide the number of a country's corporations by the number its residents and use this ratio as a proxy for employment experience. The number of corporations is obtained from the listed domestic companies from the World Bank databases.

Business Ownership Experience

We use the percentage of the population whose age is from 18 to 64 and have owned and run businesses for more than 42 months. This variable has been used in various studies (Bergmann and Stephan 2013; Levie and Autio 2008; Szerb et al. 2007). It is noteworthy that business ownership experience is different from employment experience. The experience of owning businesses confirms that people have owned and operated their own businesses. In contrast, the experience of being employed confirms that people have worked for established organizations. We believe the way we operationalize and measure the employment experience and business ownership experience minimize the overlap between the two concepts. This variable's data are obtained from the GEM databases.

Immigration Experience

We use the percentage of a host country's population who are foreign born as a proxy for international experience. These foreign-born residents are usually students, high-skilled workers, and others who move to the host countries in order to find opportunities. Research suggests these immigrants are likely to invest in their human capital (Abdulla 2020; Friedberg 2000), and are rich in entrepreneurial mindsets. In addition, people who experience different cultures have cognitive dissonance and develop an adaptive cognitive structure (Le and Kroll 2017). As a result, the immigration experience of a country's residents has been considered a component of human capital in that country (Hatak and Zhou 2021; Schultz 1961).

Control Variables

There are two sets of control variables. The first set includes macro factor variables such as population, economic development level, economic freedom, and foreign investment. ***Population***: A larger pool of talent is likely to provide more entrepreneurs (Anokhin and Schulze 2009). The data of this variable are obtained from the International Monetary Fund and are log transformed. ***Economic Development Level***: Richer countries have more resources for entrepreneurship. Research also points out that economic development level affects both entrepreneurship quantity and quality (Acs, Desai, and Hessels 2008). We use per capital GDP as a proxy for economic development level. The data are extracted from the World Bank databases. ***Economic Freedom***: a country with a high level of economic freedom may incentivize people to become entrepreneurs because they are assured that their innovations would be protected (Bradley and Klein 2016). This variable's data are taken from the Heritage database. ***Foreign Investment***: Foreign investments can be a source of resources that are necessary to pursue any entrepreneurial endeavors (Slesman et al. 2021). The data are obtained from the World Bank databases.

The second set of variables is related to individual factors, including fear of failure, entrepreneurial self-efficacy, opportunity recognition capabilities, and age. ***Fear of Failure***: This cognitive factor is likely to affect people's possibility of entering entrepreneurship (Boudreaux, Nikolaev, and Klein 2019). This variable's data are extracted from the GEM databases. ***Entrepreneurial Self-Efficacy***: Research has argued that people with a high level of entrepreneurial self-efficacy are more likely to become entrepreneurs (Boudreaux, Nikolaev, and Klein 2019). We use perceived capabilities from the GEM databases as a proxy for this variable. ***Opportunity Recognition***: People entering entrepreneurship based on opportunity recognition are likely to initiate high-quality entrepreneurship (Dyer, Gregersen, and Christensen 2008). We use Perceived Opportunity Rate from the GEM databases as a proxy for this variable. ***Age***: Young people are more likely drawn into entrepreneurship and innovation than older individuals (Estrin, Korosteleva, and Mickiewicz 2013). We use the age structure of a country's population as a proxy for this variable. The data are obtained from the World Bank databases.

Analytical Methods

We use the Generalized Estimating Equations (GEE) for hypothesis testing. GEE was developed by Liang and Zeger (1986), Zeger and Liang (1986), and Zeger, Liang, and Albert (1988). This approach helps researchers overcome some issues with panel data (also called longitudinal data). This approach has been extensively used in other fields (Zorn 2001), and management scholars increasingly employ this technique (Ballinger 2004). An advantage of GEE is that this approach still generates robust results even if the

dependent variable is not normally distributed or continuous. Additionally, this technique can help address correlations among repeated measures or clusters (Ballinger 2004; Zorn 2001). The GEE model is often compared with the random effects model. Even though these two analytic techniques have their own advantages (Zorn 2001), they usually generate similar results. The GEE is run by the *geeglm* command in the *geepack* package in R.

RESULTS

Descriptive Statistics
Table 1 displays the correlations among control variables, predictors, and dependent variables. All coefficients of correlations are less than .65. This indicates that there is no serious multicollinearity among these variables. The Variance Inflation Factors (VIFs) suggest that all scores are below 3, satisfying the rule of thumb that VIF scores should be less than 10.

Testing for Heteroskedasticity, Autocorrelation, and Reverse Causality
To make sure the GEE models produce unbiased results, we check for the presence of heteroskedasticity, autocorrelation, and reverse causality in the data set. First, we use Breusch-Pagan test to detect the heteroskedastic issue, but the results indicate that the panel data set satisfies the homoscedasticity requirements. Second, we use the Wooldridge test for autocorrelation detection. The results indicate that the data set does not have serious issues with autocorrelations. Third, we use the Panel Ganger Causality test for the presence of reverse causality. The results also suggest that the data set does not face serious issues with reverse causality.

Hypothesis Testing Results
The testing results are displayed in Table 3. Model 1 includes all control variables. We test the first four hypotheses in model 2 by adding the four predictors into the first model. The findings indicate that education level is positively related to entrepreneurship quality (β = .24, p < .01). Similarly, business ownership experience positively affects entrepreneurship quality (β = 1.49, p < .01). Immigration experience is moderately significantly related to the quality of entrepreneurship (β = .36, p < .10). As a result, hypotheses 1 and 3 are supported. Hypothesis 4 is marginally supported. However, hypothesis 2 is not supported.

The next four hypotheses are related to the effects of human capital on the quantity of entrepreneurship. To test these four hypotheses, first we include all control variables on Model 3. Then we include the four predictors in Model 3, resulting in Model 4. According to the findings, education level is negatively related to startup rates (β = -.06, p < .01). Business ownership experience also negatively affects startup rates (β = -.03, p < .05). Similarly, immigration experience is negatively associated with startup rates (β = -.08, p < .05). Employment experience does not have a significant effect on startup rates. As a result, hypotheses 1, 3, and 4 are supported, but hypothesis 2 is not.

TABLE 3
THE EFFECTS OF HUMAN CAPITAL OF ENTREPRENEURSHIP QUANTITY AND QUALITY (GENERALIZING ESTIMATING EQUATIONS)

	Model 1 Entrepreneurship Quality	**Model 2** Entrepreneurship Quality	**Model 3** Entrepreneurship Quantity	**Model 4** Entrepreneurship Quantity
Population (log)	-4.64***	-2.56†	.62*	.53
Foreign Investment	.14	.007	.002	-.006
Per Capita GDP (log)	34.35*	11.40	-14.48***	.12.58***
Policy Supportiveness	6.25	5.90†	-.55	-.33
Social Supportiveness	1.47	.06	.82	.93
Entrepreneurial-Self Efficacy	-1.04**	-.22	.59***	.55***
Opportunity Recognition	-.03	-.01	.12***	-.01***
Fear of Failure	.07	.05	-.03	.006
Educational Level		.24**		-.06**
Employment Experience		-.07		-.01
Business Ownership Experience		1.49**		-.03*
Immigration Experience		.36†		-.08*
Participants	1,858,444	1,858,444	1,858,444	1,858,444
Observations	551	551	551	551
Groups	86	86	86	86

†p < .10, *p < .05, **p < .01, ***p < .001

Robustness Checks

We also perform further analysis in order to check the robustness of our results. We use random effects models instead of GEE models to run all analyses again. The results are shown in Table 4. Models 1 and 2 are used to test the first four hypotheses. Models 3 and 4 are used to test the next four hypotheses. In Model 2, education level is positively related to entrepreneurship quality (β = .26, p < .05). Similarly, business ownership experience and immigration experience are positively associated with the quality of entrepreneurship (β = 1.43, p < .05) and (β = .45, p < .05). The findings in Model 4 suggest that education negatively affects startup rates (β = -.06, p < .01), and immigration experience is moderately significantly associated with startup rates (β = -.01, p < .10). These results are mostly similar with those when based on the GEE models.

TABLE 4
THE EFFECT OF HUMAN CAPITAL ENTREPRENEURSHIP QUANTITY AND QUALITY

	Model 1 Entrepreneurship Quality	**Model 2** Entrepreneurship Quality	**Model 3** Entrepreneurship Quantity	**Model 4** Entrepreneurship Quantity
Population (log)	-4.63***	-2.05	.60†	.56
Foreign Investment	.24	-.22	.04	.01
Per Capita GDP (log)	36.80	14.02	-20.46**	-19.20**
Policy Supportiveness	4.70	6.48	-.56	-.18
Social Supportiveness	2.48	.60	.81	-.82
Entrepreneurial-Self Efficacy	-1.23†	-.32	.71***	.71***
Opportunity Recognition	.02	-.02	.15**	.10*
Fear of Failure	.03	-.06	-.05	.02
Educational Level		.26*		-.06*
Employment Experience		-56.04		-10.53
Business Ownership Experience		1.43*		.04*
Immigration Experience		.45*		-.01†
R_squared	.29	.47	.70	.78
F_statistics	3.89	5.30	26	22
Groups	77	73	77	73

†p < .10, *p < .05, **p < .01, ***p < .001

Additionally, we use innovation of a country to as a proxy for entrepreneurship quality. National innovations are measured by the number of patent applications of a country's residents. We log transform this variable before using GEE models to run subsequent analyses. The results in Table 5 indicate that education level is positively related to national innovation (β = .03, p < .01). Employment experience is moderately associated with national innovation (β = 78.85, p < .10), and so is business ownership experience (β = .02, p < .10). These results are slightly different from our previous ones, but in general they indicate that the predictors positively affect entrepreneurship quality even when using national innovation.

TABLE 5
USING NATIONAL INNOVATION AS A PROXY FOR ENTREPRENEURSHIP QUALITY

	Model 1 Entrepreneurship Quality	Model 2 Entrepreneurship Quality
Population (log)	1.04***	1.17***
Foreign Investment	-.03	-.03
Per Capita GDP (log)	2.01	.60
Policy Supportiveness	.25	.31
Social Supportiveness	.23	.18
Entrepreneurial-Self Efficacy	-.14***	-.09**
Opportunity Recognition	-.02	-.01
Fear of Failure	-.01	-.01
Educational Level		.03**
Employment Experience		78.85†
Business Ownership Experience		.02†
Immigration Experience		-.001
Participants	1,858,444	1,858,444
Observations	551	551
Groups	86	86

†p < .10, *p < .05, **p < .01, ***p < .001

DISCUSSION AND CONCLUSION

There is a large body of work dedicated to ascertaining the relationship between human capital (i.e., education, employment experience, business ownership experience, and immigration experience) and entrepreneurial entry and outcomes (Martin, McNally, and Kay 2013; Marvel, Davis, and Sproul 2016; Wright et al. 2007). The popular belief is that these dimensions of human capital positively affect entrepreneurial entry and successful outcomes in terms of new ventures' survival, successful exits, and fast expansions (Dimov and Shepherd 2005; Easley 2016; Hatak and Zhou 2021; Marvel and Lumpkin 2007; Unger et al. 2011). However, our study argues that generalizing these findings and applying them at the aggregate level may not be correct given that many countries have failed in various entrepreneurial programs. We hypothesize that a country' human capital, characterized by education level, employment experience, business ownership experience, and immigration experience, is positively related to the country's entrepreneurship quality. However, these human capital dimensions negatively affect the country's entrepreneurship quantity. The findings of our study mostly support these hypotheses.

Theoretical Implications

Our study's findings align with research supporting a positive relationship between human capital and entrepreneurship quality, also called entrepreneurial success (Dimov and Shepherd 2005; Easley 2016; Hatak and Zhou 2021; Marvel and Lumpkin 2007; Unger et al. 2011). Indeed, the findings indicate that the population's education level, business ownership experience, and immigration experience are positively related to entrepreneurship quality measured by the index of ventures' innovations, high growth, and internationalization. Our study reaffirms the role of human capital in promoting high-quality entrepreneurship that generates innovations, creates jobs, fosters competition, and results in economic growth.

In contrast with the conventional belief that human capital is positively related to entrepreneurship entry, or entrepreneurship quantity (Martin, McNally, and Kay 2013; Marvel et al. 2014; Wright et al. 2007), our study indicates that, at the aggregate level, human capital negatively affects entrepreneurship

entry. These findings are counterintuitive given the common belief that investments in human capital increase entrepreneurship. At the aggregate level, we suggest that individuals rich in human capital—including high education levels, business ownership experience, and immigration experience—are likely to be absorbed by established firms that can provide them with high salaries and secure jobs. These findings are perhaps not surprising because some scholars argue that entrepreneurs often calculate risks and benefits before they actually become entrepreneurs (Douglas and Shepherd 2002; Easley 2016).

Our results did not support all aspects of human capital in significantly affecting both entrepreneurship entry and its outcomes. Employment experience did not have a significant impact on both entrepreneurship quality and quantity. This finding is quite consistent with that of Lima (2011), who suggests that those entrepreneurs with paid employment experience are less likely to reenter entrepreneurship (albeit at the individual level). In addition, our results suggest that researchers should treat entrepreneurship as a multifaced construct. In other words, we should differentiate entrepreneurship entry from its outcomes.

Practical Implications

In recent years, policy makers around the globe consider entrepreneurship a source of new employment and an engine to stimulate economic growth (Acs, Desai, and Hessels 2008; Anokhin and Schulze 2009; Estrin, Korosteleva, and Mickiewicz 2013). The policy communities turn to human capital as a strategic tool in order to foster entrepreneurship. Human capital has become "strategic human capital" in this sense (Wright, Coff, and Moliterno 2013). However, policy communities seem unclear about their expectations concerning more entrepreneurship as distinct from better entrepreneurship. Ideally, countries prefer to have both higher numbers and a higher quality of startups. Our study suggests that investments in human capital can result in higher entrepreneurship quality but not a higher number of entrepreneurial entries. This result may disappoint practitioners who have worked hard to increase the number of new ventures in their countries by investing in human capital. In most cases, better entrepreneurship is even more important than more entrepreneurship. Ventures with low innovation and low growth have consumed enormous public resources but generate few jobs and little contribution to economic growth (Shane 2009).

Our study also has implications for policy makers in developing countries where entrepreneurship is quite dynamic with high startup rates and low quality. Many of these ventures are small businesses aimed at survival purposes. We suggest that these countries should pay more attention to human capital investments that would slowly transform them from low-quality to more innovative entrepreneurship. For policy makers in developed countries where entrepreneurship is quite innovative but startup rates are quite large, further investment in human capital may not increase the number of new ventures as they might expect.

Limitations and Future Research

Our study investigates the relationship between human capital and both entrepreneurial entry and outcomes at the national level. We have argued that people rich in human capital are desired by established firms and therefore may prefer being salaried employees rather than becoming entrepreneurs. Additional macro and micro factors may moderate these relationships. For example, a country with higher economic freedom may encourage more people to pursue innovative entrepreneurship because they are ensured that they would fully capture the value of their entrepreneurial endeavors. In other words, the economic freedom might strengthen the relationships between human capital's dimensions and entrepreneurship quality.

Moreover, risk-taking propensity and entrepreneurial self-efficacy could moderate the relationship between human capital and the likelihood of entering entrepreneurship. For instance, among highly-educated people, those with high risk-taking propensity may be more likely to enter entrepreneurship than those with low risk-taking propensity. Likewise, the highly educated individuals with a strong belief in their capabilities may be more likely to pursue entrepreneurship entry than their counterparts who have a weak belief in their capabilities. These arguments may also apply to employment experience, business ownership experience, and immigration experience.

Conclusion

We proposed that human capital (education level, employment experience, business ownership experience, and immigration experience) is positively related to entrepreneurship quality and negatively associated with entrepreneurship quantity at national level. Our findings were largely supportive of our hypotheses and serve to inform the stream of research assessing the impact of human capital on entrepreneurial outcomes, including entrepreneurial successes or entrepreneurship quality. The findings also suggest that a country rich in human capital may have fewer people entering entrepreneurship. Our study has offered informative suggestions for both the researcher and practitioner communities.

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