

Why are some entrepreneurs more innovative than others?

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Abstract Entrepreneurs differ in the degree and type of novelty that they introduce to the economy. This study provides theoretical insights and empirical evidence on the emergence of entrepreneurial innovativeness. The results suggest that entrepreneurial innovativeness depends both on individual factors *and* on the environment in which the individual acts. In particular, high educational attainment, unemployment, and a high degree of self-confidence are significantly associated with entrepreneurial innovativeness at the individual level. Furthermore, the distribution of innovative and imitative entrepreneurship varies across countries. Entrepreneurs in highly developed countries are significantly more likely to engage in innovative rather than purely imitative activities. The theoretical approach of this study combines a judgment and decision making framework with factors that contribute towards the individual perception of decision alternatives. Data used in the empirical analysis originate from the 2002–2004 adult population surveys of the Global Entrepreneurship Monitor, yielding a sample of 9,549 nascent entrepreneurs from 30 different countries.

Keywords Entrepreneurship · Innovation · Business opportunities · Judgment · Decision making

JEL Classifications M13 · O31 · L26

1 Introduction

Why are some entrepreneurs more innovative than others? This question surely belongs to the core of entrepreneurship research (Shane and Venkataraman 2000). Surprisingly, our knowledge about what exactly leads to innovative rather than purely imitative business ventures is still very limited. To some extent, this may be due to a lack of suitable empirical data to investigate this question. Studying different types and degrees of entrepreneurial innovativeness obviously poses some challenges to identify a relevant population and to define, disentangle, operationalize, and empirically measure the concepts of entrepreneurship and innovation in a precise way. In addition, it constitutes a theoretical challenge because it requires researchers to think about and take a stand on the nature and origins of entrepreneurial opportunities and the question why some rather than other individuals exploit these opportunities. Until today, no comprehensive theory is available that answers these questions. Arguably, a more problematic issue is that we still lack a common understanding of what entrepreneurship, innovation, and opportunity actually mean (Davidsson 2005; Koppl 2007; McMullen et al. 2007).

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Despite these inherent difficulties and without claiming to resolve them, the aim of this article is to contribute to the entrepreneurship literature by providing some theoretical considerations and empirical evidence that helps us better understand the emergence of different types and degrees of entrepreneurial innovativeness. The conceptual approach of this article is based on a judgment and decision making framework that analyses factors influencing individual decision making combined with additional insights that help us understand where different decision alternatives come from. The empirical evidence is based on data from the Global Entrepreneurship Monitor (GEM) adult population surveys from three consecutive years, 2002–2004, containing data on the innovativeness of nascent entrepreneurs in 30 countries. In addition to the information about individual entrepreneurs contained in the GEM survey, macro-economic indicators are included for the purposes of this study to quantify some relevant dimensions of the environment in which these individual entrepreneurs make their decisions.

The analysis focuses on entrepreneurial innovativeness at the market level rather than on a global scale. The results show that innovativeness depends both on individual factors *and* on the environment in which an entrepreneur is situated. In particular, high educational attainment, unemployment, and a high degree of self-confidence are significant factors associated with entrepreneurial innovativeness at the individual level. Furthermore, entrepreneurs living in countries that are close to or operating at the worldwide production possibility frontier (PPF) are more likely to engage in innovative business ideas, while purely imitative forms of entrepreneurship are more likely to be found in developing countries.

The article relates to the literature on nascent entrepreneurship (Wennekers et al. 2005; Arenius and Minniti 2005; Koellinger et al. 2007) and to the literature on entrepreneurial innovativeness (Cliff et al. 2006; Low and Abrahamson 1997; Shane 2000). The theoretical approach suggested here to analyze entrepreneurial innovativeness extends the existing literature by integrating individual and environmental factors that influence entrepreneurial behavior in general. In particular, the main idea is that any type of entrepreneurial behavior can be analyzed by asking two questions: First, given particular decision alternatives, why do some individuals

choose one over the other(s)? And second, where do these individual decision alternatives come from in the first place? The empirical evidence presented here is novel because, to my best knowledge, no further studies exist on the prevalence of innovative versus imitative entrepreneurs across countries.

2 Theoretical background

2.1 Definitions

The question “why are some entrepreneurs more innovative than others” implicitly assumes that entrepreneurs differ in terms of the degree and type of novelty they introduce to the economy. This simple starting point is consistent with current thinking about entrepreneurship and is likely to be a basis for consensus (Aldrich 1999; Cliff et al. 2006; Davidsson 2005; Low and Abrahamson 1997; Shane 2000).¹ However, asking this question also implies that innovation cannot generally be the defining element of entrepreneurship. For the purpose of this study, instead of defining entrepreneurship on the basis of innovation, I define it as the *introduction of new economic activity* (Herbert Simon in Sarasvathy 1999; Davidsson 2005). This includes both the introduction of innovation to the marketplace, as well as entering as a new imitative competitor. In particular, the analysis focuses on *nascent entrepreneurs* who initiate serious activities that are intended to culminate in a viable business start-up (Aldrich 1999).

Innovation is a subjective concept and whether some activity qualifies as innovative or not depends on the perspective of the observer. Obviously, the criteria for innovation become stricter when one zooms out from a micro to a macro perspective and the “right perspective” is in essence determined by the question one is asking. From an economic point of view, a product, service or production process does not need to be new to the world to have economic impact. Instead, it is sufficient if the innovation is new to the market under scrutiny. This market perspective is also the relevant perspective for the individual deciding about whether to start a business and which opportunity to pursue: When making judgments about the expected

¹ It is also consistent with the empirical evidence of this study.

payoffs of the venture, the individual only needs to be concerned about the competitive factors that directly affect her. For example, someone trying to start a Turkmenian restaurant in Kansas City only needs to be concerned about the expected competition from other restaurants in Kansas City and the needs and wants of customers in that region, whereas it is totally irrelevant for her expected payoff and her start-up decision how many restaurants there are in Turkmenistan and if Turkmenian food is new to people in other parts of the world.

Building upon this market-based perspective and the work of Picot et al. (1989) and Aldrich (1999), imitative nascent entrepreneurs can be defined as individuals trying to start a business in an established population whose routines, competencies, and offers vary only minimally, if at all, from those of existing organizations. They bring little or no incremental knowledge to the populations they enter and organize their activities in the same way as their predecessors. Innovative nascent entrepreneurs, by contrast, attempt to start firms whose routines, competencies or offers vary significantly from those of existing organizations in the particular market they enter. In the above example, the entrepreneur trying to start a Turkmenian restaurant in Kansas City would most probably qualify as innovative, whereas the same business idea in Turkmenistan would classify as imitative.

To discover the relevant factors that influence the distribution of innovative versus imitative business ideas, the specific properties that characterize and distinguish innovative and imitative business opportunities need to be considered. By definition, innovation requires novelty. Hence, innovative ideas are characterized by limited available information about the behavior of customers, potential competitors, or “how to make things work” in the first place. The innovator needs the courage to “conquer unknown territory”. Consequently, innovation involves Knightian uncertainty (Knight 1921) and risk for the potential entrepreneur.² In contrast, purely imitative business ideas take place in established markets. Performance of competitors and behavior of customers can be observed. Imitation can be triggered by an

entrepreneur who observes the data and discovers that a profit opportunity has not been realized yet by other market participants due to asymmetric information or simply pure ignorance. At the extreme, this may imply risk free arbitrage (Kirzner 1973). However, imitative business ventures may also exhibit some degrees of financial and technological risk as well as uncertainty about the reaction of competitors to market entry—these factors are obviously also relevant for innovative ventures. But the key distinction is that imitative business ideas lack the additional uncertainty and risk of novelty and discovery.

2.2 A judgment and decision making framework

Given this basic distinction between innovation and imitation, the answer to the question “Why are some entrepreneurs more innovative than others” basically boils down to two sub questions: (1) Why are some individuals more likely than others to choose alternatives with more risky and uncertain outcomes? (2) Where do these more risky and uncertain decision alternatives come from?³

Schade and Koellinger (2007) suggested that a judgment and decision making framework can be used to answer the first sub question. Such a framework assumes different decision alternatives as externally given and analyzes factors that influence the individual choice for one over the other alternative(s). In principal, an individual can decompose the given alternatives of action into their components before making a decision. Only four types of information are needed (Connolly et al. 2000):

1. What are my possible courses of action? (Alternatives)
2. What are the events that might follow from those actions? (Outcomes)
3. What is the likelihood of each event? (Risk)
4. What is the value of each event to me? (Individual utility)

Given this information, a rational and individually optimal decision could be made. Of course, the main

² Risk refers to a non-deterministic outcome with a *known* probability distribution, whereas uncertainty refers to a non-deterministic outcome with *unknown* probability distribution.

³ In general, any type of entrepreneurial behavior can be analyzed by asking these two fundamental questions: Given particular decision alternatives, why do some individuals chose one over the other(s)? And where do these individual decision alternatives come from?

difficulty is that outcomes and probabilities are usually not directly observable. Instead, the decision maker needs to exercise judgments about cues perceived in the environment (such as the news, stock market movements or casual conversations with friends) to form an opinion or belief about expected outcomes and probabilities (such as what is the probability that my business idea will earn me a sufficient income). In practice, individuals vary significantly in their ability to perform sound judgments and in general, this process is often subject to a variety of systematic biases which lead to suboptimal judgments and decisions (Schade and Koellinger 2007).

When making a decision pro or contra to a risky or even an uncertainty course of action, such as starting a business or deciding about an innovative versus an imitative business idea, numerous factors are relevant. This includes, for example, preferences and opportunity costs (Hamilton and Harper 1994; Gifford 1992), the availability of financial resources (Evans and Leighton 1989), the individual tolerance for uncertainty (Knight 1921), as well as person- and situation-specific differences in subjective evaluations of how attractive alternative courses of action are (Schade and Koellinger 2007).

In particular, the basic distinction that innovation is inherently more risky and uncertain than imitation immediately leads to the presumption that innovative entrepreneurs should be more prone to accept risk and uncertainty than imitative entrepreneurs. Thus, hypothesis 1:

Hypothesis 1 Innovative entrepreneurs are prone to accept higher levels of risk and uncertainty than imitative entrepreneurs.

Furthermore, the literature on descriptive decision making has shown that people's propensity to engage in risky or uncertain activities varies relative to individually given (monetary) reference points. Thus, most individuals do not have stable risk and uncertainty preferences. Instead, their preferences vary depending on the circumstances they are in. The typical empirical patterns described by prospect theory for risky choices (Kahneman and Tversky 1979) also seem to apply to uncertain outcomes (Kilka and Weber 2001). Thus, an aversion to high risk and uncertainty is usually observed among individuals that are in a gain position relative to their

individual reference point, whereas individuals in a loss position actually seek high risk and uncertainty. Applying this behavioral pattern to business start-up decisions would suggest that very innovative business ideas with high risk and uncertainty should be more likely to be pursued by individuals who have "nothing to lose". This would include people with an income that is below average and unemployed individuals, leading to hypotheses 2 and 3:

Hypothesis 2 Unemployed individuals are more likely to start innovative rather than imitative businesses.

Hypothesis 3 Individuals with below average income are more likely to start innovative rather than imitative businesses.

In general, when exercising judgments about probabilities and outcomes, people often use simple heuristics (Gigerenzer and Todd 1999; Goldstein and Gigerenzer 2002) or intuitive optimization rules (Lévesque and Schade 2005) to guide their choices in situations that are characterized by risk and uncertainty. This can lead to decisions that are not necessarily optimal from a normative perspective (Kahneman and Tversky 1979; Fox and Tversky 1995; Thaler et al. 1997). In particular, innovative business ideas require people to make decisions based on very little evidence. Making decisions based on little evidence requires high levels of self-confidence. In fact, it is a characteristic of overconfident people (Shane 2003; Bernardo and Welch 2001; Cooper et al. 1995). Overconfidence is greatest for difficult tasks, for forecasts with low predictability, and for activities that lack fast and clear feedback (Fischhoff et al. 1977; Lichtenstein et al. 1982; Yates 1990; Griffin and Tversky 1992), all of which are particularly relevant for innovative business ideas. This suggests that innovative entrepreneurs should exhibit a higher level of confidence than imitative entrepreneurs, although this higher level of confidence might not be justified by their objective skills, abilities, and probabilities of success. This leads to hypothesis 4:

Hypothesis 4 Individuals with a higher level of self-confidence are more likely to exploit innovative rather than imitative business opportunities.

At the macro level, prevailing wage levels, employment opportunities, taxes, business regulation,

and unemployment benefits might influence the opportunity costs and expected returns to starting a business (Amit et al. 1995, van Stel et al. 2006, Acs et al. 2005). Furthermore, “soft” factors such as the social acceptance of entrepreneurship and potential failure might also be relevant. To the extent that these macro level factors are different across countries and fluctuate over time, e.g., in correspondence with the business cycle, we can expect that the distribution of innovative and imitative business opportunities pursued by nascent entrepreneurs will vary across countries and over time.

2.3 Where do business alternatives come from?

While the judgment and decision making framework helps us to analyze individual behavior when different alternative courses of action are given, it remains silent about where these decision alternatives or potential business opportunities come from. There are two possible answers to this question: Either, business opportunities objectively exist in the environment and just need to be perceived and recognized as such (Kirzner 1973), or they are created by the decision maker (Sarasvathy 2001; Schumpeter 1934). In reality, the perception of business opportunities might actually require both individual access to existing information in the environment *and* individual creativity. In addition, these two different sources of business opportunities require us to consider environmental and individual factors to explain the prevalence of innovative entrepreneurship.

Furthermore, it is important to recall that the degree of innovativeness of a business idea is a matter of perspective. From a market perspective, an individual does not necessarily need to be highly creative to come up with a business idea that is new to the market. Instead, whether individual creativity is required for innovation depends on the market environment: If markets are characterized by symmetric information and optimal individual behavior, creativity is a necessary condition for innovation because any improvement of the status quo will require the generation of new knowledge which can only be the result of individual creativity. However, if markets are characterized by information asymmetries or sub-optimal behavior of market participants, individual creativity is neither a necessary nor a

sufficient condition for innovation: Individual creativity is not necessary because the recognition of and the optimal response to existing information can result in a means-ends framework that is new to the market. Individual creativity is also not a sufficient condition for innovation because the lack of relevant information might cause individuals to “re-invent the wheel” over and over again.

Summarizing the above arguments, it can be expected that the ability of an individual to perceive an innovative business idea is a function of the environment in which the individual is located and individual factors that influence creativity and the likelihood to perceive relevant information from the environment.⁴

2.3.1 Factors influencing individual creativity and entrepreneurial alertness

The ability to invent and the ability to conceive new business opportunities will not necessarily coincide in one person. In fact, many inventors do not actively seek to patent or commercialize their work. Many of the most well-known inventors, however, were both inventive and entrepreneurial (Khan and Sokoloff 1993). Individual characteristics that are systematically associated with creativity and inventiveness are high intelligence, the ability to and the interest in abstract and theoretical thinking, and an unusual curiosity and enthusiasm for problems and general solutions (Root-Bernstein 1989). The ability to invent and to recognize innovative business opportunities obviously also requires mastery of the basic tools and operations in the field of invention, which suggests that systematic training and previous experience in a

⁴ In their classical writings, Schumpeter (1934) and Kirzner (1973) disagreed about whether business opportunities require the creation of new knowledge or just differential access to existing knowledge, as pointed out by Shane and Venkataraman (2000). This disagreement was arguably the result of different assumptions that Schumpeter and Kirzner made about the market environment. Schumpeter assumed equilibrated markets as a starting point of his analysis, which led him to conclude that only innovation as a result of individual creativity could generate new business opportunities and cause further economic development. Kirzner, instead, took disequilibrated markets as a starting point of his analysis and concluded that differential access to existing information is a sufficient condition for the existence of business opportunities. Both views are consistent with the reasoning presented above.

particular field are relevant (Shane 2000). However, there is evidence suggesting that previous knowledge and experience is a double-edged sword. For example, Shepherd et al. (2003) show that the decisions of venture capitalists first become better with increasing experience. Beyond a specific point, however, further gains in experience are associated with reductions in reliability and performance. Numerous other studies have also shown that individuals may also be too well trained or too experienced in a particular field to be truly inventive (Burnet 1968; Cliff et al. 2006; Delmar and Shane 2006). Indeed, highly inventive individuals often do not specialize in one particular field, they tend to be generalists and pursue two or three fields simultaneously, permitting them to cross boundaries and bring different perspectives to each (Root-Bernstein 1989).

More likely than not, these highly intelligent and curious individuals will seek higher education. To the extent that higher educational attainment is correlated with the above-mentioned characteristics such as intelligence, abstract thinking, curiosity, and a strong interest to find general solutions to problems, we can expect that higher educational attainment is associated with creativity but also with a higher probability to perceive innovative business ideas that are grounded on the inventions of others. Thus, hypothesis 5:

Hypothesis 5 Individuals with high educational attainment are more likely to start innovative rather than imitative businesses.

Other individual-specific factors could also influence the individual likelihood to perceive innovative rather than imitative business ideas. Baron (2006), for example, points out that one reason why specific persons (and not others) perceive an innovative business opportunity could be that they possess an appropriate cognitive framework to recognize patterns in seemingly unrelated changes or events. In a similar spirit, Sarasvathy (2001) explains that the creation of radically innovative firms, in an industry that does not yet exist, calls for different strategies than those used for penetrating a predefined and well-structured market. Instead of selecting the optimal means to create a particular pre-defined effect (causation), such radical innovation may require to take a set of means as given and focus on selecting between possible effects that can be created with that set of means (effectuation). Thus, according to

Sarasvathy's effectuation theory, radical innovations are more likely to be the product of experimentation and chance than the product of strategic planning and optimization.

2.3.2 Factors influencing the existence of objective opportunities

In addition to creativity, which may enable individuals to come up with their own innovative business ideas, the discussion above also emphasized that opportunities for innovative entrepreneurial activity can objectively exist in the outside world.⁵ Examples for such objective opportunities are the invention of new technologies that can be marketed or used to improve production processes, such as the Internet or genetically modified seeds.

The objective existence of business opportunities in general, whether they are innovative or imitative, is influenced by environmental factors such as changes in technology, politics, regulation, demographics or other trends in society, such as changes in culture, fashion, or urbanization (Shane and Venkataraman 2000; Eckhardt and Shane 2003; Shane 2003). These factors vary across countries and industries and significant changes in one or more of these factors are likely to generate opportunities for entrepreneurship (Eckhardt 2003; Shane 2003). Acs et al. (2005) emphasize that the creation of innovative business opportunities is the result of the creation of new knowledge. The creation of new knowledge is endogenous in economic systems via R&D investments of firms that try to improve their performance. Yet, all or parts of the new knowledge generated via R&D may also be used by other firms or entrepreneurs because the returns to R&D investments can usually not be perfectly appropriated (Geroski 1995). In addition, universities, research laboratories, and independent researchers can generate new knowledge. The new knowledge and the technological opportunities generated by R&D are likely to stimulate innovative entrepreneurship (Shane 2001; Acs et al. 2005). Hence, countries with high levels of

⁵ Objectivity here means that the required knowledge for these innovative business ideas does not have to be created by the potential entrepreneur herself. Rather, it has already been created by someone else and can in principle be observed and recognized by other individuals.

R&D activity should generate more opportunities for innovation and should, accordingly, exhibit higher prevalence rates of innovative entrepreneurs, *ceteris paribus*.⁶

In addition, the education system contributes towards the generation and the diffusion of new knowledge in a society. Especially higher education serves the purpose of teaching students the state of the art in science and technology and training them to recognize, analyze and solve complex problems, which eventually leads to the creation of new knowledge. Thus, the prevalence of a highly developed education system should also positively influence the objective availability of innovative entrepreneurial opportunities in a country. Thus, hypothesis 6:

Hypothesis 6 Countries with highly developed education systems exhibit a higher share of innovative rather than purely imitative nascent entrepreneurs.

Countries also vary in their level of economic development and technology usage. Technical inefficiencies together with market inefficiencies are possible reasons for countries falling below the worldwide PPF, which is an economic concept to describe the maximum feasible combination of goods and services an economy can produce, given the current state of technology and the availability of scarce production factors (Kumar and Russell 2002). A greater distance to the frontier suggests that a country does not make efficient use of its production factors and the available technologies. On the one hand, this inefficient use of technologies and production factors should create opportunities for entrepreneurship that would diffuse new technologies, knowledge and best practices to less developed countries. On a global scale,

this type of entrepreneurship would be considered imitative. From a market-specific perspective, however, such behavior counts as innovative, because it introduces products, service or production techniques that are new to the local market. On the other hand, existing market inefficiencies also provide opportunities for imitative new businesses. As long as markets are not in equilibrium, a simple imitation of the behavior of other market participants can still yield a profit. On the contrary, closeness of a country to the worldwide PPF implies relatively little room for imitation because any point at the PPF is characterized by an efficient use of available resources and the current state of technology. Hence, it can be expected that there are more opportunities for imitative entrepreneurship in countries that are operating below the worldwide PPF, while the scope for imitative entrepreneurship is limited in highly developed countries. This leads to hypothesis 7:

Hypothesis 7 Highly developed countries exhibit a higher share of innovative nascent entrepreneurs, while developing countries exhibit a higher share of purely imitative nascent entrepreneurs.

To summarize, the individual probability to exploit an innovative rather than imitative business idea is a function of various factors that influence the objective existence and distribution of business opportunities in the environment, individual creativity and the alertness to business opportunities, all of which are related to the question “where do business opportunities come from”. In addition, individual preferences, opportunity costs, cognitive styles and the use of particular decision heuristics influence the probability that someone who perceived an innovative business idea actually decides to exploit it.

3 Data and operationalisation

Data used in the analysis originate from the 2002–2004 adult population surveys of the GEM (Reynolds et al. 2005). Pooling the observations from three consecutive years in one dataset allows for controlling of fluctuations in the distribution of entrepreneurial innovativeness across countries and over time. GEM is currently the largest and most widely recognized cross-country research initiative to study the prevalence, determinants, and consequences of

⁶ Unfortunately, any attempt of an empirical test of this presumption is currently severely restricted by the availability of appropriate data to systematically measure and compare innovative efforts across countries (Cohen and Levin 1989). The current internationally available data suffer from various problems. For example, R&D spending is an inappropriate measure for R&D output because countries are likely to vary significantly in their R&D productivity and only a fraction of all inventions is the result of formal R&D budgets. Patents are also an inappropriate measure (Griliches 1990), partially because patents vary significantly in their value and patent systems vary significantly across countries. In addition, cross-country data on R&D and patents are only available with significant time gaps for many countries and for some countries they are not available at all.

entrepreneurial activity. The core activity of GEM is the annual compilation of empirical data on entrepreneurial activity based on a random sample of at least 2,000 adult-age individuals in each of the participating countries. Initiated with 10 participating countries in 1997, the project has expanded to 35 countries in 2005. The GEM survey uses three questions to identify nascent entrepreneurs:

1. Over the past 12 months have you done anything to help start a new business, such as looking for equipment or a location, organizing a start-up team, working on a business plan, beginning to save money, or any other activity that would help launch a business? (Yes, no, don't know/refuse).
2. Will you personally own all, part, or none of this business? (All, part, none, don't know/refuse).
3. Has the new business paid any salaries, wages, or payments in kind, including your own, for more than three months? (Yes, no, don't know/refuse).

An individual is coded as a nascent entrepreneur, if he or she answered “yes” to question 1, “all” or “part” to question 2 and “no” to question 3. Thus, a nascent entrepreneur is defined as someone who has, during the 12 months preceding the survey, done something tangible to start a new firm; who expects to own at least part of this new firm and who has not paid wages for more than three months.⁷ Table 1 summarizes the number of individuals per country and year of observation that qualify as nascent entrepreneurs.⁸ There are 30 different countries represented in the sample with an average of 318 valid observations per country.

Since 2002, the GEM survey includes three follow-up questions relating to the innovativeness of the business idea of those individuals who qualify as nascent entrepreneurs. These follow-up questions ask the nascent entrepreneur about the novelty of the technology she attempts to use, the novelty of the product or service to her potential customers, and the expected degree of competition in the market

Table 1 Nascent entrepreneurs: Number of valid observations per country and year

Country	2002	2003	2004	Total
Argentina	164	227	180	571
Australia	102	119	121	342
Belgium	63	54	83	200
Brazil	–	127	196	323
Canada	129	88	91	308
Chile	202	208	–	410
China	119	77	–	196
Croatia	44	28	42	114
Denmark	69	58	50	177
Finland	38	50	46	134
France	37	15	73	125
Germany	403	242	244	889
Greece	–	53	81	134
Hong Kong	33	28	23	84
Hungary	69	–	77	146
Iceland	100	129	135	364
Ireland	–	91	65	156
Israel	52	–	72	124
Italy	–	29	59	88
Japan	16	24	8	48
Netherlands	73	52	84	209
Norway	77	56	94	227
Poland	69	–	79	148
Singapore	78	53	120	251
Slovenia	54	48	31	133
Spain	–	281	333	614
Sweden	31	32	375	438
Switzerland	74	70	–	144
United Kingdom	280	547	536	1,363
United States	398	572	119	1,089
Total	2,774	3,358	3,417	9,549

she wishes to enter. Hence, these questions can be used to construct a profile of the innovativeness of business ideas pursued by nascent entrepreneurs. As outlined above, the relevant perspective is the market the nascent entrepreneur attempts to enter.

Table 2 describes the survey questions on innovativeness in the GEM survey and the respective answer categories. Table 3 shows the definitions of the different types of innovative activity among nascent entrepreneurs based on responses to the questions in Table 2.

⁷ GEM uses the information on the duration that wages have been paid to differentiate between nascent, young, and established entrepreneurs.

⁸ Not all countries are included in the survey every year. In addition, several countries originally included in the GEM survey were excluded from the analysis because they had systematically missing values on one or several of the socio-economic variables.

Table 2 Survey questions on innovativeness

Survey question	Answer categories
T–“Were the technologies or procedures required for this product or service generally available more than a year ago?”	T1—Yes T2—No
C–“Will all, some, or none of your potential customers consider this product or service new and unfamiliar?”	C1—All C2—Some C3—None will consider this new and unfamiliar
M–“Right now, are there many, few, or no other businesses offering the same products or services to your potential customers?”	M1—Many business competitors M2—Few business competitors M3—No business competitors

Table 3 Definition of dependent variables: Types of innovative activity among nascent entrepreneurs

Innovative activity	Definition by answer categories from Table 2
Pure imitation	T1, C3, M1
Innovation (any kind)	Every other combination

This study differentiates between purely imitative entrepreneurs and those who carry out *any* type of innovative behavior. Purely imitative entrepreneurs are defined as nascent entrepreneurs who have neither a product nor a process innovation and expect many business competitors in the market they enter.

Obviously, the answer categories described in Table 2 would also allow the construction of different measures for the types and degrees of entrepreneurial innovativeness. The above-defined categories were chosen for the following reason: The primary objective was to differentiate between purely imitative business ideas and those that contain some degree of novelty. Thus, the sternest possible definition for purely imitative businesses that the data allowed is chosen as a reference category.

GEM data also provide a number of relevant explanatory variables that relate to the theoretical considerations of the previous section. For each individual, GEM contains basic socio-economic information including country of residence, age,

gender, educational attainment, current working status, and household income. The latter is transformed into 33% percentiles relative to the relevant national income distribution of the respondent. Current employment status relates to hypothesis 2, household income relates to hypothesis 3 and educational attainment to hypothesis 5. Age and gender are included as control variables.

In addition, the data contain four variables that relate to individual perceptions. Specifically, respondents were asked whether they believe to have the knowledge, skill and experience required to start a business (*suskill*). This variable captures individual self-confidence in the entrepreneurial domain and relates to hypothesis 4. Respondents were also asked if fear of failure would prevent them from starting a business (*fearfail*). This variable may serve as a proxy for downside risk tolerance and relates to hypothesis 1.

Respondents were also asked if they thought that good opportunities for starting a business would exist in their residential area within the 6 months following the survey (*opport*). There is also a variable (*discent*) that records if the individual has experienced a business failure in the 12 months preceding the survey. This variable controls for a specific pre-knowledge and experience of the entrepreneur. Finally, the data record if respondents knew someone who had started a business in the two years preceding the survey (*knowent*). Knowing other entrepreneurs might influence alertness to business opportunities and reduce ambiguity about the entrepreneurial process and the associated outcomes (Minniti 2005). *Opport*, *discent* and *knowent* are added as control variables.

Two country-level variables are added to the dataset to control for the influence of environmental conditions on the distribution of entrepreneurial innovativeness. The data are taken from the IMD World Competitiveness Online database 2002–2004.⁹ GDP per capita in current US dollars was added to each observation according to the country of residence and the time of the survey (2002, 2003 or 2004). GDP per capita was recorded as a percentage value of GDP per capita in the USA to reflect the

⁹ <http://www.worldcompetitiveness.com/OnLine/App/Index.htm>

relative distance of each country to the worldwide PPF.¹⁰ This variable relates to hypothesis 7. To approximate the quality and outreach of the educational system of a country, the percentage of population that has attained at least tertiary education for persons 25–34 years old was added. This variable relates to hypothesis 6.¹¹

Preparatory bivariate correlations of these explanatory variables show only weak coefficients, indicating that multicollinearity is not an issue of concern in the multivariate analysis.

4 Empirical results

Figure 1 shows the average prevalence of nascent entrepreneurial activity from 2002 to 2004 across the 30 countries included in the sample. While on average more than 10% of the adult population are trying to start a business in Argentina and Chile, less than 2% do so in Sweden and Japan. Reasons for these substantial cross-country differences in entrepreneurial activity have been analyzed in various studies, including Wennekers (2006) and Koellinger et al. (2007).

Figure 2 shows the average shares of imitative and innovative activities among adult nascent entrepreneurs across countries from 2002 to 2004. The figure shows that purely imitative and innovative types of entrepreneurship co-exist in all countries. It also shows that the distribution of innovative activities among nascent entrepreneurs varies substantially across countries. For example, the share of purely imitative nascent entrepreneurs is above 50% in Brazil, Spain, and China, but below 20% in Chile, Denmark, and Ireland.

¹⁰ The highest and lowest values are recorded for Norway and China in all three years, with 130% and 3.5% of the US value on average, respectively. The transformation of the values to percentage of US GDP per capita does not qualitatively influence the results of the econometric analysis.

¹¹ Two countries included in the GEM survey had data gaps for the relevant years, China and Croatia. The most recently available data were chosen as estimates for the data gaps: The 1998 value for China and the 2001 value for Croatia. In general, this variable does not vary much over time. The year-to-year correlations are always above 0.95 and highly significant. Thus, the imprecision introduced by this estimation procedure is negligible.

To reiterate, these numbers reflect the expectations of nascent entrepreneurs who attempt to enter a particular market environment and do not reflect innovativeness on a global scale. For example, the high share of market-specific innovations in Chile should not be misinterpreted as indicating that Chilean entrepreneurs introduce many products or processes that are new to the world. Instead, it represents entrepreneurial innovativeness at the market level. As explained in Sect. 2.1, this market-based perspective, which builds on the perceptions of the entrepreneur, is the relevant perspective for the individual decisions about whether to start a business and which kind of opportunity to pursue because the individual only needs to be concerned about the competitive factors that directly influence her expected payoff. The question whether a particular market-specific innovation would also qualify as an innovation on a global scale is not relevant in this analysis.

Using these data, the following logit estimation results depict the possible antecedents of entrepreneurial innovativeness (Table 4). The reference category of the dependent variable ($y = 0$) is a purely imitative activity. Thus, the model identifies factors that make a nascent entrepreneur more likely to be innovative in any possible way. The model is estimated in two different set-ups. The first set-up includes GDP per capita and tertiary education as country-level explanatory variables to test hypotheses 6 and 7. In contrast, the second set-up includes country dummy variables that serve as a “catch-all” factor that captures all possibly relevant factors at the country level that could influence the degree of innovativeness of each individual nascent entrepreneur. The purpose of this second set-up is to test hypotheses 1–5 and to find out whether the individual level covariates in the first set-up are robust or possibly subject to an omitted variable bias from missing environmental factors. All estimated coefficients are reported as odds ratios.

The estimation results show that both individual and environmental variables are significantly associated with entrepreneurial innovativeness. This is an important result because it implies that the nature of business opportunities that individuals pursue is determined by the interplay of individual characteristics and the environment in which the individual lives.

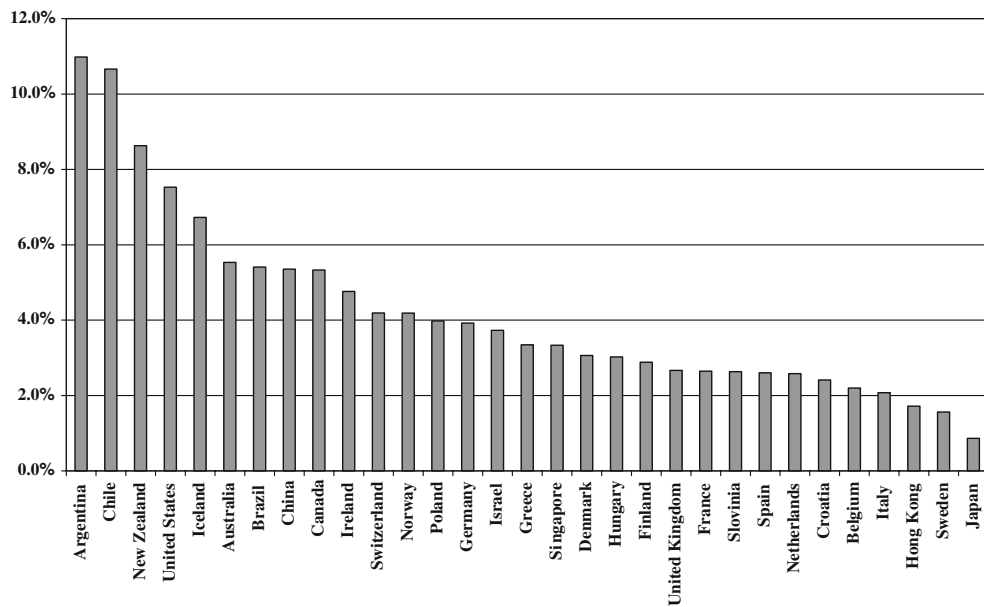


Fig. 1 Nascent entrepreneurs in % of adult population, 18–64 years old, averages 2002–2004

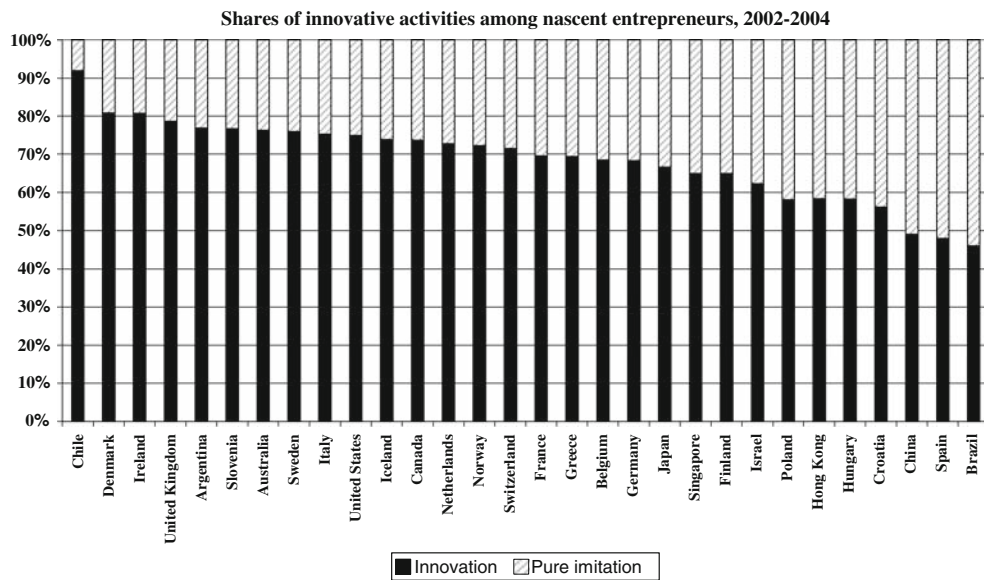


Fig. 2 Shares of imitative and innovative activities among adult nascent entrepreneurs, 18–64 years old, averages 2002–2004

The estimated coefficient on GDP per capita shows that innovative entrepreneurship is significantly more likely to occur in highly developed countries. Vice versa, this implies that purely imitative forms of entrepreneurial activity are more likely to occur in developing countries that operate below the world-wide PPF. This finding supports hypothesis 7.

The results also show a significant positive effect of higher education and self-confidence on entrepreneurial innovativeness, which is in line with hypotheses 4 and 5. In addition, unemployed individuals have indeed a higher chance to start more innovative business, supporting hypothesis 2. However, estimated coefficients are not significant for fear

Table 4 Logit model estimations on innovative nascent entrepreneurs

	Innovative nascent entrepreneurs (sinno)			
	Model 1		Model 2	
	Odds	$P > z $	Odds	$P > z $
<i>Individual covariates</i>				
Female	1.14**	0.02	1.15**	0.02
HH income (middle 33%)	0.97	0.71	0.97	0.65
HH income (upper 33%)	1.02	0.78	1.06	0.43
Tertiary education	1.37**	0.00	1.21**	0.00
Employment (not working)	1.30**	0.00	1.20**	0.04
Employment (retired, students)	1.38**	0.03	1.36**	0.04
Age	0.99	0.30	1.00	0.86
Age*Age	1.00	0.42	1.00	0.94
Knowent (yes)	1.04	0.55	1.02	0.70
Fearfail (yes)	0.91	0.17	0.94	0.34
Suskill (yes)	1.23**	0.01	1.21**	0.02
Opport (yes)	1.20**	0.00	1.17**	0.01
Discent (yes)	1.04	0.65	0.96	0.64
<i>Country covariates</i>				
GDP per capita, % of USA	1.90**	0.00	—	—
Tertiary education, % of pop	0.98	0.39	—	—
<i>Controls</i>				
Country dummies	—	—	Yes	
Year (2003)	0.84**	0.01	0.97	0.69
Year (2004)	0.81**	0.00	1.07	0.42
<i>Model diagnostics</i>				
N	6,605		6,576	
LL	−3,918		−3,768	
Prob > χ^2	0.00		0.00	

Note: The reference category of the dependent variable in both estimations is purely imitative behavior (=0). Reference categories of the explanatory variables are HH income (lower 33%), tertiary education (no), employment (full or part-time job), Year (2002), and “no” as an answer to the binary variables

* Denotes significance at 95% confidence

** Denotes significance at 99% confidence

of failure (hypothesis 1), higher income (hypothesis 3), and a highly developed education system (hypothesis 6).¹²

¹² Additional regressions, not reported here, show that different types of innovative entrepreneurial activity have different antecedents. In fact, some of the explanatory variables show a significant positive effect in one model but a significant negative effect in another model. For example, sufficient skill perceptions are positively related to product innovations, but negatively related to process innovations. The estimation results reported Table 4 could be thought of as the average effect across all possible different types of innovative entrepreneurial activity.

5 Discussion

Table 5 summarizes the empirical evidence on the seven hypotheses. Contrary to the theoretical expectations, both models did not show a significant influence of fear of failure on entrepreneurial innovativeness. However, this empirical finding should not be mistaken as evidence against hypothesis 1, which stated that innovative entrepreneurs are likely to be less risk averse. Instead, the insignificant estimation results could be due to the fact that fear of failure (*fearfail*) may not be a sufficiently good measure for risk or uncertainty aversion. What may actually be needed to test hypothesis 1 is an experimentally validated survey item that measures risk preferences, such as the one proposed by Dohmen et al. (2005).

Table 5 Summary of empirical results

Hypothesis	Empirical support*
(1) Innovative entrepreneurs are less averse to risk and uncertainty	
(2) Innovation more likely among unemployed individuals	+
(3) Innovation more likely among individuals with low income	
(4) Innovation more likely among confident individuals	+
(5) Innovation more likely among highly educated individuals	+
(6) Innovation more likely in countries with well developed education systems	
(7) Innovation more likely in countries close to the PPF	+

* Dependent variable is entrepreneurial activity that involves at least one innovative element, such as introducing a new product, a new process, or entering a market with limited expected competition

The inclusion of such a measure could be an interesting extension of the GEM survey.

The empirical evidence supports hypothesis 2, which stated that currently unemployed individuals should have a higher likelihood to consider innovative and, thus, more risky and uncertain business ideas. This is in line with prospect theory (Kahneman and Tversky 1979) which suggests that people in a loss situation are often actually risk and uncertainty seeking. The psychological logic behind such behavior could be that taking risks in a loss situation might involve a small chance to regain the desired material or social reference point, even though the expected value of taking such risks might be negative. In the case of unemployed individuals, the desired reference point they want to get back to might be an average income level and an acceptable social status.

The same kind of reasoning led to hypothesis 3, which claimed that individuals with a low income should be more likely to engage in innovative business opportunities. This hypothesis, however, is not supported by the empirical results. Indeed, the estimated coefficients show no significant relationship between household income and nascent entrepreneurial innovativeness. A possible reason is that purely imitative business ideas could have a lower average expected payoff than highly innovative

ideas.¹³ At least, this might be the prevailing ad hoc feeling of most people if success stories about entrepreneurs in the media mostly feature interesting innovative business ideas rather than pure arbitrage. Hence, purely imitative business ideas may not be a sufficiently attractive incentive to start a business for individuals with a high income. This opportunity costs argument might offset the tendency of low-income earners to accept more risky and uncertain decision alternatives.

Hypothesis 4, which claimed that innovation is more likely to occur among confident individuals, is supported. Since the success of entrepreneurs in the market is likely to be influenced by their skills and abilities, individuals who are confident in their skills and abilities will expect a higher payoff from starting a business than people who lack this self-confidence. Consequently, they are more likely to actually start a business (Koellinger et al. 2007). In addition, the inherent difficulties of starting a truly new and innovative business, combined with the low predictability of success and the lack of fast and clear feedback make a high level of self-confidence all the more important to engage in such kind of high risk activities. Importantly, whether a high level of self-confidence is objectively justified is not relevant when making the start-up decision. The true skills and abilities of a nascent entrepreneur for a particular business will only be revealed *ex-post*, conditional on actually starting the business. *Ex ante*, the potential entrepreneur must rely on her subjective self-evaluation, which might be biased.

Empirical evidence also supports hypothesis 5, which claimed that innovation is more likely to occur among highly educated individuals. A high educational attainment should provide individuals with necessary background knowledge about the current state of science and technology. In addition, it should provide highly educated people with the training to recognize, analyze, and solve complex problems, all of which contribute towards the individual ability to conceive innovative business ideas. However, it

¹³ Investment theory suggests that projects with higher risk must have a higher expected return if markets are efficient, information is complete, and investors are risk averse (Sharpe 1964). However, to the best knowledge, no empirical evidence yet exists to support or reject this hypothesis for new business start-ups.

should be recognized that individual educational attainment most probably correlates with other relevant variables not included in the study, such as intelligence, curiosity and a strong interest to find general solutions to problems. Thus, without controlling for these unobserved factors explicitly, we cannot conclude that higher education has a direct positive influence on entrepreneurial innovativeness. Rather, the result should be understood as indicating a potentially positive influence of higher education *and* its unobserved correlates, such as intelligence.

Hypothesis 5 claimed that innovation among nascent entrepreneurs is more likely to be found in countries with highly developed educational systems. However, the results of the econometric analysis do not indicate this. One reason for this could be that the chosen proxy variable (the percentage of population with at least tertiary education for persons 25–34 years old) is not sufficiently precise to capture those aspects of the educational system that actually increase creativity and innovativeness. Another possible reason is that the overall level of economic development could be more important for the degree of entrepreneurial innovativeness than the educational system alone.¹⁴

Finally, hypothesis 6 stated that highly developed countries are more likely to exhibit high shares of innovative entrepreneurs, while purely imitative entrepreneurship is more likely to prevail in less developed countries. The estimation results strongly support this hypothesis. The share of innovative entrepreneurship is significantly higher in economically advanced environments, even though in such environments market-level innovation is more likely to be globally new than in developing countries. Thus, even though market-level innovation should be relatively easier and cheaper in developing countries because many opportunities for imitation from highly developed countries should exist, the *ratio* of innovative to imitative entrepreneurs is higher in economically advanced countries, due to the lack of purely imitative business opportunities in these

environments. As explained above, closeness of a country to the PPF implies relatively little room for imitation because any point at the PPF is characterized by an efficient use of available resources and the current state of technology. This observation could also help to explain the relatively low rates of entrepreneurship in highly developed countries (Carree et al. 2002; Wennekers et al. 2005). While opportunities for purely imitative (but still potentially profitable) entrepreneurship are abundant in developing countries, such opportunities become increasingly exploited as countries progress towards to the PPF. Thus, there should be objectively fewer entrepreneurial opportunities in advanced countries, and those opportunities that do exist are more likely to involve innovation.

These empirical results are certainly not conclusive. Rather, they should be perceived as preliminary evidence on an important and complex research topic. The study takes advantage of the only currently available dataset that yields comparable information on different types of innovative activity among nascent entrepreneurs across countries and over various years, the GEM survey. However, some of the limitations of the data should be acknowledged. First, the study relies on subjective measures of innovativeness. It is certainly true that the subjective judgments of individuals influence their behavior. Therefore, it is interesting and appropriate to analyze how perceptions of self-confidence and business opportunities and other factors relate to the propensity of nascent entrepreneurs to innovate. However, because the evaluations of the survey respondents are necessarily subjective, the measurement could confound objective innovativeness with perceptual biases of the entrepreneurs. An objective measurement of innovativeness would also have to take into account the perceptions of customers or some performance criterion such as survival. This is an opportunity for future research. Second, the theoretical considerations in Sect. 2 outlined many additional factors not included in this study that could influence the innovative propensity of nascent entrepreneurs. Examples are direct measures of intelligence, creativity, risk, and uncertain preferences or a reliable measure of R&D output across countries. Of course, it is virtually impossible to include all potentially relevant explanatory variables in one study and this is not necessary as long as the missing variables are

¹⁴ This was indicated in a control regression: If GDP per capita was eliminated from the RHS, the proxy for the educational system became positive and significant, reflecting the fact that highly developed educational systems are more prevalent in high income countries. However, once GDP per capita is controlled for explicitly as in Table 4, the proxy for the educational system becomes insignificant.

independent from the covariates included in the regression (Wooldridge 2002). However, a conclusive test of hypotheses requires controlling for such unobservable heterogeneity, for example via fixed effects estimation in a panel or via experimental methods. Again, these are relevant and highly desirable avenues for future research. The particular strengths of the data reported here are the broad, international scope of the survey, and the measurement of innovative propensity among individuals who are actually in the start-up process at the time of the survey. Possible future studies using panel data or experimental methods are unlikely to have both the international and the real-world context of the data presented here.

6 Conclusions

Understanding the antecedents of entrepreneurial innovativeness is relevant because it requires us to address two of the most relevant issues in entrepreneurship research: Where do business opportunities come from? And why are some individuals more likely than others to exploit these opportunities? The theoretical part of this study suggests that these questions can be answered by combining a judgment and decision making framework with additional insights about individual creativity and economic factors that contribute to the objective existence of profit opportunities. The most important results of the empirical analysis can be summarized as follows:

First, innovative and imitative forms of entrepreneurship co-exist in all countries. No country is characterized by only imitative or innovative new business ventures. In addition, the distribution of innovative and imitative forms of entrepreneurship varies significantly across countries. Second, the strong country effects revealed in the regressions suggest that entrepreneurial innovativeness cannot be fully explained by individual specific factors alone. This finding implies that a substantial amount of commercializable new knowledge must be created by other human agents in a society than the entrepreneur. Consequently, we can conclude that entrepreneurial opportunities often have an objective component rather than being entirely the product of the creativity of the entrepreneur. Objectivity in this case means that some agent(s) in society, who are not necessarily

entrepreneurs, have generated information about a new end or a new mean that could, in principal, be generally accessible and perceived by other agents. The objective existence of this information, e.g., in the form of newly developed technologies or new organizational forms, influences the probability of potential entrepreneurs living in that society to perceive and ultimately to pursue an innovative rather than purely imitative business idea. In this sense, the empirical evidence presented here shows that the availability and quality of objective opportunities varies across countries. The results indicate that the position of a country relative to the worldwide PPF has a strong effect on the availability of opportunities for innovative and imitative new businesses. In particular, highly developed countries have a substantially lower share of purely imitative entrepreneurship than countries operating below the worldwide PPF.

Third, the empirical study revealed a significant influence of various individual-level characteristics identified in the empirical study, such as education, employment status, and self-confidence. This implies that even if opportunities to some extent exist objectively in the outside world, this does not inevitably trigger the creation of a certain number of innovative new businesses in a society. The act of perceiving, developing, and exploiting an opportunity remains an individual act that is inseparably linked to factors that influence individual decisions and ultimately make some individuals more likely than others to become innovative entrepreneurs. Differences in the distribution of such individual-specific factors across societies (such as education, self-confidence, and risk aversion) are likely to influence the prevalence of innovative entrepreneurial activity, even *if* societies should be identical in their endowment with objective opportunities.

Finally, asking the question “why are some entrepreneurs more innovative than others” does not imply that we should value innovative entrepreneurs more highly than imitative entrepreneurs. Instead, it is important to note that *both* innovative and imitative entrepreneurs can play an important role in the economy. For example, Quah (1997), Mankiw et al. (1992) and Barro and Sala-I-Martin (1997) emphasize that the speed of technology diffusion from highly developed to less developed countries is a key component for the speed of economic convergence. Imitative entrepreneurial activity could serve as a

mechanism that speeds up the diffusion of technology and best practices and hence could contribute to the convergence between countries and sectors with different levels of productivity and wealth (Schmitz 1989). The other side of the coin is that innovative entrepreneurship on the global scale can cause technological improvements and hence shift the worldwide PPF outwards (Schumpeter 1934), generating long-term economic growth and prosperity. Thus, both innovative and imitative entrepreneurial activity could be an important factors contributing towards economic development and the prosperity of nations. The relative importance of these different types of entrepreneurial innovativeness on growth is likely to co-vary with the level of economic development. I believe that further work on these interdependencies is an important and interesting avenue for future research.

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