Socio-cognitive traits and entrepreneurship: The moderating role of economic institutions

Christopher J. Boudreaux

Department of Economics, Florida Atlantic University

Boris N. Nikolaev

Department of Entrepreneurship, Baylor University

Peter Klein

Department of Entrepreneurship, Baylor University

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ABSTRACT

We examine how country-level institutional context moderates the relationship between three socio-cognitive traits—entrepreneurial self-efficacy, alertness to perceived business opportunities, and fear of failure—and entrepreneurial action. To do this, we blend social cognitive theory (SCT) with institutional theory to develop a multi-level model of entrepreneurial entry. We merge data from the Global Entrepreneurship Monitor (GEM) surveys and the Economic Freedom of the World (EFW) index for 45 countries from 2002 to 2012. Our results, which are based on a multi-level fixed-effects model, suggest that entrepreneurs' self-efficacy and alertness to perceived opportunities promote entrepreneurial action while fear of failure discourage it. However, the strength of these relationships depends on the institutional context, with entrepreneurial self-efficacy and alertness substantially more likely to lead to new ventures in countries with higher levels of economic freedom. These results suggest that economic freedom not only channels individual efforts to productive entrepreneurial activities, but also affects the extent to which individuals' socio-cognitive resources are mobilized to encourage high-growth entrepreneurship.

Keywords: entrepreneurship, economic freedom, social cognitive theory, multilevel analysis, alertness, opportunity recognition, fear of failure

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1. Executive summary

A growing body of academic research has identified various socio-cognitive traits such as self-efficacy and fear of failure as important determinants of entrepreneurial action (e.g., Rauch & Frese, 2007; Baron, 2006; Welpe et al., 2012). It is also widely acknowledged that country-level economic institutions such as competitive markets play an important role in promoting new business creation and long-run economic growth (Acemoglu et al., 2005; Bjørnskov & Foss, 2016; Estrin et al., 2013; Aidis et al., 2012). However, we still lack an integrative theoretical model and a systematic analysis of how country-level institutional context interacts with individual-level socio-cognitive traits to promote new venture creation. To fill this gap in the literature, we develop and test a *multi-level* model of entrepreneurial entry that brings a social cognitive perspective (Bandura, 1986; Wood & Bandura, 1989; Lent & Brown, 1996) to the study of institutions (North, 1990; Williamson, 2000; Acemoglu et al., 2005). Specifically, we focus on level two institutions

of Williamson's (2000) four-level hierarchy and examine the extent to which people with *similar* socio-cognitive traits—entrepreneurial self-efficacy, alertness to perceived business opportunities, and fear of failure—are more or less likely to engage in entrepreneurial action depending on the institutional environment in their country. We test the predictions of our model using a large representative sample of 721,581 individuals from 45 countries across a wide range of developmental and institutional contexts and employing a multi-level fixed-effects regression model to account for the hierarchical nature of our data.

Consistent with social cognitive theory (henceforth SCT), we find that entrepreneurs' self-efficacy and alertness to perceived business opportunities promote entrepreneurship while fear of failure decreases the likelihood of starting a business. However, the strength of these relationships *depends* on the institutional constraints in one's local environment, which determine the extent to which people are able and willing to allocate their available socio-cognitive resources towards productive market activities such as entrepreneurship (North, 1990; Baumol, 1990; Williamson, 2000). In countries with high levels of economic freedom, for example, people who are alert to potential business opportunities are more likely to start new ventures compared to their counterparts who have *similar* socio-cognitive resources but live in less economically free societies with more cumbersome regulations and weak contracting institutions.

Our study contributes to overlapping streams in entrepreneurship, SCT, and new institutional economics. First, we develop a multi-level framework and empirically test the link between individual socio-cognitive traits and country institutional context. In doing so, we provide empirical evidence for one possible mechanism through which formal economic institutions *enable* individuals to more effectively channel their socio-cognitive resources towards productive entrepreneurship. This allows us to move the conversation from *whether* socio-cognitive traits

matter to examining the optimal institutional conditions under which they are *more likely* to promote business creation. We also explore the multi-dimensional nature of economic freedom by studying which institutions are more likely to facilitate (impede) the effect of socio-cognitive traits on entrepreneurial entry. Finally, we provide preliminary empirical evidence with respect to necessity-motivated ventures.

2. Introduction

A large body of academic research suggests that motivation and performance achievement are controlled by several socio-cognitive mechanisms related to entrepreneurial self-efficacy, outcome expectations, and personal goals that can significantly influence people's propensity to engage in entrepreneurial action (e.g., Rauch & Frese, 2007; Baron, 2006; Welpe et al., 2012). It is also widely acknowledged that economic institutions such as competitive markets, a robust banking system, and secure property rights play an important role in promoting entrepreneurship and long-run economic growth and prosperity (Acemoglu et al., 2005; Estrin et al., 2013; Aidis et al., 2012; Bjørnskov & Foss, 2016). Notwithstanding this impressive body of work, however, we still lack systematic analysis of how country-level institutional context interacts with individual-level socio-cognitive traits to promote new business ventures that can have a long-lasting economic impact.

We fill this gap in the literature by studying how formal institutions—level two in Williamson's (2000) four-level hierarchy—*moderate* the relationship between three socio-cognitive traits—entrepreneurial self-efficacy, alertness to perceived business opportunities, and fear of failure—and entrepreneurial action. This is important because institutions, together with the standard constraints of economics, "determine transaction and production costs and hence the profitability and feasibility of engaging in economic activity" (North, 1991: 97). This implies a *multi-level* dynamic such that the extent to which individuals are able and willing to allocate their

socio-cognitive resources towards entrepreneurship *depends* on the degree to which the local institutional environment supports or constrains such activities (Williamson, 2000).

Specifically, we ask the following two questions: Is it possible that a reinforcing effect exists such that individuals with *similar* socio-cognitive traits are more likely to pursue entrepreneurship depending on the institutional context? If so, which type of institutions are most likely to influence this dynamic? To address these questions, we blend social cognitive theory (Bandura, 1986; Wood & Bandura, 1989; Lent & Brown, 1996) with institutional theory (North, 1990; Williamson, 2000; Acemoglu et al., 2005) to develop a conceptual framework that links individual-level socio-cognitive traits to country-level institutional context. In doing so, we answer recent calls in the literature for more systematic studies that examine entrepreneurship as a *multi-level* phenomenon driven by factors that interact across different levels of analysis (Shepherd, 2011; Terjesen et al., 2016; Bjørnskov & Foss, 2016; Kim et al., 2016).

We test the predictions of our model using a large representative sample of 721,581 individuals from 45 countries across a wide range of developmental and institutional contexts. Because of its potential for long-term economic impact (Reynolds et al., 2004; Block et al., 2015), we focus on opportunity entrepreneurship, understood as the pursuit of potentially valuable business opportunities as perceived by individual actors. To account for the hierarchical nature of our data, we use a multi-level fixed-effects regression model (Peterson et al., 2012). This allows us to avoid the so-called *ecological fallacy*, i.e., making inferences about individual behavior from macro-level statistical correlations (Robinson, 1950; Freedman, 2002; Seligson, 2002), a problem that can be further exacerbated by the inappropriate aggregation of data from one level to another (Autio et al., 2013).

Consistent with SCT, we hypothesize and find that socio-cognitive traits such as entrepreneurial self-efficacy and alertness to perceived opportunities promote new business creation while fear of failure discourages it. However, the strength of these relationships *depends* on the local institutional environment, which moderates the extent to which people are able and willing to allocate their socio-cognitive resources to pursue productive market activities such as entrepreneurship (North, 1990; Baumol, 1990; Williamson, 2000). In countries with high levels of economic freedom, for example, people who are alert to potential business opportunities are more likely to engage in opportunity entrepreneurship compared to people who have *similar* socio-cognitive resources but live in societies with more burdensome regulations and weaker protections for contracts.

Our theoretical model and empirical findings make several contributions. First, prior studies show that institutions affect entrepreneurial action (Bjørnskov & Foss, 2008; Nyström, 2008; McMullen et al., 2008; Nikolaev et al., 2018), but the specific mechanisms through which individual beliefs, expectations, and goals interact with macro-level policies and conditions are typically inferred, rather than examined directly. Thus, we still lack an integrative theoretical framework and systematic empirical analysis that can "help detail [multi-level] institutional mechanisms" (Jennings et al., 2013: 3). Our model lets us study one possible mechanism that considers economic institutions as *moderators* of the relationship between key socio-cognitive traits and opportunity entrepreneurship.

Second, an important shortcoming of the literature so far has been the assumption that responses to institutional and policy differences are homogenous across different types of industries, businesses, and groups of individuals (Bjørnskov & Foss, 2016). In that sense, almost all empirical studies so far estimate the *average treatment effect* of institutions on entrepreneurship

(Bjørnskov & Foss, 2016; Su et al., 2017), which not only hides important mechanisms through which institutions might work, but can also create substantial measurement error (Autio et al., 2013). Instead, the effect of institutions can significantly differ based on the characteristics of the firm or the individual (Bjørnskov & Foss, 2013), a dynamic which is also relevant in the context of cultural institutions (Autio et al., 2013). Our paper advances this stream of research by showing that the extent to which formal institutions promote new opportunity-driven ventures also depends on individual traits such as entrepreneurial self-efficacy, providing further nuance on the application of SCT in the domain of entrepreneurship.

Third, while studying complex composite indicators can be a useful way of summarizing the effect of a wide range of institutional policies, it can also hide important trade-offs between policy components (Lihn & Bjørnskov, 2017). Although we focus on the overall level of economic freedom for the main analytical part of the paper, we also account for the multi-dimensional nature of economic freedom by exploring which institutions are more likely to moderate the effect of social-cognitive traits on entrepreneurial entry. Thus, we answer recent calls in the literature for more systematic multi-level investigations that examine the role of *specific* institutions in promoting high-growth entrepreneurship (cf. Estrin et al., 2013). Finally, in further tests, we provide preliminary empirical evidence with respect to necessity entrepreneurs, who represent over a billion people around the world (Brewer & Gibson, 2014; Khanna, 2007).

3. Operationalizing economic institutions

In this paper, we adopt Williamson's (2000) conceptual framework which categorizes institutions as a four-level hierarchy.[1] At the top (level one) are informal institutions such as customs, traditions, and religious norms. These institutions are deeply embedded in society and

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[1] This framework has been used in several recent papers on the institutional context of entrepreneurship (Bylund & McCaffrey, 2017; Estrin et al., 2013; Misangyi et al., 2008; Pacheco et al., 2010).

emerge and change spontaneously over a long period of time (100 to 1000 years). Formal institutions, which define the economic "rules of the game," are located at level two and represent the institutional environment, which can change more rapidly (10 to 100 years). These formal rules and constraints are related to property rights and formal regulatory policies, which relate to the effectiveness of government action. The third level is governance, which represents the play of the game—how government structures align with transactions—which can change even more rapidly (1 to 10 years). Finally, the three previous levels determine the fourth, which represents *resource allocation*, including engaging in entrepreneurial action.

Because entrepreneurs are willing to take high levels of risk in order to capture future returns, level two institutions are particularly important for entrepreneurial action as they determine how much of the potential future profits entrepreneurs get to claim (Estrin et al., 2013; Acemoglu et al., 2005; Baumol, 1990). Moreover, formal institutions such as business, credit, or labor regulations capture various "constraints" on human behavior that can inhibit people's ability to exploit their socio-cognitive resources in pursuit of potentially profitable business opportunities. In this respect, people with *similar* socio-cognitive resources (e.g., being alert to a potential business opportunity) may be more or less likely to pursue entrepreneurship depending on the institutional constraints in their local environment. Consequently, we follow most empirical studies on the topic and focus on formal institutions (level two), which we operationalize as economic freedom (e.g., see Bjørnskov & Foss, 2008; McMullen et al., 2008; Sobel, 2008; Nyström, 2008; Lihn & Bjørnskov, 2017).[2]

To measure economic freedom, we use the Economic Freedom of the World (EFW) index (Gwartney et al., 2016). The EFW index is a complex composite indicator that captures various

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[2] This logic is now part of the established theoretical framework that entrepreneurship scholars increasingly use to explain differences in entrepreneurial outcomes across countries and over time. For excellent summaries, see Bjørnskov & Foss (2016) and Su et al. (2017).

institutional constraints related to the size of government, the legal system and property rights, sound monetary policy, trade barriers, and regulation. Because recent studies suggest that various elements of the EFW index may capture policies that are potential substitutes of each other, we focus on the overall index (Bjørnskov & Foss, 2016), though we include some robustness checks using individual subcomponents.

4. Theory and hypotheses

SCT (Bandura, 1986; Wood & Bandura, 1989; Lent & Brown, 1996) suggests that human behavior is influenced by personal, behavioral, and environmental factors which interact in a three-way relationship. While individual cognition contributes to human behavior, the institutional environment is equally important to people's career choices (Wood & Bandura, 1989). Central to SCT are individual traits such as self-efficacy, outcome expectations, and personal goals (Bandura, 1986), which form the core of our theoretical model. Within this more general framework, social context is viewed as either shaping individuals' socio-cognitive traits directly or *moderating* their relationship with proximal choice behavior (e.g., Lent et al., 1994).

This view is also consistent with the perspective from new institutional economics, which provides a more formal and fine-grained framework of analyzing the relationship between economic institutions and individual behavior (North, 1990; Baumol, 1990; Williamson, 2000; Acemoglu et al., 2005). Within this tradition, formal institutions *moderate* the relationship between socio-cognitive resources and proximal choice behavior in two ways. First, formal institutions are viewed as "constraints" on human behavior (North, 1991, p. 97), which can either facilitate or impede the extent to which people are able to allocate their socio-cognitive resources towards productive market activities such as opportunity entrepreneurship (e.g., North, 1990; Williamson, 2000; Acemoglu et al., 2005). These institutional constraints include cumbersome labor, credit or

business market regulations, international trade barriers (e.g., tariffs, compliance cost of importing, etc.), marginal tax rates, or, more generally, capture the integrity of the legal system and the efficiency of contractual institutions. These constraints can significantly impede people's ability to pursue productive entrepreneurship even if they have the necessary socio-cognitive resources (e.g., being alert to a new business opportunities) and are willing to do so.

Second, institutions determine the relative rewards from engaging in different productive and non-productive market and non-market activities (Baumol, 1990; Williamson, 2000). In that sense, people with the same socio-cognitive resources may choose to allocate their scarce psychological resource to activities other than productive entrepreneurship if the relative pay-off from alternative activities is higher (Baumol, 1990; Williamson, 2000). This is because decisions about which business opportunities to pursue and which to pass up "involve discerning circumstances in which new products, services, or business models can be introduced profitably to one or more markets" (Wood et al., 2016: 1162), which to a great extent is determined by the local institutional environment (Williamson, 2000; North, 1990; Foss & Klein, 2012).

What this implies for our model is that people with *similar* socio-cognitive resources may allocate them in a completely different way (e.g., pursue non-productive entrepreneurship) as they adapt their strategies to fit the opportunities and constraints in their local institutional environment (Baumol, 1990; North, 1990; Williamson, 2000; Acemoglu et al., 2005). Figure 1 summarizes this dynamic in which economic institutions *moderate* the relationship between three socio-cognitive traits and entrepreneurial action. In what follows, we blend social cognitive theory with new institutional economics to develop our hypotheses and further motivate our multi-level approach.
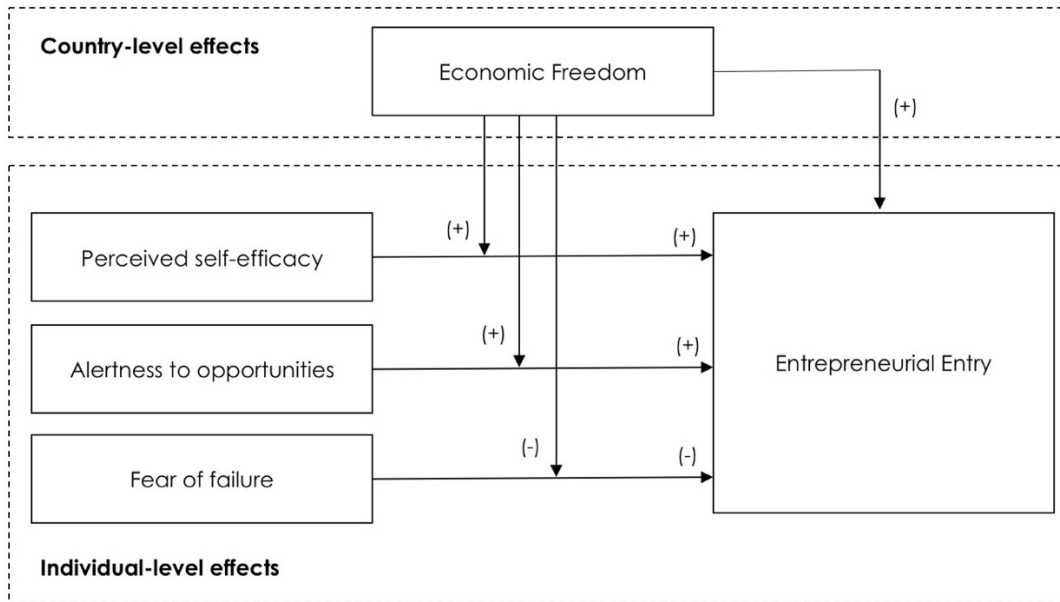
Figure 1: Theoretical Model

4.1.Socio-cognitive traits and entrepreneurial action

SCT (e.g., Bandura, 1986; Wood & Bandura, 1989; Lent & Brown, 1996) suggests that motivation and performance achievement are controlled by several self-regulatory mechanisms. One key mechanism is personal self-efficacy, defined as people's "beliefs in their capabilities to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over events in their lives" (Wood & Bandura, 1989: 364). In the context of entrepreneurship, self-efficacy refers to the belief entrepreneurs have in their own skills and capabilities to start and run new business ventures (McGee et al., 2009). The key message from this literature is that in order to be successful, entrepreneurs need not only skills and knowledge, but also resilient self-belief in their own capabilities to accomplish desired goals and exercise control over their environment (Rauch & Frese, 2007; McGee et al., 2009; Godwin et al., 2016). This is critical to our theory because it suggests that there is a difference between having skills and knowledge and actually using them in challenging circumstances where outcomes are highly uncertain, and behavior can be constrained by the institutional context.

Perceived self-efficacy is central to the entrepreneurial mindset (Mauer et al., 2017), and a large number of studies suggest that it is a strong indicator of entrepreneurial action (e.g., see meta-analysis by Rauch & Frese, 2007). Self-efficacy beliefs have been consistently linked to people's intentions to engage in entrepreneurship (Sequeira et al., 2007; Wilson et al., 2007; Zhao et al., 2005), which is, arguably, one of the most important antecedents of behavior (Ajzen & Fishbein, 1977; Ajzen, 2001). Perceived self-efficacy can also influence motivation, which in turn can determine how much effort people exert in pursuing their goals (Wood & Bandura, 1989). The stronger the self-belief in one's capabilities, the greater and more persistent the effort will be to master challenging tasks and complete goals, even in the face of adversity (Wood & Bandura, 1989; Bullough et al., 2014). In this respect, self-efficacy can be particularly important in the domain of entrepreneurship where decisions are made in a highly dynamic, complex, and extremely uncertain environment and involve high levels of personal risk, stress, and effort (Baron & Shane, 2007; Rauch & Frese, 2007). Taken together, this suggests the following hypothesis:

Hypothesis 1: *Perceived self-efficacy increases the likelihood of becoming an opportunity-motivated entrepreneur.*

SCT also suggests that people are future oriented, which means that they create goals in the present to motivate behavior that can fulfill these goals in the future (Bandura, 1986). When people have no clear vision about what they are trying to accomplish, their motivation is low, and their efforts can be misguided (Wood & Bandura, 1989). In that sense, opportunity recognition can facilitate the development of more clear goals, providing a sense of purpose and direction, which can encourage and sustain a level of effort necessary to fulfill these goals (Baron & Shane, 2007). Thus, many entrepreneurship scholars have identified opportunity recognition as one of the most distinctive and fundamental features of entrepreneurial behavior (Kirzner, 1979; Stevenson &

Jarillo, 2007; Venkataraman, 1997), which is also a key construct in many recent entrepreneurship models (Gaglio & Katz, 2001; Baron, 2006; Tang et al., 2012).[3]

Entrepreneurial alertness, understood as the perception of potential business opportunities, is central to much modern theorizing about entrepreneurship (Foss & Klein, 2010). People who have entrepreneurial alertness are more likely to recognize what they perceived as opportunities for economic profit. This recognition, in turn, serves as the basis of forming goals that lead to new venture creation (Baron, 2006). In the language of social cognitive theory, "symbolic conceptions are translated into appropriate courses of action" (Wood & Bandura, 1989: 362). Although not all businesses start as a result of perceived business opportunities, many do (Baron & Shane, 2007). Thus, having alertness to perceived opportunities is an important antecedent of becoming an entrepreneur (Baron & Shane, 2007), which leads to our next hypothesis:

Hypothesis 2: *Entrepreneurial alertness to potential business opportunities increases the likelihood of becoming an opportunity-motivated entrepreneur.*

Central to SCT are expectations about future outcomes (Bandura, 1986). When people believe that an outcome is difficult to obtain, and the likelihood of failure is high, they are more likely to have self-debilitating thoughts that can stifle future behavior (Wood & Bandura, 1989). In the context of entrepreneurship, this suggests that while having alertness to potential business opportunities is an important precursor of entrepreneurial action, it is not sufficient. This is because entrepreneurship requires action, and action requires willingness to bear uncertainty (McMullen & Shepherd, 2006). In this respect, the entrepreneurship literature emphasizes the critical role of risk propensity (Knight, 1921; Schumpeter, 1934). Thus, whether an individual engages in entrepreneurship depends not only on their self-efficacy and alertness to new opportunities, but

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[3] A central concept in Kirzner's (1973, 1979, 1985) influential writings, for example, is that of *entrepreneurial alertness*, which he defines as "the ability to notice … opportunities that have hitherto been overlooked" (1979: 48).

also, and even more importantly, on their willingness to bear uncertainty (Knight, 1921; Mises, 1949; Foss & Klein, 2012). Within this framework, individuals who become entrepreneurs differ in fundamental ways from non-entrepreneurs in their motivation and attitude toward risk propensity (e.g., Douglas & Shepherd, 2002; Knight, 1921; Schumpeter, 1934).

Fear of failure frames how individuals define and bear uncertainty in achievement situations (Heckhausen, 2013) and is considered a major impediment to entrepreneurial action (Caliendo et al., 2009). This is because failure provokes unpleasant emotional response (e.g., grief, shame, guilt and self-blame) that can damage one's self-esteem (Shepherd, 2003; McGregor & Elliot, 2005). Thus, if people view failure in a negative way, they will actively try to avoid it (Shepherd, 2003). Fear of failure can be particularly inhibiting in the context of entrepreneurship because it is difficult to separate business failure from personal failure since the identity of the business is often closely tied to the identity of the entrepreneur (Shepherd, 2003). Just as entrepreneurial overconfidence is a strong motivator of entrepreneurial entry, fear of failure makes entry less likely (Busenitz & Barney, 1997). Consequently, fear of failure can discourage people from engaging in activities with high failure rates such as entrepreneurship (e.g., Caliendo et al., 2009), so that:

Hypothesis 3: *Fear of failure decreases the likelihood of becoming an opportunity-motivated entrepreneur.*

4.2. The moderating role of economic institutions

The decision to engage in entrepreneurial action happens at the individual level, and a variety of individual-level factors have been found to affect the probability of entrepreneurial entry (e.g. see Simoes et al., 2016). However, human behavior does not occur in an institutional vacuum (Bandura, 1986; Wood & Bandura, 1989; North, 1990; Williamson, 2000). Instead, the feasibility of every exchange in the economy, including the decision to start a new business, is embedded in a complex matrix of formal and informal rules, norms, and incentives within which the exchange

takes place (Williamson, 2000; Baumol, 1990; Acemoglu et al., 2005). These institutional conditions regulate resource allocation by shaping relative economic rewards and shared expectations about future outcomes (Williamson, 2000; Bylund & McCaffrey, 2017)[4] thus molding "the subjective mental constructs that individuals use to interpret the world around them and make choices" (North, 1990, p. 3). What this implies for our model is that there are "multiple equilibria," so that individuals with *similar* socio-cognitive traits may engage in a completely different behavior based on the mental models formed in their local environment (North, 1991; Williamson, 2000). This multi-level dynamic suggests that an interactive relationship exists such that formal institutions *moderate* (facilitate or constrain) the extent to which individuals are likely to allocate their socio-cognitive resources towards entrepreneurship (Wood et al., 2016).

According to the main tenets of SCT (Bandura, 1986; Wood & Bandura, 1989), people with strong self-efficacy beliefs will be more likely to pursue new business opportunities even in adverse environments (Bullough et al., 2014). However, the extent to which self-efficacy will encourage entrepreneurial entry will also depend on the institutional context, which can influence people's intentions, the effort they exert in pursuing challenging tasks, and the degree to which they mobilize their socio-cognitive resources (Wood & Bandura, 1989). People with *similar* self-efficacy beliefs, for instance, will be less likely to pursue entrepreneurial action in institutional contexts where expected business returns (profits) are lower and less certain, the relative rewards from alternative career paths higher, and there are significant institutional barriers to starting new business ventures (Baumol, 1990; Williamson, 2000; Acemoglu & Johnson, 2005).

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[4] This institutional matrix represents collectively recognized rules, symbols, or social modes of thinking that create a "system of mutual expectations" (Sugden, 1998, p. 73) about the choices and expectations of other actors in society (Eggertsson, 2005; North, 1990; Bylund & McCaffrey, 2017).

In this respect, Acemoglu & Johnson (2005) suggest two channels through which the institutional environment can influence people's expectations about potential gains and losses from engaging in entrepreneurship: (1) the risk of expropriation by arbitrary government (vertical institutions), and (2) the quality of contracting institutions (horizontal institutions). When vertical and horizontal institutions are weak (i.e., economic freedom is low), potential rewards from engaging in entrepreneurial action will be lower because arbitrary expropriation will be seen as a loss by potential entrepreneurs (Acemoglu & Johnson, 2005). Because high-growth opportunity entrepreneurs also rely on larger capital investments, they depend heavily on the quality of contractual arrangements for input supplies, distribution of products, and long-term sources of funding (Estrin et al., 2013). When these arrangements are vague, contradictory and constantly changing, potential entrepreneurs and investors feel less protected (Acemoglu & Johnson, 2005). This, in turn, can further encourage opportunistic behavior and reduce the expected return from starting a new venture (Estrin et al., 2013). Therefore, people with similar self-efficacy beliefs will be less likely to engage in entrepreneurship in countries where vertical and horizontal institutions are weak.

In societies with lower levels of economic freedom, entrepreneurs who possess highly specialized knowledge, skills and strong self-efficacy beliefs must also contend with political markets (Ge et al., 2017) and extractive governments (Aidis et al., 2008), which can further inhibit the extent to which entrepreneurs can capitalize on their psychological resources. Government policies also tend to limit the returns to skills related to managing risk or adapting resources to changing market forces and further restrict access to credit, labor, or financial markets (King et al., 2012). This, in turn, can limit the ability of entrepreneurs to use their socio-cognitive resources toward newly emerging profitable sectors (King et al., 2012).

As the scope and size of government increases, the state also requires more revenue, which is usually acquired through higher rates of taxation. While higher taxes can be used to provide infrastructure, education, and other public goods useful to entrepreneurs, they also represent an additional cost to productive market activities, which can lower expected returns and provide disincentive for people to engage in entrepreneurship even if they have the necessary socio-cognitive resources (Baumol, 1990; Murphy et al., 1990). Prior evidence, for instance, indicates that heavy regulatory and tax burden negatively affects entrepreneurs' opportunity evaluation decisions (Wood et al., 2016). That is, when economic freedom is low, entrepreneurs will be less likely to pursue a business opportunity even if they are alert to one, and even if they have strong self-efficacy beliefs, because they are more likely to discount its marginal value in terms of future profits (Wood et al., 2016). In that case, productive market behavior will be less lucrative on the margin compared to alternative behaviors, and people with *similar* self-efficacy beliefs may be pulled into non-productive entrepreneurship such as manipulating the political and legal system to capture favorable treatment from the state (Downs, 1962; Niskanen, 1971; Olson, 1965; Sobel, 2008). Taken together, this leads to our next hypothesis:

Hypothesis 4: *Economic freedom positively moderates the relationship between perceived self-efficacy and opportunity-motivated entrepreneurship.*

Being an entrepreneur means to act on a perceived opportunity one believes is worth pursuing. However, because entrepreneurship takes place over time, and because the future is unknowable, entrepreneurial action is inherently uncertain (McMullen & Shepherd, 2006; Foss & Klein, 2012). Uncertainty creates a sense of doubt and delays action through hesitancy (Dewey, 1997), indecision (Goldman, 1986), self-doubt (Bandura, 1986), and procrastination (Yates & Stone, 1992). Thus, SCT suggests that uncertainty can act as a barrier for entrepreneurial action (Bandura, 1986; Busenitz, 1996; Kaish & Gilad, 1991; Kirzner, 1979). What this implies for our model is

that having alertness to potential market opportunities is not a sufficient condition for starting a new business. Instead, people who identify market opportunities will be less likely to put effort, persevere, and pursue their goals as the institutional environment becomes less certain (North, 1990; Williamson, 2000; Acemoglu & Johnson, 2005; Bylund & McCaffrey, 2017).

According to North (1990: 3), "institutions reduce uncertainty by providing a structure to everyday life." However, when the legal rules are random, contradictory, and constantly changing, formal institutions (level 2) can create more uncertainty than alleviate it (Acemoglu & Johnson, 2005; Williamson, 2000). As institutional uncertainty increases, people will refrain from investing in new business ventures even if they are alert to potentially profitable business opportunities (Bylund & McCaffrey, 2017). This decision can be fueled by fears of increasing government involvement in the economy that can range from simple tax-rate increases to the establishment of new industry regulations that can pose threats to short-term profits and increase the risk of expropriation (Higgs, 1997; Acemoglu & Johnson, 2005). Under such conditions, it is difficult for entrepreneurs to forecast, plan, and engage in essential activities necessary to managing their ventures successfully.

Moreover, when regulations are numerous and often changing (low economic freedom), both public officials and entrepreneurs have a more difficult time navigating through the legal uncertainty (Acemoglu & Johnson, 2005; Williamson, 2000). In that case, entrepreneurs increasingly rely on informal arrangements because of the inefficiency of the public sector (Rodrik, 2008). But enforcing such informal arrangements can be more difficult, ultimately increasing uncertainty in the process of starting a business (Acemoglu & Johnson, 2005). As the bureaucratic apparatus grows, private decision-making is replaced with government decision-making, which can further create a coordination problem and lead to even larger bureaucracy and

more regulation (Boettke & Coyne, 2009). The implication for our model is that increasing the complexity of the regulatory environment puts pressure on new businesses to comply with the increasing number of regulations, which requires larger and more complex administrative structures (Meyer & Scott, 1991). This can inhibit entrepreneurs' motivation and ability to start new business ventures even if they are alert to new business opportunities, because they must learn and comply with a large number of rules and regulations (Estrin et al., 2013).

Finally, the greater the degree of economic freedom in the economy, the more individuals can use their own judgement to act on potential opportunities and engage in voluntary cooperation. In this respect, "freedom of entry is the legal and institutional prerequisite for the discovery procedure of the market" (Kirzner, 1982: 4). In other words, economic freedom is a critical institutional requirement that enables individuals to act on potential business opportunities. Therefore, because lack of economic freedom is associated with greater regime uncertainty (Bjørnskov, 2016), weak vertical and horizontal institutions (Acemoglu et al., 2005), lower expected returns, and can further provide incentives for economic agents to engage in alternative activities (Baumol, 1990; Sobel, 2008), we expect that people who are alert to potential business opportunities will be less likely to start a new business when economic freedom is low. This lead to our next hypothesis:

Hypothesis 5: *Economic freedom positively moderates the relationship between alertness and opportunity-motivated entrepreneurship.*

SCT suggests that people who are not afraid of failure will be more likely to engage in risky behaviors such as starting a new business (Bandura, 1986; Wood & Bandura, 1989). However, the extent to which fear of failure will influence the decision to engage in entrepreneurial action will also depend on the institutional environment where risk tolerance plays out. This is because the decision to start a new business will depend not only on people's willingness to bear uncertainty, but also on their perception of potential gains and losses from engaging in the risky activity, which

is at least partially determined by the institutional context (Acemoglu & Johnson, 2005; Williamson, 2000). When risk-attitudes are *similar*, people will be more likely to engage in entrepreneurial action if the potential gains are higher (Rabin, 2013).

In societies with low levels of economic freedom (weak vertical and horizontal institutions), where expected returns are lower and more uncertain (Higgs, 1997; Acemoglu et al., 2005; Bylund & McCaffrey, 2017), fear of failure is more likely to impede entrepreneurial entry. On the other hand, well-defined property rights and transparent and efficient legal system (i.e., strong horizontal and vertical institutions) will greatly reduce transaction costs, mitigate uncertainty in human interaction, and in turn facilitate entrepreneurial action, even if risk attitudes are similar. Moreover, when government spending increases relative to private spending, political decision-making is substituted for personal choice and economic freedom is reduced (Gwartney et al., 2016), which can further crowd out private investment and increase the cost of essential inputs (human and physical capital) that are essential to high-growth entrepreneurial ventures (Aidis et al., 2012; Estrin et al., 2013). This can further inhibit entrepreneur's ability to capitalize on their lack of fear of failure by increasing the cost of essential inputs that can further lower expected profits. Countries with larger welfare states also "do not emphasize the responsibility of the individual for their own survival, which may hamper ambitions to strive for innovation and growth" (Hessels et al., 2008, p. 328) even if people are not afraid to engage in entrepreneurial action.

Finally, the new institutional economics (Baumol, 1990; North, 1990; Williamson, 2000) suggests that as economic freedom decreases, potential gains will be relatively lower (e.g., due to higher taxation and increasing costs of inputs), regime uncertainty will be higher (Bylund & McCaffrey, 2017), and the relative rewards from engaging in productive market opportunities will decline (Baumol, 1990; Murphy et al., 1990). This will further inhibit the positive effect of low

perception of fear of failure on entrepreneurial entry by encouraging people to allocate their socio-cognitive resources toward other activities that have higher expected return (Sobel, 2008), so that:

Hypothesis 6: *Economic freedom positively moderates the relationship between fear of failure and opportunity-motivated entrepreneurship.*

5. Data and Methods

We test these hypotheses using data from the Global Entrepreneurship Monitor (GEM), covering 45 countries from 2002 to 2012. Table 1 shows the average values of the main variables of interest in this study for each country in our sample. Forty-seven percent of all individuals reported having skills that are required to become an entrepreneur (self-efficacy), and 32 percent of all individuals reported being alert to new business opportunities (i.e., opportunities they expected to arise in the next six months).[5] The average level of economic freedom was 7.47, ranging from 5.76 to 8.86. The mean participation rate in OME and NME was six percent and two percent, respectively. Table 2 provides summary statistics and a correlations matrix for all variables in our study.

5.1. Dependent variables

We follow convention and define entrepreneurship as an "attempt at a new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business" (GEM, 2016). We furthermore narrow our definition to only opportunity-motivated entrepreneurs (OME), who are "pulled" into entrepreneurship by opportunities that promise high individual rewards including higher income or a greater sense of autonomy. We focus on OME because of its potential for economic growth and new job creation via high growth

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[5] There is substantial cross-country variation in opportunity and necessity entrepreneurship. Opportunity entrepreneurship ranges from a high of 33.61% participation in Peru to a low of 2.65% participation in Hong Kong. Necessity entrepreneurship ranges from a high of 20.31% in Peru to a low of 0.31% in Denmark.

businesses creation, which is relevant for public policy (Acs, 2006; Autio and Acs, 2010; Hessels et al., 2008; Minniti and Lévesque, 2010; Estrin et al., 2013).

Country	N	(%) Opportunity entrepreneurship	(%) Necessity entrepreneurship	Self-efficacy	Alertness	Fear of failure	Economic freedom
Argentina	4249	10.1	6.23	64.2	43.42	37.87	6.18
Austria	4612	7.09	1.18	53.66	46.12	40.18	7.65
Belgium	15040	4.32	0.49	40.92	26.76	30.53	7.41
Brazil	23366	10.83	6.59	55.67	47.15	36.95	6.41
Chile	3942	10.48	6.62	58.5	38.08	33.69	7.81
China	15736	11.38	8.58	40.84	34.84	30.94	6.25
Croatia	10295	5.48	3.31	53.15	28.73	37.97	6.63
Czech Republic	2638	5.99	2.52	42.65	27.86	38.32	7.15
Denmark	20620	5.49	0.31	41.31	58.18	37.74	7.82
Finland	11083	6.16	1.1	43.47	50.95	32.79	7.81
France	14695	2.93	0.86	32.07	24.55	44.78	7.34
Germany	41521	5.17	1.77	42.69	25.9	44.12	7.63
Greece	12737	6.42	2.56	55.39	21.17	59.87	7.02
Hong Kong	3629	2.65	1.45	23.7	21.14	38.03	8.81
Hungary	13926	5.34	2.2	41.38	16.28	34.15	7.21
Iceland	10774	12.72	1.28	53.65	53.29	37.12	7.59
India	7447	8.81	3.14	51.54	42.38	29.46	6.45
Ireland	13196	6.99	1.8	49.11	34.19	36.72	7.9
Israel	7857	5.17	1.89	41.56	29.85	42.57	7.27
Italy	13249	3.59	0.8	40.15	27.53	42.22	7.21
Japan	12151	3.41	1.3	14.68	8.3	35.46	7.61
Jordan	1282	19.58	3.82	80.73	39.94	31.83	7.19
Korea	8307	6.38	4.12	30.17	13.21	38.46	7.39
Latvia	9427	7.97	2.79	45.2	30.62	40.91	7.34
Lithuania	2758	7.32	2.63	38.47	26.4	52.14	7.45
Mexico	2555	5.56	1.43	51.86	40.63	25.32	6.79
Netherlands	17070	7.29	0.79	45.15	41.85	28.31	7.6
Norway	7604	8.77	0.72	43.29	55.51	30.21	7.53
Peru	1312	33.61	20.31	77.06	56.94	25.69	7.43
Poland	5414	5.63	3.98	46.58	22.89	48.73	7.01
Portugal	6089	6.93	1.53	53.26	21.48	45.71	7.21
Romania	6504	4.34	2.35	34.9	27.01	43.07	7.34
Russia	11882	3.36	1.43	27.02	21.63	41.21	6.48
Singapore	5947	7.57	1.45	32.66	19.02	37.25	8.77
Slovakia	3147	9.44	4.52	51.16	20.81	48.87	7.38
Slovenia	16051	5.21	0.85	50.61	31.76	32.29	6.84
South Africa	8381	3.94	2.22	30.86	18.48	21.61	6.96
Spain	161873	5.03	1.19	50.36	24.77	48.72	7.43
Sweden	38019	3.04	0.36	42.29	43.52	34.46	7.48
Switzerland	10690	6.64	1.21	49.78	37.14	31.92	8.35
Thailand	2379	16.94	5.86	45.82	30.22	50.78	6.67
Turkey	8690	6.5	3.64	51.82	36.49	30.25	6.86
Uganda	1966	20.91	17.55	84.54	70.3	28.54	6.97
United Kingdom	93585	6.12	1.13	49.32	33.37	33.44	8.17
United States	27886	10.33	2.29	57.72	34.67	26.55	8.12

Table 1. Descriptive Statistics

Variables[a]	Mean	Std. dev	Min	Max		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Entrepreneurship																		
OME	0.06	0.24	0	1	[1]	1.00												
NME	0.02	0.13	0	1	[2]	-0.03*	1.00											
Micro-conditions																		
Self-efficacy	0.47	0.5	0	1	[3]	0.21*	0.09*	1.00										
Alertness	0.32	0.47	0	1	[4]	0.14*	0.03*	0.18*	1.00									
Fear of failure	0.39	0.49	0	1	[5]	-0.08*	-0.02*	-0.13*	-0.07*	1.00								
Individual-level (level 1)																		
Age	42	14	14	99	[6]	-0.06*	-0.03*	-0.01	-0.07*	-0.03*	1.00							
Age (squared)	1956	1230	196	9801	[7]	-0.07*	-0.03*	-0.03*	-0.07*	-0.04*	0.98*	1.00						
Gender	0.51	0.5	0	1	[8]	0.07*	0.02*	0.16*	0.07*	0.07*	0.03*	0.02*	1.00					
Education	0.68	0.47	0	1	[9]	0.05*	0.02*	0.09*	0.06*	-0.03*	0.11*	-0.12*	-0.01*	1.00				
Household Income	0.80	0.40	0	1	[10]	0.03*	-0.01*	0.06*	0.03*	-0.03*	-0.04*	-0.04*	-0.05*	-0.02*	1.00			
Country-level (level 2)																		
GDP per capita (PPP)[b]	31.4	16.2	0.24	101.6	[11]	0.04*	0.07*	0.01*	0.00	0.07*	0.05*	0.04*	0.00	0.1	-0.02*	1.00		
Population[c]	97.6	232	0.28	1,350	[12]	0.01*	0.05*	0.00	0.05*	-0.01	0.01*	0.01*	0.00	-0.04*	-0.05*	-0.26	1.00	
Economic Freedom (EFW)	7.47	0.55	5.76	8.86	[13]	0.01*	0.07*	0.01*	0.02*	-0.03*	0.11*	0.11*	0.02*	0.1	-0.01	0.01	-0.18*	1.00

Notes: * $p < 0.05$. [a] N= 721,581 observations. [b] Denoted in thousands of US dollars. [c] Denoted in millions.

Table 2. Summary Statistics and Correlation Matrix

We measure opportunity entrepreneurship (OME) with a dummy variable that takes a value of 1 if an individual responds that he or she has become an entrepreneur in order to take advantage of a business opportunity and 0 otherwise.[6] GEM also classifies some individuals as necessity-motivated entrepreneurs (NME) if they engage in entrepreneurship due to "no better choices for work" (Reynolds et al., 2004 p. 217). We exclude these entrepreneurs from our OME construct such that the category 0 only includes non-entrepreneurs.[7] While we focus on OME for the main analytical part of the paper, we also provide several robustness tests with respect to NME. Overall, 44,708 of 721,581 individuals are classified as engaged in OME (6.20%).

5.2. Economic freedom

We use the Fraser Institute's Economic Freedom of the World (EFW) index (Gwartney et al., 2016), arguably the most widely used measure of economic freedom, as a proxy for level two formal institutions in Williamson's hierarchy.[8] The index has five major areas: (1) size of government (e.g., marginal tax rates, transfers and subsidies), (2) legal system and property rights (e.g., impartial courts, judicial independence, integrity of the legal system, business cost of crime), (3) sound monetary policy (e.g., inflation, freedom to own foreign accounts), (4) international trade (e.g., regulatory trade barriers such as tariffs and compliance costs of importing and exporting), and (5) regulation (credit, labor, and business regulations). The index is closely related to other cross-national measures that are commonly used to assess the institutional context across countries such as legal origins (La Porta et al., 2008), protection against expropriation (Acemoglu et al.,

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[6] GEM sorts individuals into categories based on their motivations toward entrepreneurship. For instance, GEM asks individuals, "Are you involved in this start-up/firm to take advantage of a business opportunity or because you have no better choices for work?" (Reynolds et al., 2004 p. 217).

[7] In practice, this makes little difference. Our results are robust to the inclusion or exclusion of necessity entrepreneurs in the "else" (0) category. Most likely, this is because there are comparatively few necessity entrepreneurs in GEM (1.91%).

[8] Berggren (2003), De Haan et al. (2006), Hall and Lawson (2014), and Bradley and Klein (2016) review the literature on economic freedom.

2001), constraints on executive (Marshall and Jaggers, 2002), and other indices that measure the quality of the regulatory environment and government efficiency (e.g., see World Bank Governance Indicators).

5.3. Socio-cognitive traits

Based on our theoretical development, we also extract measures of perceived entrepreneurial self-efficacy, alertness to new business opportunities, and fear of failure from the GEM survey. Specifically, self-efficacy is taken from the GEM variable *suskill*, which is a dummy indicator that takes a value of 1 if an individual *believes* that he or she has the knowledge, skills, or experience required to start a new business venture and 0 otherwise. Alertness to new business opportunities is taken from the GEM variable *opport*, which is a dummy indicator with a value of 1 if an individual perceives that in the next six months there will be good opportunities to start a new business and 0 otherwise. Finally, fear of failure is taken from the GEM variable, *fearfail*, which is a dummy variable coded as 1 if an individual indicates that they are afraid of failure and 0 otherwise. All of these variables span the years from 2002 to 2012. Exact questions used in the GEM survey are available in Table 1 in Appendix A, which provides definitions of all variables used in the study. These individual-level variables from GEM have been previously used in the entrepreneurship literature (e.g., see Autio et al., 2013; Wennberg et al., 2013).

5.4. Other controls

We include control variables both at the individual and country level that previous research in the field has identified as relevant antecedents of start-up intentions and entrepreneurial entry (for a summary, see Simoes et al., 2016). At the individual level, we control for education, gender, age, age squared, and household income. Human capital has been identified as a relevant determinant of entry into nascent entrepreneurship (Davidsson & Honig, 2003; Parker, 2004). On the one hand, more educated people may have better job opportunities on the labor market, which may

discourage them to become self-employed (Brown et al., 2011; Van Der Sluis et al., 2008). On the other hand, however, people with higher education may be better able to identify self-employment opportunities and have greater managerial ability, which are important prerequisite of starting and managing new ventures (Simoes et al., 2016). Prior studies also indicate that highly educated people are more likely to direct their entrepreneurial efforts toward high-growth ventures (Autio, 2005). We use GEM's harmonized educational attainment variable, *gemeduc*, which is a dummy coded 1 if the individual has completed secondary education and 0 otherwise.

Gender is another well-established determinant of entrepreneurship with prior studies indicating that women are significantly less likely to choose entrepreneurship as a career compared to men for reasons such as limited access to start-up capital, lack of work-related experience or childcare concerns (Alsos et al., 2006; Fairlie & Robb, 2009; Fischer et al., 1993; Simoes et al., 2016). Previous studies also indicate that men are more focused on material success (Hofstede, 2003), which can influence their growth aspirations (Autio, 2005).

The extant literature also suggests financial capital[9] as an important antecedent of entrepreneurship (Acs & Szerb, 2007; Fairlie & Krashinsky, 2012). By alleviating liquidity constraints, financial capital can support nascent firm performance and can be particular important for opportunity-driven businesses that usually require more start-up capital (Blanchflower & Oswald, 1998; Evans & Jovanovic, 1989; Holtz-Eakin et al., 1994; Lindh & Ohlsson, 1996). The GEM dataset allows us to control for household income, *gemhhinc*, that classifies individuals into terciles for each country. Thus, household income is measured with a dummy coded 1 if the individual is classified as high income and 0 if the individual is classified as medium or low income.

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[9] Financial capital is measured as household income which is strongly correlated with wealth (Bricker et al., 2016; Saez & Zucman, 2016).

Finally, we control for age and its quadratic term. Previous studies suggest that younger people are more likely to start new business ventures, but this relationship is non-linear (Parker, 2004; Lévesque & Minniti, 2006; Wennberg et al., 2013). Because younger people have more time to recover their initial investment and have more physical and mental availability, they tend to be more risk loving, which can be particularly important in the context of high-risk, high-growth opportunity-driven start-ups (Simoes et al., 2016). Generational differences also influence people's perceptions about workplace values, with younger people placing more importance on job titles and status (Cennamo & Gardner, 2008). Data on all of these individual-level characteristics were extracted from the GEM dataset and span the period from 2002 to 2012.

At the country level, we control for economic development and population besides our institutional variables. Economic development is a robust predictor of opportunity-entrepreneurship across countries (e.g., see Nikolaev et al., 2018), with more economically developed countries more likely to promote high-growth opportunity-driven businesses. Therefore, we control for country-level economic development using Gross Domestic Product (GDP) per capita at purchasing power parity (PPP), which further allows us to account for the "natural rate" of entrepreneurship (e.g., see Wennekers et al., 2005; Aidis et al, 2012; Estrin et al., 2013). Because previous studies suggest that the relationship between GDP and entrepreneurship is non-linear, with more economically developed countries having larger positive returns from entrepreneurship compared to less developed ones, we also include a quadratic term (Wennekers et al., 2005). Finally, we control for the natural logarithm of a country's total population, *Log pop*. We extract both of these country-level variables from the World Bank's Development Indicators' database from 2002 to 2012.

Variables	Description	Source
Entrepreneurship		
NME	Necessity-Motivated Entrepreneurship. Coded 1 if the individual is involved in entrepreneurship because there are no other options for work and 0 otherwise. The 0 category does not include opportunity-motivated entrepreneurs.	GEM (2016)

OME	Opportunity-Motivated Entrepreneurship. Coded 1 if the individual is involved in entrepreneurship in order to take advantage of a business opportunity and 0 otherwise. The 0 category does not include necessity-motivated entrepreneurs.	GEM (2016)
Micro-conditions		
Perceived self-efficacy	Coded 1 if an individual believes he or she possesses the skills necessary to become an entrepreneur and 0 otherwise. GEM variable, *suskill*, collected with "Do you have the knowledge, skill, and experience required to start a new business?"	GEM (2016)
Alertness	Coded 1 if there will be good opportunities for the individual to start a business in the next six months and 0 otherwise. GEM variable, *opport*, collected with: "In the next six months, there will be good opportunities for starting a business?"	GEM (2016)
Fear of failure	Coded 1 if the individual is afraid of failure and 0 otherwise. GEM variable, *fearfail*, collected with "Fear of failure would prevent you from starting a business?"	(GEM 2016)
Individual Variables		
Age	The age of the individual at the time of the GEM survey.	GEM (2016)
Age (squared)	The squared age of the individual at the time of the GEM survey.	GEM (2016)
Education	Coded 1 if the individual has completed secondary school and 0 otherwise.	GEM (2016)
Gender	Coded 1 if the individual is female and 0 otherwise.	GEM (2016)
Household income	Based on the Gemhhinc variable that separates income by terciles: high income, medium income, and low income. Coded 1 if the individual has high income and 0 otherwise.	GEM (2016)
Country Variables		
GDP per capita (log)	Log of real GDP per capita, PPP	World Bank (2016)
Population (log)	Log of country population.	World Bank (2016)
Economic freedom (EFW)	Economic freedom of the world index summary measure. It evaluates countries on five dimensions of freedom: freedom from government, protection of property rights and rule of law, freedom in monetary policy, freedom from regulation, and the freedom to trade internationally.	Fraser Institute (2016)

Table 3. Variable descriptions

5.5 Estimation methods

Because we combine individual-level observations with country-level measures of economic freedom, we analyze our data using hierarchical linear modeling methods. This is important because using standard estimation techniques such as OLS in the presence of clustered data significantly increases the possibility of Type 1 errors due to the underestimation of standard errors (Hofmann et al., 2000). Thus, to estimate the effects of individual-level socio-cognitive traits and country-level measures of economic freedom on the individual decision to engage in opportunity entrepreneurship, we use multilevel random effects modeling. In multilevel (also called mixed linear) models, random effects refer to group-specific factors that are assumed to influence the dependent variable(s). In our case, a group (level 2) cluster refers to countries. Thus, the use of random effects assumes that the groups are drawn randomly from a larger population (Peterson et al. 2012; Autio et al., 2013).

More specifically, to estimate the influence of country (level 2) factors on individuals' likelihoods of participation in opportunity entrepreneurship (coded as a binary variable), we employ a mixed-effects logistic regression model that assumes unobserved country-specific effects (u_i) to be randomly distributed with a mean of zero, constant variance ($u_i \approx$ IID $(0, \sigma_u^2)$), and uncorrelated to the predictor variables. This allows the constant term to vary randomly across countries (level 2). To estimate the influence of country-level factors on the likelihood of participating in opportunity entrepreneurship, we then apply a multilevel linear model (GLS) to estimate fixed parameters and maximum-likelihood estimates (MLE) of variance components (Raudenbush, 1988). We use a random-effects, generalized least square (GLS) algorithm that allows regression slopes and intercepts to vary across countries (Martin et al. 2007). The GLS approach allows the standard errors to vary across groups and provides a weighted level 2 regression such that groups with more reliable level 1 estimates are assigned greater weights and, consequently, exercise greater influence in the level 2 regression (Hofmann et al. 2000).

Following prior work on multilevel modeling (Autio & Acs, 2010; Autio et al., 2013; Wennberg et al., 2013; Xavier-Oliveira et al., 2015), we proceed with a three-step estimation strategy to examine the predictors of opportunity entrepreneurship. First, we estimate the between-group (country) variance in both dependent variables by including no predictors or controls in our mixed effects logistic regression model. We observe significant country-level variance, which provides support for the choice of a multilevel model over a simple logistic regression model. We call these regression models the "null model" (model 1 of Table 4). Second, we add individual-level and country-level controls to the models to estimate the proportion of variance explained by these predictors (model 2 of Table 4). Third, we include an interaction term between economic freedom and our three measures of socio-cognitive traits: self-efficacy, alertness to business opportunities, and fear of failure (models 3-5 of Table 4). The reduction in the variance of the

random intercept from the null models provides a measure of the extent to which our country-level predictors exclusively accounted for the proportions of the remaining variance. All analyses were performed using both Stata 14 and R, which produced consistent results.

6. Empirical Results

Opportunity-motivated entrepreneurship

Table 4 illustrates the effects of institutional factors on entry into entrepreneurship and the moderating effects of institutions on the relationship between socio-cognitive traits and entrepreneurial action. When testing hypotheses at the individual level, where individuals are nested within nations, multi-level models should be used if intra-class correlation coefficients (ICCs) show significant national differences in individual-level variables (Hofmann et al. 2000; Peterson et al. 2012; Autio et al., 2013). To see if this applies in our case, we first estimated a multi-level logistic regression as the null model without predictors. The ICC (denoted by ρ), captures the proportion of total variance contributed by the country-level variance component and estimates the amount of the variance in the dependent variables that resides between countries. The ICC value (model 1 of Table 4) indicates that 9.3% of the variance in opportunity entrepreneurship resides between countries. The LR test of ρ equal to zero rejects the null hypothesis that the variance in the random intercept is not statistically different from zero, thereby providing support for the usage of multi-level techniques over OLS.

	Opportunity-Motivated Entrepreneurship (OME)					
	1	2	3	4	5	6
Fixed part estimates						
Individual-level (level 1)						
Age		1.13***(0.00)	1.088***(0.00)	1.088***(0.00)	1.088***(0.00)	1.089***(0.00)
Age (squared)		0.99***(0.00)	0.999***(0.00)	0.999***(0.00)	0.999***(0.00)	0.999***(0.00)
Female		0.53***(0.01)	0.714***(0.01)	0.715***(0.01)	0.714***(0.01)	0.713***(0.01)
Education		1.51***(0.02)	1.268***(0.02)	1.268***(0.02)	1.267***(0.02)	1.269***(0.02)
Household income		1.47***(0.02)	1.276***(0.02)	1.276***(0.02)	1.277***(0.02)	1.276***(0.02)
Self-efficacy			6.461***(0.10)	6.678***(0.10)	6.466***(0.10)	6.450***(0.10)

Alertness			2.090***(0.02)	2.092***(0.02)	2.101***(0.02)	2.090***(0.02)
Fear of failure			0.574***(0.01)	0.576***(0.01)	0.574***(0.01)	0.568***(0.01)
Country-level (level 2)						
Economic freedom (EFW)			1.290***(0.05)	0.947 (0.04)	1.196***(0.05)	1.331***(0.05)
GDP (PPP)			0.999***(0.00)	0.999***(0.00)	0.999***(0.00)	0.999***(0.00)
GDP (PPP) squared			1.000***(0.00)	1.000***(0.00)	1.000** (0.00)	1.000***(0.00)
Population (log)			0.991 (0.04)	0.989 (0.04)	0.994 (0.04)	0.991 (0.04)
Moderating effects						
Self-efficacy x EFW			1.442***(0.03)			
Alertness x EFW				1.142***(0.02)		
Fear of failure x EFW					0.865***(0.02)	

Random part estimates						
Number of observations	721581	721581	721581	721581	721581	721581
Number of groups (countries)	45	45	45	45	45	45
Variance of random intercept	0.34	0.34	0.15	0.15	0.15	0.15
Variance of overall residual	3.28	3.29	3.29	3.29	3.29	3.29
% of variance, ρ	9.3	9.3	4.5	4.5	4.6	4.4
Model fit statistics						
Degrees of freedom	0	15	23	24	24	24
Prob > χ^2	***	***	***	***	***	***
Log-likelihood	-163932	-157015	-139721	-139606	-139692	-139697
AIC[a]	327869	314065	279488	279259	279433	279442
LR test of $\rho=0$[b]	***	***	***	***	***	***
LR test of model fit[c]	--	--	--	*	*	*

Notes: Standard errors in parentheses. ***p < 0.001; **p < 0.01; *p < 0.05, two-tailed tests. Estimates are represented as odds ratio (OR). OR > 1 represents a positive relationship and OR < 1 represents a negative relationship.
[a] AIC is Akaike's information criterion = 2k-2 x (log likelihood), where k denotes the degrees of freedom (number of predictors in the model).
[b] Statistically significant (p < 0.001). LR test of $\rho = 0$ confirms that country-level variance component is important.
[c] LR test performed between Models 2 and either Model 3, Model 4, or Model 5 using maximum-likelihood

Table 4. Effects on individual-level entry into opportunity entrepreneurship (odds ratio).

Random-effects logistic regression models are reported in models 2-6 of Table 4, along with estimates for the fixed part (estimates of coefficients), random part (variance estimates), and model fit statistics. Model 2 in Table 4 augments our null model to include only individual-level control variables, following the approach of Wennberg et al., (2013). Model 3 in Table 4 includes all individual-level and country-level controls including the three socio-cognitive variables. This specification reports the proportion of variance of opportunity entrepreneurship accounted for by only the individual-level and country-level controls. We observe that the variance component of

the random intercept decreased from 0.34 in the null model (Model 1 in Table 4) to 0.15 in Model 3, which suggests that our controls explain up to 55.9% $(((0.34-0.15)/0.34) \times 100)$ of the country-level variance.

Model 3 in Table 4 reports the influence of economic freedom on the odds of participation in opportunity entrepreneurship. The odds ratio of economic freedom in model 3 (1.29) indicates that a one-unit increase in a country's level of economic freedom is associated with a 29% $(1.29-1.00; p < 0.001)$ increase in the odds of average individual-level participation in opportunity entrepreneurship. These results imply, for instance, that if EFW in Argentina increases from 6.18 to the US level of 8.12, then the odds of becoming an opportunity entrepreneur increase by 56.26%. Because 10 percent of the population of Argentina, or 4.4 million people are considered opportunity entrepreneurs, what this result implies for our findings is that the corresponding increase of 1.94 points in economic freedom, will increase the number of opportunity entrepreneurs by 2.5 million (a 56% increase).
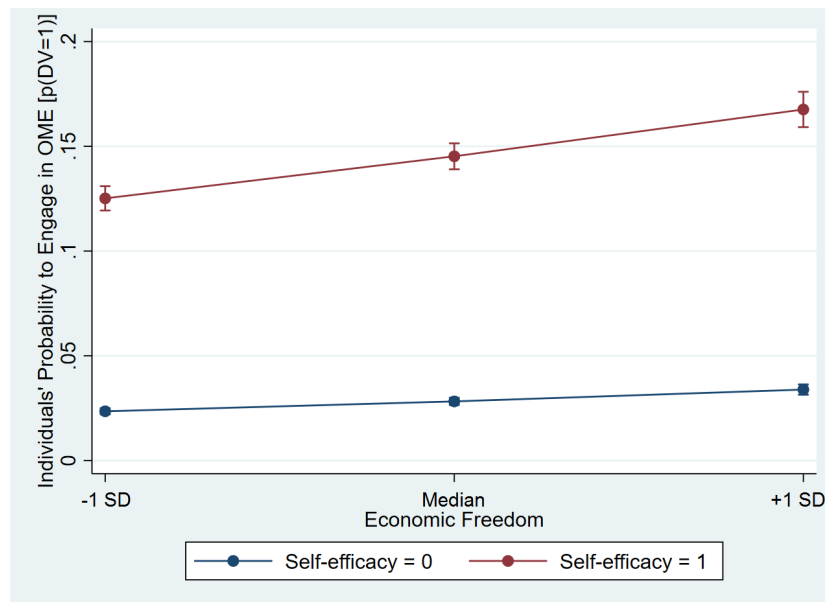
Figure 2. Interaction between country-level economic freedom and individual-level self-efficacy in opportunity-motivated entrepreneurship (OME)
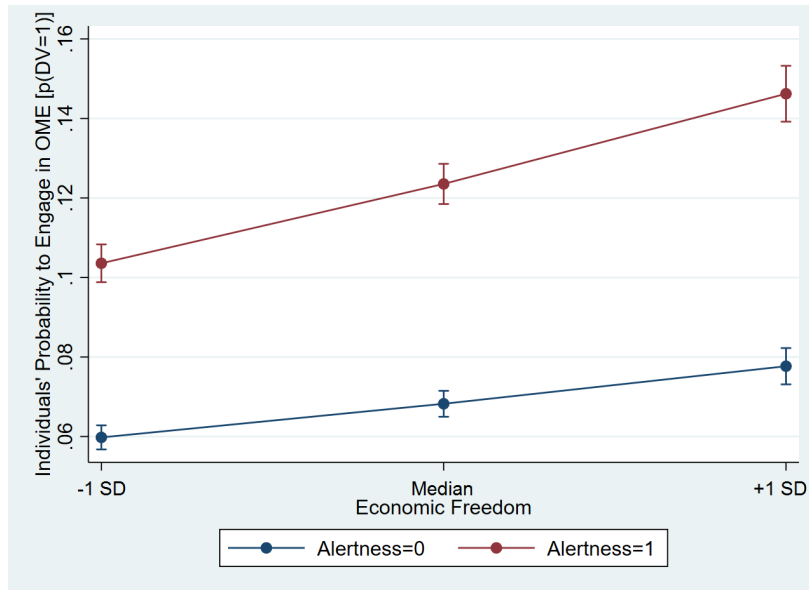
Figure 3. Interaction between country-level economic freedom and individual-level alertness in opportunity-motivated entrepreneurship (OME)
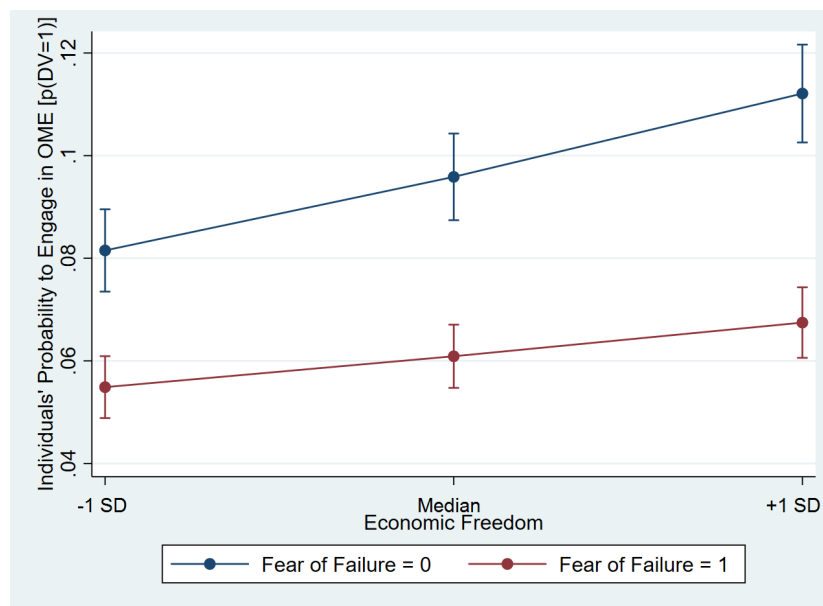

Figure 4. Interaction between country-level economic freedom and individual-level fear of failure in opportunity-motivated entrepreneurship (OME)

We also observe, consistent with our expectations, that our socio-cognitive measures of self-efficacy (Hypothesis 1: $p < 0.001$) and alertness (Hypothesis 2: $p < 0.001$) increase the odds of average individual-level participation in opportunity entrepreneurship (the odds ratios are 6.46

and 2.09, respectively). In contrast, fear of failure (Hypothesis 3: p < 0.001) reduces the odds of average individual-level participation in opportunity entrepreneurship by 43% (1.00−0.57; p < 0.001).

Models 4-6 in Table 4 add the interaction terms which test our hypotheses that economic freedom moderates the relationship between socio-cognitive traits (alertness, self-efficacy, and the fear of failure) and opportunity entrepreneurship. We observe that, as economic freedom increases, self-efficacy (Hypothesis 4: p < 0.001) and alertness to opportunities (Hypothesis 5: p < 0.001) become stronger predictors of opportunity entrepreneurship. Finally, fear of failure (Hypothesis 6: p < 0.001) becomes a weaker deterrent of opportunity entrepreneurship when economic freedom is high. This is consistent with our theoretical predictions.

Because interpretation of interaction coefficients from logistic regressions is not as straightforward (Ai & Norton, 2003), and to further facilitate discussion of our findings, we provide interaction plots that show the average predicted probability (with 95 percent confidence intervals) of engaging in opportunity entrepreneurship at different levels of economic freedom[10] for people with varying levels of self-efficacy (Figure 2), alertness to new business opportunities (Figure 3), and fear of failure (Figure 4). The vertical axis denotes the probability that an individual engages in opportunity entrepreneurship (i.e., p[DV=1]) whereas the horizontal axis reflects the quality of economic freedom. All three figures suggest that people with the same socio-cognitive resources—self-efficacy, alertness to new business opportunities, and fear of failure—will be more likely to start a new business when EFW is high. For example, the results in Figure 4 imply that as economic freedom increases, both people who are afraid of failure and those who are not are more likely to engage in opportunity entrepreneurship compared to their counterparts who live in

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[10] High freedom refers to the level of economic freedom that is one standard deviation (sd = 0.55) above the median level; median freedom refers to the median level of economic freedom (7.5); and low freedom refers to the level of economic freedom that is one standard deviation below the median level.

less economically free societies. In addition, the gap between the two groups increases as the level of economic freedom goes up. In other words, economic freedom enables people who are risk takers to start entrepreneurial ventures and this is also true for people with strong self-efficacy beliefs (Fig.2) and perceived business opportunities (Fig. 3).

Additional robustness tests

We conducted several additional tests to examine the robustness of our findings. These results are reported in the online appendix. Specifically, we examined whether our results are affected by the Great Recession or driven by the inclusion of outlier countries like Greece and Italy which could influence empirical results (Lihn & Bjornskov, 2017). To control for these possibilities, we excluded Greece and Italy (Appendix Table 4) and excluded the years 2008 and 2009 (Appendix Table 5). Overall, these results were consistent with our main findings presented in the study.

We also conducted a more detailed analysis of our model using the area components of EFW. The results from the analysis using the regulatory and property rights protection components of EFW are very similar to our baseline results. However, the findings from the size of government component of economic freedom are different, which supports previous research showing that this component is negatively and only weakly correlated with the other four areas of the index (Heckelman & Stroup, 2005; Kreft & Sobel, 2005; Lihn & Bjørnskov, 2017). Lastly, we analyzed our model in the context of necessity-motivated entrepreneurship. These results (presented and discussed in the online appendix) are largely consistent with our model but should be interpreted with caution as they should be analyzed in a different theoretical and empirical framework.

7. Discussion, limitations, and future research

Entrepreneurship is a multi-level phenomenon that depends critically on economic institutions such as competitive markets that regulate the extent to which entrepreneurs can freely act on their

local knowledge of potential business opportunities while utilizing their psychological and physical resources (Hayek, 1945; Kirzner, 1982; McMullen & Shepherd, 2006). Despite the theoretical appeal to examine entrepreneurship as a multi-level phenomenon, however, studies have only recently started exploring the interaction of variables across different levels of analysis (e.g., see Autio et al., 2013). Our study was motivated by this gap in the literature, which we addressed by developing a multi-level theoretical framework and adopting a mixed effects methodology to examine how country-level institutional context (level 2) moderates the relationship between individual-level socio-cognitive traits (level 1) and entrepreneurial entry.

Using a large cross-country cross-individual sample of 721,581 individuals from 45 countries, we found suggestive evidence that pro-market institutions, measured by the Economic Freedom of the World (EFW) index, positively affects opportunity entrepreneurship. More importantly, the positive influence of economic freedom was found to work directly, but also indirectly by enhancing the effect of three socio-cognitive traits—entrepreneurial self-efficacy, alertness to new business opportunities, and lack of fear of failure—that previous studies have found to be key antecedents of entrepreneurial action. In additional tests, we examined specific dimensions of the EFW index and found that institutions associated with area 2 of the index (strong enforcement of property rights, impartial courts, protection of property rights, and judicial independence) and area 5 (low business, credit, and labor market regulations) are most likely driving our main findings. This is consistent with our theoretical development, which suggests that excessive and arbitrary government regulations and weak protection of property rights (weak vertical and horizontal institutions) lower the expected returns from productive entrepreneurship discouraging people from starting new ventures even if they are alert to new business opportunities, not afraid of failure, and have strong self-efficacy beliefs.

Our conceptual framework and empirical findings have several implications for entrepreneurship theory and public policy. First, we answer numerous calls in the comparative entrepreneurship literature for new studies that examine the interactive mechanisms between micro and macro-level variables (Bjørnskov & Foss, 2016; Su et al., 2017; Terjesen et al., 2016). Specifically, our theory and findings imply one possible mechanism through which economic institutions can channel individual effort to productive entrepreneurial activities by *enabling* individuals to use their entrepreneurial self-efficacy, alertness to perceived business opportunities, and confidence of success more effectively in the process of new venture creation. In that sense, we move the conversation from *whether* individual-level socio-cognitive resources matter to *what* are the optimal institutional conditions under which individuals can best utilize these psychological resources. In this respect, we also provide additional nuance to the application of social cognitive theory to entrepreneurship research, which aids our understanding of how these theories depend upon institutional context. Specifically, we show that while socio-cognitive resources such as self-efficacy are key regulatory mechanisms that can promote entrepreneurial action, this positive effect can be significantly suppressed in environments with low economic freedom.

From a policy perspective, our study offers important insights because pro-market institutions are often criticized for creating large disparities in income[11] that can stifle socio-economic mobility and lead to a variety of negative social outcomes (Wilkinson & Pickett, 2011). The results in this study, however, suggest that institutions consistent with the principles of economic freedom (e.g., lower levels of intrusive labor, credit, and business market regulations) can encourage opportunity entrepreneurship, which is widely considered a main driver of innovation and economic prosperity. At the same time, pro-market institutions tend to reduce the probability of entry into necessity

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[11] The equality-efficiency trade-off is widely accepted in economics (Okun, 2015). But see recent research on the relationship between inequality and economic freedom (Bennett & Nikolaev, 2016b; Holcombe & Boudreaux, 2016).

entrepreneurship. This suggests that in societies with higher level of economic freedom, significantly less people will be forced to choose self-employment out of economic desperation.

Even more importantly, our results imply that pro-market institutions tend to promote productive entrepreneurship by enhancing the positive effect of various socio-cognitive resources. This, in turn, can provide an important feedback loop and encourage more individuals to invest in human capital development, take more risks, and accumulate entrepreneurial experiences that can create a virtuous cycle leading to even higher rates of innovation, diffusion of knowledge, and, ultimately, long run economic prosperity. In that sense, institutions consistent with the principles of economic freedom are essential for creating the necessary conditions required for a dynamic and more experimental economy that can provide more opportunities for people to move up the income ladder by developing and better utilizing their own talents, competencies, local knowledge, and ideas in a self-directed manner. In this respect, future studies may also want to consider the direct relationships between economic institutions and various socio-cognitive traits. This is important because both SCT and the new institutional economics also consider institutions as important antecedents of various psychological resources. For example, people in more economically free societies are incentivized to invest in skills and knowledge in order to survive the highly competitive environment. In turn, the kind of skills and knowledge individuals and their organizations acquire will shape evolving perceptions about opportunities (North, 1991). For example, recent entrepreneurship theories suggest that "the institution of private property … has an important psychological dimension that enhances our feelings of…internal control [i.e., self-efficacy] and personal agency, and it thereby promotes entrepreneurial alertness" (Harper, 2003, p. 74). This is supported by research that notes that personal agency and internal control are influenced by economic freedom (Pitlik et al., 2015; Nikolaev & Bennett, 2016). What this implies

is a complementary model in which socio-cognitive traits also *mediate* the relationship between economic institutions and opportunity entrepreneurship.

As any empirical study, however, this one also has a number of limitations. First, our empirical analysis is constrained to only 45 countries, most of which have moderate to high levels of economic freedom. Thus, our inferences are limited to our sample and should be viewed as a lower bound of the positive relationship between economic freedom and opportunity entrepreneurship. As cross-country entrepreneurship data become available for a more representative set of countries, future research will be able to explore our hypotheses in a broader range of institutional contexts and provide external validation for our findings.

Another limitation of the GEM dataset is that it only provides snapshots in time when it comes to individuals' entrepreneurial traits, intentions and behavior. Entrepreneurship, however, is a dynamic and uncertain process that takes place over time and involves making decisions about the future. Unfortunately, we are unable to estimate how institutions and individual behavior co-evolve over time or whether new businesses today succeed in the future. Large cross-country longitudinal datasets at the individual level that survey entrepreneurial behavior and motivations are still largely unavailable and present one of the most promising avenues for future research.

A more important critique of our analysis has to do with the so called "halo effect" that is often associated with individual-level measures (e.g., self-efficacy, alertness, and fear of failure) that rely on people's subjective evaluations. For example, are individuals who are alert to new business opportunities more likely to become entrepreneurs or are successful entrepreneurs more likely to answer that they are alert to opportunities because they are successful entrepreneurs in the first place? The main concern here is that of reverse causality and measurement error leading to common method bias. However, we are less worried about reverse causality because we focus on level 2 institutions from Williamson's (2000) hierarchy that change rather slowly over time (10-

100 years). What this implies for our estimations is that the behavior of a single person is highly unlikely to influence the institutional environment over the course of our study. Moreover, the main contribution of our study is to explore interactive effects. In this case, reverse causality, endogeneity, and common method bias are not likely to significantly bias our findings (see Podsakoff et al., 2012). The halo effect, however, is problematic when it comes to estimating the direct effect of our individual level variables (H1-H3).

A final concern is that of omitted variables, which can also bias the parameter. We have included all relevant controls and socio-cognitive traits from the GEM database that can be matched to the relevant country-level institutional variables, but surely other factors can also affect opportunity entrepreneurship. One possibility is that the relationship between socio-cognitive traits and opportunity entrepreneurship depends on country-level culture. Self-efficacy and fear of failure affect entrepreneurial entry, but these relationships can be moderated by uncertainty avoidance, the level of collectivism, and performance orientation (Wennberg et al., 2013). Measures of social norms and country-level culture are often used as indicators in the sociology-based institutional literature (Meyer, & Rowan, 1977; DiMaggio, 1988; DiMaggio & Powell, 1981; 1993; Scott, 1995). In the new institutional economics, formal institutions such as law and regulation are nested within the informal institutions of norms, culture, and social convention (Williamson, 2000) and these different levels likely have distinct effects on entrepreneurship. In other words, formal institutions (e.g., EFW) might affect how socio-cognitive traits influence entrepreneurship—as our results indicate—but formal institutions might also be affected by informal institutions (e.g., culture). Therefore, to build on this extant literature, future scholars may also examine the interaction between culture and institutions as it pertains to entrepreneurial entry.

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