

Institutional Change and Early-Stage Start-Up Selection: Evidence from Applicants to Venture Accelerators

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Abstract. Existing research at the nexus of institutional theory and entrepreneurship suggests that lowering institutional barriers to forming, growing, and exiting new firms can affect the types of start-ups that entrepreneurs found in a region. These institutional changes could influence entrepreneurs' perceptions of the value of partnering with venture accelerators and potentially improve these sponsors' capacity to select high-growth start-ups to fund and develop. This study evaluates these ideas by developing and testing three hypotheses. First, institutional reforms improve entrepreneurs' perceived value of venture accelerators for resources that affect new venture development. Second, they reduce the average probability of being selected for new applicants, due to a surge in the number and heterogeneity of new applicants within accelerators' local ecosystems. Third, institutional reforms increase the quality of selected cohorts for accelerator managers due to increases in the average quality and human capital of new applicants. To evaluate these hypotheses, I analyze data from 13,770 applicants to venture accelerators over multiple application cycles between 2016 and 2018 in 170 countries. I use a differences-in-differences design to estimate the effects of institutional changes on start-up selection after regulatory reforms that reduced the time and procedures to start new firms, obtain credit, and resolve bankruptcy for entrepreneurs. The findings have valuable implications for how governments, especially those in emerging and developing economies, can support high-growth entrepreneurship.

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1. Introduction

Institutional changes, such as policy reforms and changes in government laws and regulations, have a profound effect on entrepreneurs and their start-ups (North 1990, Scott 2010, Lerner and Schoar 2010). These reforms often constitute critical external enablers of entrepreneurship (Davidsson 2015, Davidsson et al. 2018), a topic that has attracted growing interest within organizational and entrepreneurship research. Studies at the nexus of institutional theory and entrepreneurship (e.g., Hiatt and Sine 2014, Eesley 2016, Eberhart et al. 2017) have shown that reducing the regulatory barriers to entrepreneurship (Djankov et al. 2002, McAfee et al. 2004, Klapper et al. 2006) encourages more individuals to create new organizations (Dobbin and Dowd 2000, Sine et al. 2005, Tolbert et al. 2010). Removing harmful regulations, such as

limits on firm size, can also motivate more educated and experienced individuals to create new firms (Eesley 2016). Even making it easier to exit and fail—through changes in bankruptcy laws—can stimulate entrepreneurs to create more—and more promising—start-ups over time (Eberhart et al. 2017).

Although the insights from these studies have been enormously valuable, comparatively little research has looked at the implications of institutional reforms for early-stage start-up selection. Selection processes, however, are essential for the pipeline of successful start-ups that ultimately become candidates for further investment. They influence which start-ups receive funding, survive, and continue to grow and develop. Organizational sponsors—including venture accelerators, start-up incubators, boot camps, angel investors, and venture capitalists—play a crucial

role in start-up selection (Fehder and Hochberg 2014; Cohen et al. 2018, 2019). In weak institutional environments—such as those in many developing economies—these sponsors can fill critical institutional voids and enable new firm development (Dutt et al. 2016). Even in strong institutional environments, these sponsors play a vital role in supporting high-growth entrepreneurship, by selecting and developing promising start-ups within their local ecosystems (Cohen et al. 2019).

More research is needed, however, to understand how institutional reforms affect sponsors' selection and development of high-growth start-ups. Entrepreneurship scholars have, therefore, called for the need to understand not only whether institutions matter, but *how* they matter for start-ups and organizational sponsors of early-stage ventures in different geographies (Klapper et al. 2010, Lerner and Schoar 2010, Schoar 2010) and at various stages of development (Eesley et al. 2016, Eberhart et al. 2017). The purpose of this study is to develop a deeper understanding of how institutional change affects start-up selection processes, by connecting the insights from the literature on institutions and entrepreneurship to the recent literature on organizational sponsors. Specifically, this study aims to answer the following research question: How do institutional reforms affect early-stage start-up selection into venture accelerators?

I develop and test three hypotheses that provide a set of implications for entrepreneurs, accelerator managers, and governments. First, I develop the idea that, as institutions improve, entrepreneurs come to see more significant benefits from partnering with venture accelerators. These changes arise from both increased potential returns to high-growth entrepreneurship and more favorable start-up conditions overall. Second, as entrepreneurs come to perceive more significant benefits from partnering with venture accelerators, more of them apply to venture accelerators. These dynamics increase the quantity and heterogeneity of new applicants, by industry and stage, which makes selection more competitive. Institutional improvements, therefore, lower applicants' probability of being selected into venture accelerators, on average. Third, I develop and test the idea that institutional changes increase the quality of accelerators' cohorts by increasing both applicant quality and human capital. Thus, institutional changes result in a pipeline of higher-quality early-stage firms that receive accelerator funding to grow and develop.

Methodologically, I evaluate these hypotheses in the context of early-stage entrepreneurs applying to venture accelerators. I draw on data from the Entrepreneurship Database Program at Emory University, supported by the Global Accelerator Learning Initiative, to compare selection outcomes for

13,770 for-profit start-ups and their founding teams in 170 countries over multiple application cycles between 2016 and 2018. I use a differences-in-differences design to estimate the effects of national-level institutional changes on selection outcomes for applicants. These changes reduced the time and procedures to start formal operations, obtain credit, and resolve insolvency for entrepreneurs (see Djankov et al. 2002). During the observation period, most of these changes affected accelerator applicants in Southeast Asia, Sub-Saharan Africa, and Latin America.

The findings show that institutional reforms increased the quantity and quality of new applicants to venture accelerators in these regions. Institutional changes, for example, resulted in more applicants per accelerator—by between 128 and 136 applicants per program on average, or roughly 17 times more applicants per open spot in the average-sized cohort. Further, multiple simultaneous changes resulted in superadditive increases in the total number of accelerator applicants. For instance, the number of applicants increased to 144 per program on average, or roughly 18 times more applicants per open spot, after simultaneous decreases in both entry and growth barriers. Further, the number of applicants increased to 295 per program on average, or roughly 37 times more applicants per open spot in the average-sized cohort, after changes that lowered both entry and exit barriers simultaneously. Institutional reforms also improved applicants' perceived benefits of partnering with venture accelerators and increased the industry and stage heterogeneity of new applicants and the human capital of their founding teams. These changes, however, lowered applicants' probability of being selected by about 5%–7%, on average for single reforms, and by 8%–10%, on average for multiple reforms. Although institutional changes made selection more difficult for entrepreneurs, they improved cohort quality for accelerator managers. Institutional changes increased the quality of accelerators' incoming cohorts in terms of various metrics, including revenue (up to 23 times), employees (up to 67%), patents (up to 3%), wages paid to employees (up to 741%), and the amount of planned equity raises over the next 12 months (up to 249%).

These findings contribute to several areas of research on entrepreneurs and early-stage start-ups. First, they speak to the cognitive implications of institutional changes for nascent entrepreneurs (e.g., Sine and David 2010, Eesley 2016, Eberhart et al. 2017). Specifically, this study suggests that institutional reforms improved entrepreneurs' perceptions of the value of venture accelerators. The findings, therefore, support the argument that institutional reforms are critical external enablers of entrepreneurship (Davidsson 2015, Davidsson et al. 2018),

not only because they affect the rules governing market interactions (North 1990), but also because they structure entrepreneurs' cognition (Sine et al. 2005, Sine and David 2010, Tolbert and Hiatt 2010). The findings, therefore, show the link between regulative institutions and cognitive institutions governing market interactions. Second, this study contributes to the international entrepreneurship literature by looking at the relationship between government policy (laws, regulations) and high-growth entrepreneurship (e.g., Klapper et al. 2010, Lerner and Schoar 2010, Schoar 2010). The findings suggest that institutional improvements result in a surge in the number and quality of early-stage applicants to venture accelerators, a proxy for high-growth entrepreneurship. These findings have important development implications for how to promote high-growth entrepreneurship in emerging economies throughout Southeast Asia, Sub-Saharan Africa, and Latin America. These results also suggest that policy reforms can help accelerator managers select more promising start-ups in their local ecosystems. Third, this study contributes to emerging scholarship on organizational sponsors (e.g., Fehder 2015, Cohen et al. 2018, 2019), by showing that institutional variation across countries affects start-up cohort quality. Thus, in addition to variation in program design across accelerators, variation in institutional conditions across countries is a critical determinant of the pipelines of high-growth start-ups that accelerator managers select to fund and develop.

2. Theory and Hypotheses

2.1. Institutions and Their Role in Entrepreneurship

North (1990, p. 4) defined institutions as “formal written rules as well as typically unwritten codes of conduct” that constrain market interactions. By this definition, institutions include both laws and government regulations, as well as accepted practices. Institutions come in many forms, including cultural-cognitive, normative, and regulative (DiMaggio and Powell 1983, Suchman 1995, Scott, 2010). Cultural-cognitive institutions pertain to culture and cognition (e.g., perceptions, belief systems, cultural values) that shape human interactions within an environment and are generally taken for granted. Normative institutions pertain to informal rules of behavior (e.g., social norms, social sanctions) that individuals in an environment deem legitimate and appropriate. Regulative institutions pertain to formal, written rules that affect the types of opportunities and barriers that individuals face within an environment.

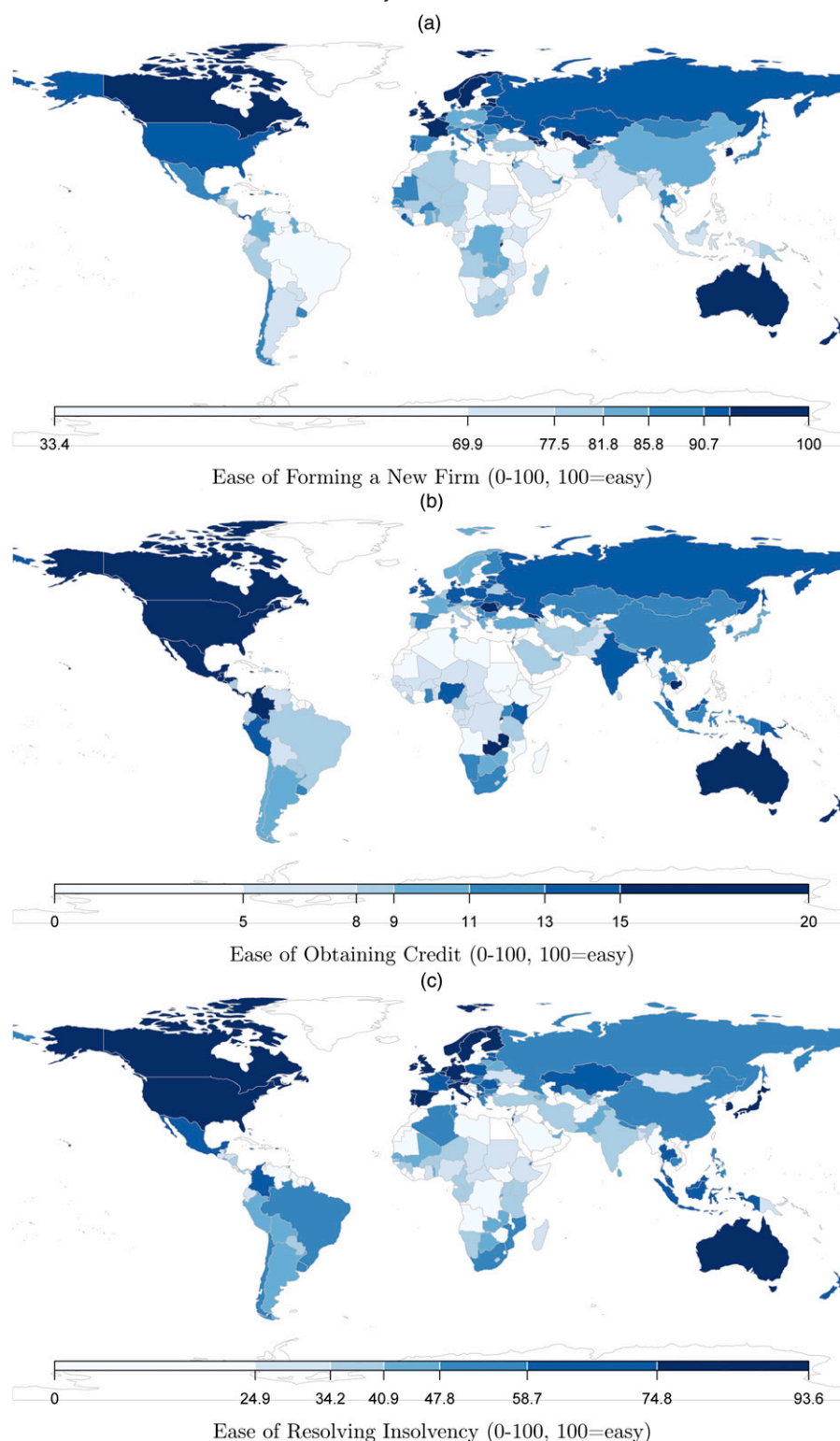
Research at the nexus of institutional theory and entrepreneurship (e.g., Sine et al. 2005, Tolbert et al. 2010, Eesley et al. 2016) has focused on three types of institutional impediments to entrepreneurship: barriers to new firm entry, barriers to firm growth, and

barriers to firm exit. Obstacles to new firm entry comprise lengthy and costly procedures for obtaining operating permits and registering new firms (Djankov et al. 2002, McAfee et al. 2004). Barriers to firm growth include limits on firm growth, such as antitrust laws (Dobbin and Dowd 2000) and laws restricting firm size (Eesley 2016). Barriers to exit comprise regulatory and government-imposed impediments to recovering from failure and losses, such as laws that limit bankruptcy protection and make it difficult for entrepreneurs to recover from failure (Eberhart et al. 2017). Institutional barriers such as these are prevalent in many countries around the world. Prior research has found that these barriers limit firm entry, growth, and exit, and thereby reduce the quality and productivity of new firms (Klapper et al. 2010, 2006; Hiatt and Sine 2014). Furthermore, these barriers can also lower product market competition and product quality and increase government corruption (Djankov et al. 2002).

2.1.1. Institutional Barriers to Entrepreneurship Across Countries.

As Figure 1 shows, it is challenging to start, grow, and exit new firms in most countries around the world. This figure illustrates the institutional landscapes in which entrepreneurs operate in terms of three central activities: forming new firms (e.g., registering limited liability companies), obtaining credit, and resolving insolvency (e.g., bankruptcy proceedings). As this figure shows, even within the United States—one of the most favorable environments for entrepreneurs—obtaining start-up capital remains challenging and poses a major barrier to firm growth.¹

Government laws and regulations that impede entrepreneurship come in many forms. To obtain an operating permit, for instance, entrepreneurs in many countries have to certify business competence, a clean criminal record, and their marital status. Government screening procedures can also include checking the company name for uniqueness, notarizing company deeds, notarizing a registration certificate, and filing with the national statistical bureau. After being screened, entrepreneurs typically have to complete a host of tax-related, labor-related, and safety and health requirements. These include designating a bondsman for tax purposes, filing with the Ministry of Finance, arranging for the automatic withdrawal of the employees' income tax from the company payroll, registering for value-added tax and other applicable taxes, registering the company bylaws, filing with the Ministry of Labor, issuing employment declarations for employees, and passing safety, sanitation, hygiene, and environmental inspections (Djankov et al. 2002, Klapper et al. 2010). Completing all the necessary paperwork to start operating a new firm can thus take as many as 53 days in France and 21 days in Malawi on average, compared with three to four days in the United States. This variation

Figure 1. (Color online) Relative Ease of New Firm Entry, Growth, and Exit

in time and procedures stems from laws and regulations that add steps, time, and costs, as well as the relative efficiency of government administration. This variation means that it is easier, on average, to start a firm in more

institutionally developed economies than in less institutionally developed ones.

The process of growing and exiting a new company in the case of insolvency is also fraught with legal and

administrative procedures. For most entrepreneurs, growing a new firm requires significant capital, and since risk capital is not available in most economies around the world, they have to rely on traditional financing such as bank loans. To obtain a bank loan, however, entrepreneurs typically have to file with credit bureaus, register collateral, and register company property and assets. These processes can be challenging when governments do not keep good records of property rights, and when filing the necessary paperwork involves passing through multiple government offices and agencies and dealing with corrupt administrators. Further, if new ventures fail, resolving insolvency and being able to recover the initial investment can also involve lengthy—and often contested—reorganization, liquidation, and debt-enforcement proceedings with local courts. The more complicated these processes, the higher the opportunities for government bureaucrats to extract rents and stall progress, thereby increasing the time and total costs involved for entrepreneurs and investors and reducing the recovery rate of company assets (Djankov et al. 2002, Klapper et al. 2010, Lerner and Schoar 2010). Entrepreneurship scholars have therefore sought to understand how institutional reforms that streamline the processes involved in forming, growing, and exiting new firms affect entrepreneurs' incentives and motivation to create and develop high-growth start-ups (e.g., Sine et al. 2005, Eesley 2016, Eberhart et al. 2017).

2.1.2. Reducing the Barriers to Firm Entry, Growth, and Exit. Studies of institutional change have examined how institutional reforms lowering the barriers to new firm entry, growth, and exit affect new firm creation (e.g., Dobbin and Dowd 2000, Sine et al. 2005, Ardagna and Lusardi 2010). These studies have found that removing burdensome laws and regulations can encourage more individuals to create new ventures (Sine et al. 2005, Eesley 2016, Eberhart et al. 2017). Institutional reforms also appear to be beneficial for entrepreneurship in various institutional contexts, including in emerging and developing economies (Klapper et al. 2006, 2010). Further, existing studies have shown that institutional reforms can change the composition of entrepreneurs who create new firms, by motivating more capable—high human capital—individuals to start ventures that are ultimately more likely to grow and generate economic and societal value (Eesley 2016, Eberhart et al. 2017).

Although many studies have examined the effects of institutional reforms on start-up formation (e.g., Suchman 1995, Dobbin and Dowd 2000, Ardagna and Lusardi 2010), comparatively few have looked at the consequences of institutional reforms for early-stage start-up selection. Selection processes involve agency

by two different sets of actors: entrepreneurs who create new firms, and organizational sponsors who select and fund them. Entrepreneurs influence start-up selection by deciding whether to seek external resources to develop their start-ups. In doing so, entrepreneurs self-select into a pool of applicants for these resources. Sponsors of early-stage ventures—organizations that provide funding and mentoring for early-stage ventures, such as venture accelerators—also influence selection by screening, evaluating, and selecting applicants to fund and develop.

Institutional scholars have long argued that institutions influence not only new organizational formation but also selection (DiMaggio and Powell 1983, Scott 2010, Tolbert et al. 2010). In the context of entrepreneurship, institutional reforms could similarly affect start-up selection processes through both supply-side and demand-side mechanisms. On the supply side, institutions restricting entrepreneurs' ability to form, grow, and exit their firms could deter many capable would-be entrepreneurs from creating high-growth start-ups that may involve more significant risks and require more resources to develop (Eesley 2016). Scholars view such institutional barriers as reasons why founders bypass entering the formal sector entirely and operate small-scale, subsistence businesses (Klapper et al. 2010, Schoar 2010, Assenova and Sorenson 2017). On the demand side, laws limiting venture growth and company exit through bankruptcy could also deter early-stage sponsors and investors, such as venture accelerators, from investing in risky, high-growth start-ups. Indeed, in weak and underdeveloped institutional environments, sponsors of early-stage ventures face increased risk of losing the value of their investments and lower growth prospects for companies in which they have invested. These factors could deter organizational sponsors from selecting potentially high-quality start-ups. These considerations affect the start-ups that sponsors select and fund over time, and thereby the types of firms that ultimately proceed to further investment and development within a region, as discussed below.

2.2. Implications for Early-Stage Start-Up Selection

The recent literature in entrepreneurship has turned more considerable attention toward the topic of external enablers of new venture creation and development. External enablers are aggregate-level, often actor-independent conditions, from which multiple entrepreneurs and ventures can benefit. These enablers include regulatory and institutional reforms, geopolitical shifts, technological transformations, and demographic changes, which can affect entrepreneurial outcomes, both with and without changing entrepreneurs' perceptions and actions (Davidsson 2015, Davidsson et al. 2018).

Regulatory improvements are particularly powerful external enablers of entrepreneurship—often associated with more significant new venture creation—opening new opportunities, legitimating new types of ventures, and improving entrepreneurs' perceptions of the overall start-up environment. These changes can operate through two primary mechanisms to affect early-stage start-up selection. First, they can reduce the uncertainty of the environment for entrepreneurs and investors. Regulatory reforms can thereby improve entrepreneurs' perceived benefits of applying to venture accelerators and increase the demand for the resources that accelerators provide. Second, regulatory changes can encourage higher entry—by more capable entrepreneurs—through eliminating barriers to entry, growth, and exit. These changes can expand the size and shift the composition of new applicants to venture accelerators and thereby reduce applicants' probability of being selected but enable accelerator managers to fund and develop more promising early-stage start-ups, thereby improving the pipeline of accelerated companies.

Looking at how institutional reforms affect early-stage start-up selection entails understanding two distinct processes. First, it involves understanding how institutional reforms affect entrepreneurs' decisions to apply for external resources. These decisions affect which start-ups ultimately receive networking opportunities, mentoring, and funding through self-selection into the application process. Entrepreneurs are often willing to go to extreme means—even give up as much as 14% of the value of their companies—in exchange for partnering with the right sponsors whom they perceive to offer excellent advice, connections, and future opportunities (Hsu 2004). Moreover, partnering with such sponsors can provide entrepreneurs with many long-term benefits that improve their ventures' survival and performance, including access to capital and advice, and more visibility and attention from potential future investors and employees (Stuart et al. 1999, Certo 2003).

Second, once entrepreneurs have self-selected into a pool of applicants, start-up selection further depends on which applicants venture accelerators will select to fund and develop. The existing research on organizational sponsors, such as venture accelerators, has shown that there is considerable variation in selection criteria, funding models, and even the size, staffing, and status of these sponsors (Hochberg 2016, DaSilva and Gurtner 2017, Cohen et al. 2019). Although all of these factors can influence the types of start-ups that sponsors select, sponsors are generally motivated out of financial and reputation concerns to select and develop the most promising start-ups. Given their limited resources, they often face the difficult decision of which applicants to turn away.

Many accelerators, for instance, turn away between 80% and 90% of all applicants, and the top accelerators are even more selective, offering spots to a select 1%–3% of all applicants. Ultimately, the value that these sponsors provide rests on the advice, connections, and funding that they provide to enable entrepreneurs to test and develop their ventures (Smith and Hannigan 2015, Cohen et al. 2018). Sponsors also care about developing thriving pipelines of successful start-ups and entrepreneurs in their local ecosystems over time by selecting and sponsoring high-quality cohorts (Cohen 2013, Smith and Hannigan 2015, Fehder 2015). Institutional reforms play a role in both of these processes.

2.2.1. Improvements in Entrepreneurs' Perceptions of Accelerator Benefits. The existing literature on institutions and entrepreneurship (Sine et al. 2005, Eesley 2016, Eberhart et al. 2017) has suggested that changes in entrepreneurs' institutional environments can produce changes in entrepreneurs' perceptions of these environments. Entrepreneurship scholars have argued that these environments act as powerful external enablers of new venture creation and development through their influence on entrepreneurial agents (Davidsson et al. 2018). These enablers operate by changing agents' perceptions and actions, for example, perceived costs of entry and exit (Eberhart et al. 2017), returns to high-growth entrepreneurship (Eesley 2016), and perceived risks of developing high-risk ventures (Sine et al. 2005). Thus, institutional improvements can affect entrepreneurs' perceived value of partnering with venture accelerators.

Accelerators provide a variety of services and funding solutions to entrepreneurs (Pauwels et al. 2016, Ganamotse et al. 2017, Cohen et al. 2019). These include networking connections, mentoring, seminars and workshops, training, and direct funding. The funding solutions that accelerators pursue can include equity, quasi-equity, debt, grants, and combinations of debt and equity. Accelerators' objectives for providing these resources, however, are similar. They are to help entrepreneurs develop high-growth start-ups by navigating the risky process of new venture creation (Hochberg 2016, DaSilva and Gurtner 2017, Cohen et al. 2018).

There are two alternative ways that institutional changes could affect entrepreneurs' perceptions of the various resources and benefits that venture accelerators provide. First, policy reforms that improve the quality of institutions and remove barriers to entry, growth, or exit for entrepreneurs could reduce the value that accelerators provide as intermediaries that support start-up development. The reason is that removing the direct barriers to market development frees entrepreneurs to obtain resources and develop

their start-ups directly through market means, rather than seeking partnerships with intermediaries. Second, policy reforms that remove barriers to entry, growth, and exit could improve entrepreneurs' overall start-up conditions and thereby increase the growth prospects for new entrants. These improvements could increase the perceived value of the growth-enabling resources that accelerators provide to entrepreneurs.

Research looking at business incubators, for instance, has shown that the benefits of open-system intermediaries depend on institutional voids (Dutt et al. 2016). When entrepreneurs face large institutional voids, such as in many emerging economies, intermediaries become essential for providing services and enabling firm growth. As the institutional conditions in these environments improve, however, the perceived value of these organizations could decrease. Therefore, institutional improvements could reduce entrepreneurs' perceived value of the resources that venture accelerators provide.

Conversely, institutional improvements could improve overall start-up conditions and increase the perceived value of venture accelerators among entrepreneurs. Prior studies have argued that forming high-growth ventures becomes more attractive to entrepreneurs as their institutional environments improve. Decreasing the barriers to firm growth and exit, for instance, raises prospects for revenue creation and employment gains for new ventures (Eesley 2016, Eberhart et al. 2017). These changes imply that, as institutions improve, these improvements could lead to more significant anticipated returns from developing high-growth ventures for entrepreneurs. Institutional improvements could thus make accelerators' services and resources more valuable. Therefore, as institutional conditions improve, entrepreneurs' perceived benefits of partnering with venture accelerators and undergoing the acceleration process could increase. These arguments imply the following hypothesis.

Hypothesis 1. *Institutional reforms lowering the barriers to entrepreneurship increase entrepreneurs' perceived benefits of accelerators for early-stage start-up development.*

2.2.2. Decreases in Applicants' Probability of Being Selected. Institutional improvements, however could decrease applicants' probability of being selected. Several mechanisms can account for this effect. First, as the barriers to entrepreneurship decrease, the choice and related payoffs of staying in the labor market relative to pursuing entrepreneurship could motivate more—and more skilled—individuals to become entrepreneurs (Djankov et al. 2002, Klapper et al. 2006, Sine and David 2010). These changes can cause the number of accelerator applicants to increase and make

the selection process more competitive for a limited number of spots in incoming cohorts. The surge in new applicants could decrease the probability of being selected. Second, institutional improvements could increase the industry heterogeneity of new entrants (Sine et al. 2005) and decrease applicants' fit with the programs of their choice. These changes can reduce the selection probability due to lower applicant fit.

Prior studies suggest that forming high-growth ventures becomes more attractive to entrepreneurs as their institutional environments improve (Eesley 2016, Eberhart et al. 2017). These changes encourage more high-ability individuals to become entrepreneurs as the prospects of firm growth increase. Thus, as more high-ability individuals enter, these changes could increase the number of new applicants to venture accelerators. These dynamics point to both a shift in the types of entrepreneurs that enter and to more significant anticipated value creation from partnering with venture accelerators. Therefore, as institutions improve, these improvements could lead to a larger applicant pool for venture accelerators.

Further, institutional improvements could increase the heterogeneity of applicants to venture accelerators. Research of the independent power sector, for instance, has shown that institutional development increased the heterogeneity of new entrants and spurred higher founding rates for ventures based on risky, novel technologies (Sine et al. 2005). Prior studies have also documented that bankruptcy reforms motivate entrepreneurs to create risky, high-growth start-ups by lowering the reputation and legitimacy costs associated with failure (Eberhart et al. 2017). These studies suggest that institutional improvements could increase the industry- and sector-heterogeneity of entrants and diversify the applicant pool to venture accelerators. Other things being equal, this increase in applicant heterogeneity lowers applicants' fit to the selection criteria of accelerator managers. These changes lower applicants' probability of being selected, on average, because applicants are less suited to the selection criteria of accelerators to which they applied.

The combination of more—and more heterogeneous—applicants lowers applicants' average probability of being selected, leading to the following hypothesis.

Hypothesis 2. *Institutional reforms lowering the barriers to entrepreneurship decrease applicants' average probability of being selected.*

2.2.3. Improvements in Accelerators' Cohort Quality. As selection into venture accelerators becomes more competitive, however, accelerator managers could benefit from a shift in the quality distribution of applicants. Several mechanisms could drive these effects.

First, improvements in the overall start-up environment could drive an upward shift in applicant quality and growth prospects. Institutional development could increase the relative ease of scaling a business in new industries by legitimating these industries and enabling start-up growth (Sine et al. 2005). Further, improvements in entrepreneurs' institutional environments could change the types of firm competencies that provide a competitive advantage (Li et al. 2005). These dynamics could motivate more entrepreneurs to create start-ups based on novel technologies, thereby raising the revenue and employment growth prospects of their start-ups. Increases in the average quality of new applicants could thus enable accelerator managers to select more promising early-stage start-ups, including those in new domains with no prior dominant technologies or established incumbents.

Second, increasing returns to partnering with venture accelerators could motivate more high-ability entrepreneurs to join venture accelerators conditional on being selected, and drive improvements in start-up cohort quality. Prior studies have suggested that partnering with the right sponsors is essential for high-ability entrepreneurs and can increase these entrepreneurs' ability to gain funding, visibility, and legitimacy for their start-ups to further their growth (Stuart et al. 1999, Certo 2003, Hsu 2004). Institutional development could also motivate high-ability individuals to found more ambitious, high-risk ventures (Eberhart et al. 2017) that necessitate venture acceleration. Institutional reforms could thereby increase high-ability individuals' returns to joining accelerators and obtaining the resources they need to catalyze further growth for their ventures.

These mechanisms can enable accelerator managers to select higher-quality cohorts within their local ecosystems through both supply-side and demand side-factors. On the supply side, an increase in applicant quality can increase the growth potential of accelerated start-ups. On the demand side, an increase in the returns to partnering with accelerators for high-ability entrepreneurs could encourage more of these entrepreneurs to join venture accelerators if selected. Thus, institutional reforms could improve the two-way matching process that yields high-quality cohorts.

Institutional reforms could thereby contribute directly to raising the quality of cohorts that accelerators fund and develop within their local ecosystems. Together, improvements in the overall start-up environment and increases in the payoffs to joining accelerators after institutional reforms could enable accelerator managers to attract and "cherry-pick" the best candidates to fund and develop. These outcomes arise from changes in the quality distribution of start-up applicants to venture accelerators and increases in

the returns to joining venture accelerators, for more promising applicants. Other things being equal, these dynamics will improve accelerators' cohort quality, leading to the following hypothesis.

Hypothesis 3. *Institutional reforms lowering the barriers to entrepreneurship increase the quality of start-up cohorts for accelerator managers.*

3. Methodology

3.1. Setting and Data

The research setting for this study comprises start-up applicants to venture accelerators in 170 countries around the world. There are several reasons for looking at accelerator applicants as a proxy for high-growth entrepreneurship in many emerging and developing economies undergoing institutional change. First, venture accelerators have recently attracted significant attention as organizational sponsors for high-growth entrepreneurship (Fehder 2015; Cohen et al. 2018, 2019). Like venture capitalists, accelerator managers are critical judges of start-up quality, typically at earlier stages of start-up development. Therefore, they are essential to the process of early-stage start-up selection for high-growth ventures. The selection process plays a critical part in their ecosystem development, providing high-ability entrepreneurs with the resources they need to develop their start-ups (Fehder and Hochberg 2014, Hochberg 2016). Second, looking at applicants to venture accelerators mitigates survivor bias affecting early-stage start-ups. Looking at both selected and rejected applicants enables inference about the factors that shape the pipeline of early-stage companies that ultimately receive additional resources to grow and develop. Finally, expanding the scope of analysis beyond the United States to look at applicants in a broad set of countries provides insights into the impact of national-level institutions on various outcomes for early-stage ventures. This comparative analysis offers insights about government policies and regulatory barriers that affect start-up selection.

Accelerators: Definition, Organizational Elements, and Goals.

Venture accelerators are organizations that provide fixed-term, cohort-based educational and mentoring programs for start-ups to expedite the time to critical milestones for further growth or to quitting (Cohen et al. 2019). The organizational form of a "venture accelerator" has primarily been modeled on Y-Combinator (founded in 2005, Cambridge, MA) and TechStars (founded in 2006, Boulder, CO), the two leading U.S.-based accelerator programs. Based on this definition, venture accelerators exhibit five essential organizational elements: (1) a fixed program term (typically three months); (2) a cohort intake of entrepreneurs; (3) educational opportunities for

entrepreneurs; (4) mentoring for entrepreneurs (e.g., from former entrepreneurs, angel investors, and corporate executives); and (5) a public “pitch” event or “demo day” during which graduating entrepreneurs from the program present their venture ideas and progress to potential investors (Hochberg 2016, Cohen et al. 2019).

Many accelerators combine elements from these models but can vary widely in their program design. For instance, some accelerators provide mostly educational opportunities for entrepreneurs. Others include active mentoring and demo days to connect entrepreneurs with potential investors. Although accelerators vary in their designs, their shared purpose is to develop high-quality ventures and their teams, helping these entrepreneurs and their start-ups learn, grow, and succeed. Indeed, many accelerators pride themselves in developing high-potential entrepreneurs and start-ups that ultimately become large and valuable companies. In the United States, for example, accelerated companies include household names such as Airbnb, Instacart, and Dropbox. For these reasons, being accepted into a venture accelerator is generally considered a reliable indicator of a venture’s future growth potential (Fehder 2015, Smith and Hannigan 2015).

Data Collection and Sampling Frame: Criteria for Inclusion. The primary data used for this study come from the Entrepreneurship Database Program at Emory University, supported by the Global Accelerator Learning Initiative, a collaboration between the Aspen Network of Development Entrepreneurs (ANDE) and Emory University. ANDE is a global membership network of organizations that support entrepreneurship in emerging markets. Data collection was made possible through funding from the U.S. Global Development Laboratory at the U.S. Agency for International Development (USAID), the Omidyar Network, the Lemelson Foundation, the Argidius Foundation, the Australian Government, the Kauffman Foundation, and Stichting DOEN.

To collect the data, the Entrepreneurship Database Program methodology team conducted both primary and secondary research. Secondary research involved using online searches and lists from secondary sources such as Enclude, F6S, GAN, Nesta, and Seed-DB, to compile a list of global accelerators supporting early-stage ventures. The methodology team reviewed accelerators’ websites to verify that their programs met the inclusion criteria based on three common characteristics of accelerators established by Cohen and Hochberg (2014) of (1) a cohort intake of ventures, (2) a time-bound program with start and end dates, and (3) program duration of 1–12 months.

The directory of accelerators included in the sampling frame comprised multiple types of organizations that differ in their program design elements. The

sampling frame for the programs did not include competitions, but a few accelerators in the sample do offer boot-camps alongside with other services. Programs with boot camps comprise only 0.6% of accelerators in the sample (4 out of 593 programs). The online appendices provide additional information about the accelerators included in the sample. In the United States, for example, the sampling frame included university accelerators (e.g., UC Berkeley SkyDeck, PlayLabs@MIT), government-sponsored accelerators (e.g., Innovation Depot, funded by the U.S. Small Business Administration SBIR-STTR program), and leading independent accelerators (e.g., Y-Combinator). The methodology team made similar efforts in other countries to ensure a broad sampling of programs.²

The data used in this study come from surveys of accelerators and entrepreneurs. The data comprise 19,418 start-ups and their founders that applied to or participated in accelerators from 2013 to 2018. The analyses for this study focus on just the three most recent waves of accelerator applicant-level data (2016–2018), because these data contain both rejected and selected applicants. The analyses further restricted the sample to just “for-profit” companies, to compare their performance on similar metrics. The final data set used in the analyses includes information on 13,770 selected and rejected for-profit applicants to 322 accelerator programs in 170 countries between 2016–2018. Accelerators in this sample rejected over 80% of all applicants during the observation period. Therefore, the modal outcome for applicants was to be rejected. In Online Appendix A, Table A10 shows the geographic distribution of applicants, and Table A11 provides the list of countries included in the sample.

Sample Composition. The majority of the sample comprises data on applicants to accelerators that support early-stage start-ups. For instance, 44% of accelerator managers in the sample indicated that they support ventures at the idea stage of development, 64% support ventures at the start-up stage, 71% support ventures at the early stage, and 43% support ventures at the growth stage. When asked to rate the goals of their accelerator, nearly 60% of respondents rated “helping ventures gain market traction” as a top priority, whereas “sparking innovation in a certain sector” was prioritized by less than 40% of respondents. The majority of respondents (62%) reported that their typical program duration was between 3–6 months, whereas the remaining 38% ran programs between 1–3 months or 6–12 months. Whereas most respondents (70%) held in-person programs, about 30% reported that they provide a mix of in-person and virtual support through web-based training and interactions. The median acceptance rate in 2016 for

accelerator programs in this sample was 10%. Forty-one percent of respondents relied on a single type of funding, whereas the other 60% relied on two or more types of funding, including equity, grants, and debt. The most common type of funding was investor funding, followed by philanthropic gifts and corporate financing.

Regarding the benefits provided to start-ups, the majority of accelerators (over 90%) provided networking connections and mentoring, with direct funding and laboratory space being less common program components. About 56% of accelerators offered direct financing, and 23% provided laboratory space. Figure A13 in Online Appendix A shows the composition of accelerators in the sample by the types of services (not mutually exclusive) that they offered to participants. Of the 142 respondents that offered access to investors, most facilitated these connections through both investor events and one-on-one matchmaking. Among the 91 respondents that provided direct investment to participating ventures, about half made equity investments, whereas less than 30% provided grants, quasi-equity, or debt. Figure A14 in Online Appendix A shows the composition of the funding types provided to participating ventures (note that the listed categories are not mutually exclusive). Among the respondents who provide direct funding, the median total amount of financing in 2016 was \$250,000. The median investment per venture was approximately \$28,000.

The number of applicants per accelerator was about 82 on average, with about 10 selected start-ups per cohort. About 92% of candidates chosen decided to enroll, implying that the majority of ventures and founding teams joined if selected. The average education level for applications in this sample was between high school (or the equivalent degree) and some college training. The average number of years of prior work experience was two years. At the time of applying, applicants had, on average, about 0.15 patents, about US\$402 in revenue per month, and about two employees. Further, most of all applicants to venture accelerators in this sample (61%) were start-ups based on inventions (i.e., technology-based start-ups). The online appendices provide additional information about applicants and accelerators in this sample.

Sample Limitations. Although this sample represents the most comprehensive information available on early-stage start-up applicants to venture accelerators across a large sample of countries, these data are nevertheless limited. First, and most importantly, the data come from entrepreneurs who applied to a self-selected group of accelerator programs. Therefore, the data should not be considered representative of all early-stage entrepreneurs. Second, because the data on accelerators were left-censored, there could be survivor bias within the group of accelerators in the sample.

Specifically, only accelerators that were active at the start of the observation period could have entered the data set, leaving unobserved accelerators that failed before the observation period began. Accelerator-level survivor bias could have skewed the age distribution of accelerators included in this sample toward older, more established programs, which could be unrepresentative of the population of accelerator programs. Third, the survey instruments used to collect the data used a relatively broad definition of what an accelerator is and what types of organizations fit that definition. Sampling was not restricted to organizations that make investments themselves or to organizations that have some temporary physical copresence for entrepreneurs. Therefore, the programs that were included in this sample are heterogeneous.

3.2. Cross-Country Variation

The main challenge in conducting comparisons of accelerator applicants is that both accelerators and early-stage start-ups vary across institutional contexts. What an “accelerator” looks like, for instance, is different in Kenya than in the United States. Even within the United States, accelerators come in many varieties and embrace different program designs. Some accelerators, such as Illumina, for example, focus exclusively on a single industry (genomics). Others, such as Y-Combinator, are open to a diversity of industries, ranging from health care to energy and environmental sustainability. This focus on a single sector, or openness to a variety of industries, affects applicants’ chances of being the right candidates for a particular accelerator.

Accelerators also vary in the stage of companies that they support (e.g., idea stage, start-up stage, growth stage). Specialist accelerators have historically preferred candidates that fit relatively narrow criteria in terms of their stage of development and industry focus. Generalist accelerators, by contrast, are open to applicants from different industries and at various stages of development.

Further, the types of indicators that accelerators use to assess venture potential can also differ across countries. In many emerging economies, such as throughout Africa and Latin America, for example, revenue funding is often a preferred indicator of venture quality than investor backing, since venture capital and angel investment are not widely available. By contrast, in more developed economies, such as the United States and Australia, for example, investor backing might be a preferred indicator of applicant quality.

The quality and composition of early-stage start-ups can also vary across countries with different institutional environments. Countries with high levels of institutional development, for instance, could have higher baseline rates of entrepreneurship—and higher

compositions of high-growth versus subsistence-based businesses—than countries with less developed institutions. These differences can make comparisons of accelerator applicants across countries challenging.

The strategy for addressing both accelerator-level and applicant-level heterogeneity in this study is to look at the pool of applicants to the same accelerators in the same countries over time. The analyses use a difference-in-differences design exploiting changes in the time and procedures to start, grow, and exit new firms within countries. These analyses aimed to identify how institutional changes affected applicants to accelerators, and thereby influenced cohort selection for accelerator managers, as discussed below. This design relies on essential assumptions about parallel trends in the acceptance rates of applicants across countries that experienced institutional reforms during the observation period and those that did not. To validate the plausibility of these assumptions, this study presents additional robustness checks and estimations in the online appendices, which are discussed further in the results section.

3.3. Empirical Strategy

In keeping with the prior literature on institutional change, this study uses a difference-in-differences (DD) design (Easley 2016, Eberhart et al. 2017) to assess the effects of national-level policy and regulatory reforms on start-up applicants and venture accelerators. This design assumes that institutional changes comprised external regulatory changes that affected applicants in countries that implemented these reforms. Further, it implies that outcomes would have pursued trajectories of parallel trends over time in the absence of these reforms (an assumption that I formally test in the robustness checks using the Mora-Reggio hypothesis test [Mora and Reggio 2013, 2015]). The DD models estimate the effects of the institutional reforms by comparing changes in outcomes for applicants in countries that experienced institutional changes (treated group) to those in countries that did not experience institutional changes (control group).

This design requires data from the pre/post-intervention period in each country that adopted institutional reforms. The analyses then compare two types of differences: (1) between the treated and control groups before the institutional change, and (2) between the treated and control groups after the institutional change. The DD estimator takes the difference in these differences to identify the effects of the institutional reforms, net of baseline differences in applicant pool composition. This approach removes biases in the post-intervention comparisons between the treated and control groups that could be the result of either stable (time-invariant) differences between groups or due to other causes of the outcome.

Several assumptions underlie the causal interpretation of the estimates. These assumptions are (1) the exchangeability of the observations in the treatment and control groups, (2) the positivity of the treatment, (3) the stable unit treatment value assumption (SUTVA), (4) the exogenous assignment of the treatment to the outcomes at baseline, and (5) common pre-treatment dynamics (“parallel trends”) between the treatment and the control groups. I discuss each of these assumptions and their plausibility in this sample.

Exchangeability. First, the observed outcomes for each group must be exchangeable. This assumption means that the observed results for one group (e.g., applicants affected by the institutional changes) can substitute for the missing counterfactual potential outcomes of the other group (applicants not affected by institutional changes). This assumption is necessary to estimate the treatment effects.

Positivity. Second, individuals must have a positive probability of receiving treatment. This assumption means that one can observe both treated and not treated applicants. This assumption holds in the sample.

SUTVA. Third, the stable unit treatment value assumption requires that the potential outcomes observed for one individual were unaffected by the treatment assignment of other individuals in the sample. Put differently, this assumption requires “non-interference” between units assigned to different treatment groups. Practically, this assumption means that outcomes for applicants in the treatment group did not affect applicants in the control group. This condition appears plausible because accelerators made separate selection decisions across countries and for each application cycle. That is, selected applicants in countries that implemented institutional reforms did not affect the selection probability of applicants in countries that did not implement institutional reforms.

Exogeneity. Fourth, exogenous assignment of the treatment at baseline means that applicants did not select the treatment (institutional reforms). In this sense, the institutional changes were external to applicants, rather than caused by them. This assumption appears plausible, because applicants in this setting were new entrants, with comparatively few resources to engage in collective action. The observation period for this sample coincided with restrictive immigration laws in countries with favorable institutional environments for entrepreneurs. Thus, it was difficult for foreign entrepreneurs to immigrate and take advantage of favorable institutional policies in other countries. For instance, the United States implemented

stringent visa and immigration policies between 2016 and 2018; thus domestic applicants made up the majority of applicants over these cycles. Therefore, the institutional changes were plausibly exogenous to entrepreneurs in this setting.

Parallel Trends. Finally, the parallel trends assumption underlying the models requires that the unobserved differences between the treatment and control groups were the same over time. This assumption is testable given the data using a hypothesis test for common pre-treatment dynamics, $H_0: q = q - 1$ (Mora and Reggio 2013). I discuss this assumption and its validity in the results section.

3.4. Measures

3.4.1. Perceived Benefits of Accelerators. The perceived benefits of accelerators were measured using applicants' ranked responses to the following question: "The following are some of the potential benefits that are typically associated with entrepreneurial accelerators. Please rank these benefits in terms of how important they are to your venture's development and success." Respondents ranked these benefits on a 1–7 Likert scale, in order of increased importance. These rankings were reverse-coded to facilitate interpretation of the effects in order of increased importance, with 1 being the least important and 7 the most important. The benefits that accelerators provide consistently ranked in the top three were network development, business skills development, and securing direct venture funding. Applicants' perceived benefits along each of these components were measured as follows:

Perceived benefits for network development measured entrepreneurs' reported rank of the benefits of accelerators for network development (e.g., with potential partners and customers) based on a 1–7 Likert scale.

Perceived benefits for business skills development measured entrepreneurs' reported rank of the benefits of accelerators for business skills development based on a 1–7 Likert scale.

Perceived benefits for securing direct venture funding measured entrepreneurs' reported rank of the benefits of accelerators for securing direct venture funding (e.g., grants or investments) based on a 1–7 Likert scale.

3.4.2. Size and Composition of the Applicant Pool. Several variables measured the size and composition of the applicant pool. First, two different continuous variables measured changes in the number and heterogeneity of applicants. The first was the count of the total number of *Applicants* per accelerator, computed by summing the total number of applicants to each accelerator per year. The second was a measure of

applicant *Heterogeneity*, capturing applicants' industry and stage heterogeneity. This measure was constructed by calculating the proportion of previously admitted applicants to the same accelerator that had the same industry/operating focus and stage of development as the applicant. This proportion was scaled to a 0–100 "applicant fit" score f for each applicant, with 100 denoting the best fit with the accelerator's revealed preferences based on its previously admitted applicants. The applicant heterogeneity measure for each accelerator in an application cycle was then constructed as $H = 100 - \bar{f}$, with 100 denoting high heterogeneity in terms of industry and stage of development relative to previously admitted applicants, and 0 denoting low heterogeneity.

Additionally, several human-capital variables measured the composition of applicants in terms of their founding teams' prior education and work experience to capture differences in entrepreneurial ability (Easley 2016). *Team Education* measured the combined education of members of the founding team listed on the application, using the sum of individuals' levels of education. *Team Experience* measured the total number of years of prior work experience of members of the founding team listed on the application, using the sum of founders' years of previous work experience. The analyses also looked at whether start-up applicants had female co-founders listed on the application. The dichotomous variable *Female co-founder* coded for whether any of the members of the founding team of each start-up applicant were women.

3.4.3 Applicant Quality. Many venture accelerators assess the quality of start-up applicants using long questionnaires that founders answer as part of the application process. These questionnaires probe into start-ups' traction at the time of applying and often aim to give accelerators' staff a sense of the progress applicants have made to date. Y-Combinator, for example, one of the most selective accelerators in the United States, asks applicants to discuss their intellectual property (IP), revenue, and progress toward launching a product or service. Applicants have to answer questions about their IP such as: "Was any of your code written by someone who is not one of your founders? If so, how can you safely use it?" Questions also probe into the stage of development: "How far along are you? Do you have a beta yet? If not, when will you? Are you launched?" Finally, they ask about traction and performance to date: "How many users do you have? Do you have revenues? If so, how much?" In the United States, many accelerators also ask whether applicants have sought and secured venture capital and angel investment. Although having equity funding is often seen as a favorable indicator of applicant quality, this form of financing is not widely

available to entrepreneurs in other contexts. For these reasons, revenue is a common indicator of start-up quality for applicants in many other contexts.

The analyses, therefore, focused on three primary indicators of applicant quality: employees, revenue, and intellectual property. First, the ability to attract and retain early employees is often seen as a quality indicator, because early employees supplement the skills and abilities of the founders. Second, although the importance of revenue as an indicator of applicant quality varies by geography, in the majority of countries around the world—especially those where venture capital (VC) is not widely available—the ability to show revenue can demonstrate that a start-up has a viable product offering. Finally, intellectual property is valuable in the sense of giving exclusive rights over the use of inventions. In the applicant sample, over 60% of start-up applicants were invention-based. The measures of applicant quality were constructed as follows:

$\text{Log}(\text{Revenue} + 1)$ measured the average monthly revenue (in US\$) for each applicant at the time of applying to an accelerator. This variable was natural log-adjusted to correct for skew.

$\text{Log}(\text{Employees} + 1)$ measured the number of full-time and part-time employees of the start-up at the time of applying to a venture accelerator, natural log-adjusted for skew. Full-time employees are individuals who spend all of their working hours employed at the start-up (typically 40 hours or more per week). Part-time employees are those individuals who spend only a part of their working hours at the start-up (usually fewer than 40 hours per week).

$\text{Log}(\text{Patents} + 1)$ measured the log of the count of patents related to inventions that the start-up owned or filed to protect at the time of applying to a venture accelerator, adjusted for skew.

In addition to these quality measures, the analyses also evaluated several alternative measures in the robustness checks. These were the wages paid to early employees, $\text{Log}(\text{Wages} + 1)$, company profit, $\text{Log}(\text{Profit} + 1)$, and the planned equity raise over the next 12 months, $\text{Log}(\text{Planned Equity Raise 12 months} + 1)$. The results from these robustness checks using these measures of start-up quality are reported in Table A4 in Online Appendix A.

3.4.4. Applicant Outcomes. Applicant outcomes were coded as a dichotomous measure *Selected* equal to one if an applicant succeeded at being admitted to the accelerator program of choice, and zero otherwise. The quality of selected applicants into each accelerator in each application cycle was measured as the average log *Revenue*, log *Employees*, and log *Patents* for selected applicants.

3.5. Treatment Variables

The institutional “treatment” variables used in the analyses comprise policy and regulatory reforms that lowered entry, growth, and exit barriers in 170 economies around the world. These variables come from the World Bank’s Ease of Doing Business data, accessible at <http://www.doingbusiness.org>. The methodology used to measure the institutional barriers to start-up entry, growth, and exit came from seminal research in international entrepreneurship (e.g., Djankov et al. 2002; Klapper et al. 2006, 2010). The online appendices provide more information about the criteria used to measure institutional reforms and the survey instruments used to collect the data.

The treatment status of applicants in this sample was coded based on regulatory changes in an applicant’s country of operations in 2017. Applicants were coded into treated and control groups as follows. Applicants were “treated” with *Reduced barriers to entry* if the country of their operations experienced a reduction in the total number of procedures or in the time (in days) required to commence formal operations, including in pre-registration procedures, registration procedures, and post-registration procedures. Applicants were “treated” with *Reduced barriers to growth* if the country of their operations increased the ease of obtaining credit from banks and other financial institutions. Finally, applicants were “treated” with *Reduced barriers to exit* if the country of their operations implemented reforms that increased the ease of resolving insolvency, liquidating assets, and recovering the initial investment capital through bankruptcy proceedings.

Figure 2 plots the countries in the sample that implemented institutional reforms that lowered entry, growth, and exit barriers for entrepreneurs. As this figure shows, most of the institutional improvements were in emerging and developing economies. The identification of the effects of institutional changes comes primarily from applicants in Latin America and the Caribbean (38% of the sample), Sub-Saharan Africa (24% of the sample), and East Asia and the Pacific region (15% of the sample). Institutional reforms reducing entry barriers for new firms in these regions affected about 22% of applicants in the sample. Reforms that lowered growth barriers affected about 19% of applicants. Finally, reforms that lowered exit barriers affected 21% of applicants. The incidence of all three types of reforms in the same country was rare and affected only about 9% of applicants in the sample. The findings are robust to excluding applicants in countries affected by two or more institutional changes and to triple-differences models to estimate the effects of these changes (see the online appendices).

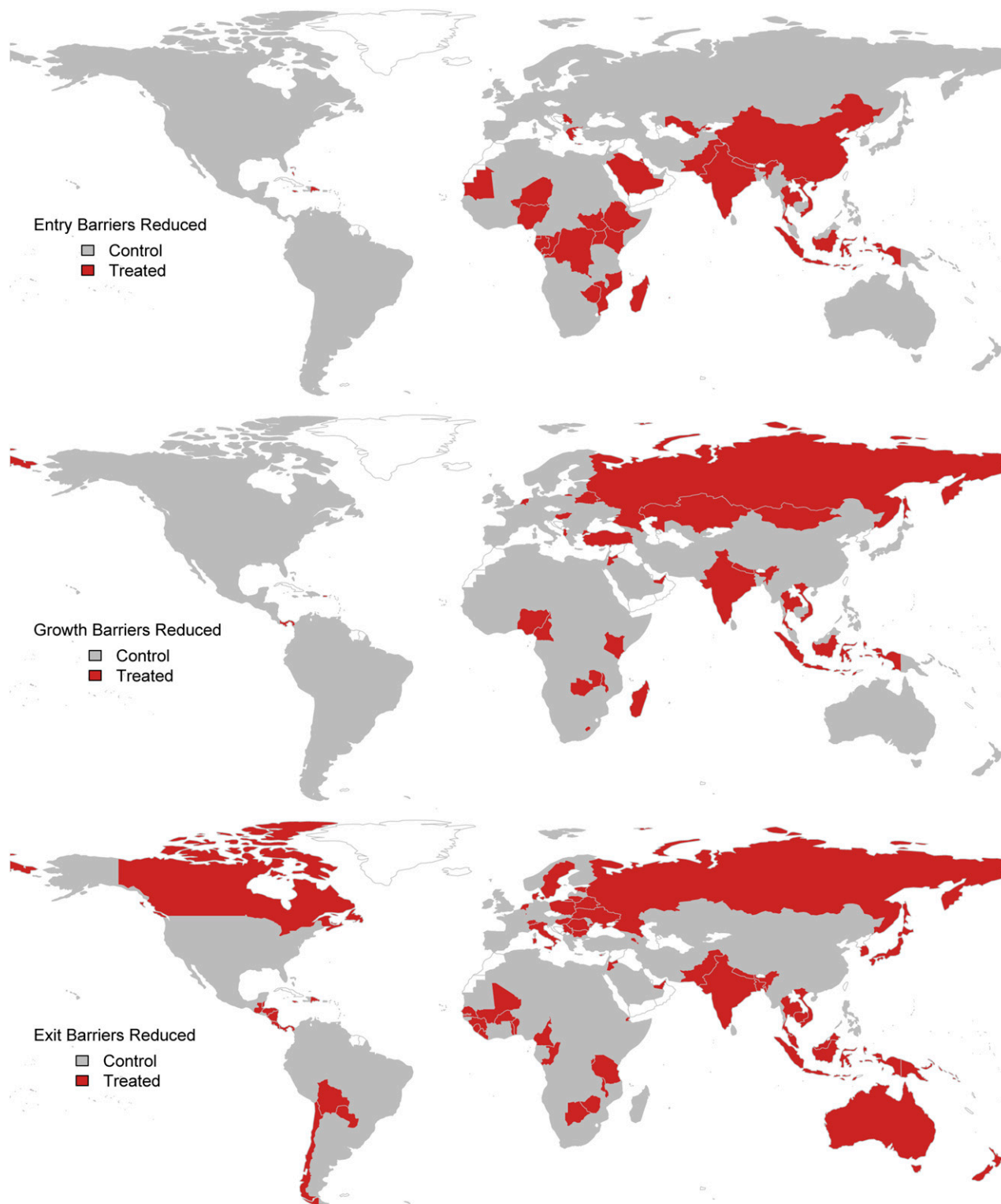
Figure 2. (Color online) Countries with Reduced Barriers to Entry, Growth, and Exit in 2017

Figure A4 in Online Appendix A shows the process involved in commencing operations, obtaining capital, and resolving insolvency. As this figure shows, there are multiple steps, procedures, and costs that entrepreneurs bear to create, grow, and exit new firms.

Often, these steps are imposed externally through regulations related to passing inspections, registering property, accessing information from credit bureaus and registries, and recovering assets through bankruptcy proceedings. The World Bank collects detailed

information about the procedures involved for entrepreneurs in collaboration with local legal experts to measure the total time and costs involved.

3.6. Statistical Analysis

The statistical analyses evaluated the effects of institutional reforms on selection outcomes for accelerator applicants using a quasi-experimental, difference-in-differences (DD) design. The DD models compared two periods for applicants and accelerators: the period before the institutional reforms (before 2017) and the period after these reforms (2017 and after). This window of observation was based on the availability of data on rejected applicants beginning in the 2016 application cycle. The strategy of looking at application cycles before and after institutional reforms enabled two types of comparisons. The first was a comparison of the baseline differences between the treated and control groups of applicants (i.e., those that were in countries affected by the reforms, and those in countries not affected by the reforms, respectively). The second was a comparison of the outcomes before and after the institutional reforms. The models estimated changes in the applicant pool, selection probabilities, and cohort quality before and after the institutional reforms. The causal interpretation of these models relies on an assumption of “parallel trends” between the treated and control groups. This assumption appears to be validated in this sample, as shown in Figure A1 in Online Appendix A.

The models that tested Hypothesis 1 estimated changes in applicants’ perceived benefits of the value that accelerators provided for networking, skills development, and direct venture funding. These models compared changes in these perceived benefits before and after institutional reforms reducing the barriers to entry, growth, and exit in the accelerators’ countries of operation.

The models that tested Hypothesis 2 estimated changes in applicants’ probability of being selected before and after institutional reforms, along with the contributing mechanisms. Additional models tested for several alternative explanations, including changes in the number of accelerators and cohort sizes.

The models that tested Hypothesis 3 examined whether accelerator managers selected higher-quality cohorts after institutional reforms. The models looked at changes in the log revenues, log employees, and log patents of candidates chosen before and after the reforms. Robustness checks also looked at differences in other performance measures, including wages paid and planned equity raises over the next 12 months. The online appendices provide the results from these robustness checks.

4. Results

4.1. Perceived Value of Venture Accelerators

Table 1 presents the results from difference-in-differences models testing Hypothesis 1. These models look at three types of benefits that accelerators provide: network development, business skills development, and access to direct venture funding. Further, the models look at three types of institutional reforms: reduced barriers to firm entry (panel A), reduced barriers to firm growth through improved access to credit (panel B), and reduced barriers to exit through bankruptcy (panel C).

The results show that the perceived benefits of accelerators for networking and skills development increased after the institutional reforms. The perceived benefit of accelerators for networking increased by about 5% following reforms that lowered the barriers to entry ($b = 0.218$, $p = 0.007$, two-tailed test; Table 1, panel A, column 1), by about 6% after reforms that lowered barriers to growth ($b = 0.26$, $p = 0.003$, two-tailed test; Table 1, Panel B, column 1), and by about 3% after reforms that lowered the barriers to exit ($b = 0.147$, $p = 0.077$, two-tailed test; Table 1, panel C, column 1). The perceived benefits of accelerators for business skills development increased by about 4% after reforms lowering the barriers to entry ($b = 0.15$, $p = 0.074$, two-tailed test; Table 1, panel A, column 2), by about 6% after reforms lowering the barriers to growth ($b = 0.234$, $p = 0.010$, two-tailed test; Table 1, panel B, column 2), and by about 4% after reforms lowering the barriers to exit ($b = 0.142$, $p = 0.099$, two-tailed test; Table 1, panel C, column 2). These results support Hypothesis 1.

The results also showed that the perceived benefits of venture accelerators for securing venture funding decreased after credit-based reforms that made securing debt funding from banks more accessible. Indeed, reforms that lowered the barriers to growth (credit constraints) decreased the perceived benefits of venture accelerators for securing direct venture funding by about 8% ($b = -0.339$, $p = 0.000$, two-tailed test; Table 1, panel B, column 3). By contrast, reforms that lowered the barriers to exit (bankruptcy) increased the perceived benefits of accelerators for securing venture funding by about 7% ($b = 0.308$, $p = 0.001$, two-tailed test; Table 1, panel C, column 3). Table A8 in Online Appendix A probes further into these effects by looking at the split-sample results based on whether accelerators offered direct venture funding as one of their primary benefits. The coefficient estimates for changes in the perceived benefits of accelerators for financing were positive and statistically significant for accelerators that offered direct funding after reforms

Table 1. Difference-in-Differences Estimates: Perceived Benefits of Venture Accelerators

Panel A: Entry barriers reduced in 2017						
	Network development		Business skills development		Securing direct venture funding	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	4.732		4.065		4.069	
Treated	4.608		4.164		4.77	
Diff (T-C)	-0.125	0.026	0.098	0.089	0.701	0.000
After						
Control	4.55		4.044		4.35	
Treated	4.644		4.292		4.657	
Diff (T-C)	0.094	0.11	0.249	0.000	0.308	0.000
Diff-in-Diff	0.218	0.007	0.15	0.074	-0.393	0.000
N	13,220		13,213		13,745	
Panel B: Growth barriers reduced in 2017						
	Network development		Business skills development		Securing direct venture funding	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	4.727		4.087		4.11	
Treated	4.6		4.046		4.736	
Diff (T-C)	-0.127	0.050	-0.041	0.539	0.626	0.000
After						
Control	4.538		4.063		4.359	
Treated	4.671		4.256		4.645	
Diff (T-C)	0.133	0.025	0.193	0.002	0.286	0.000
Diff-in-Diff	0.26	0.003	0.234	0.010	-0.339	0.000
N	13,220		13,213		13,745	
Panel C: Exit barriers reduced in 2017						
	Network development		Business skills development		Securing direct venture funding	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	4.705		4.093		4.197	
Treated	4.745		4.022		4.111	
Diff (T-C)	0.04	0.481	-0.071	0.229	-0.086	0.149
After						
Control	4.526		4.103		4.384	
Treated	4.713		4.174		4.606	
Diff (T-C)	0.188	0.002	0.071	0.256	0.222	0.001
Diff-in-Diff	0.147	0.077	0.142	0.099	0.308	0.001
N	13,220		13,213		13,745	

Note. Means estimated by linear regression; p-values based on two-tailed hypothesis tests.

lowering exit barriers, and positive but not statistically significant for accelerators that did not offer direct funding. These split-sample results suggest that the effects on the perceived benefits of accelerators for funding were driven by programs that offered direct funding as one of their primary benefits.

4.2 Applicants' Probability of Being Selected

The next set of analyses examined how institutional reforms affected the composition of applicants and the probability of being selected. These analyses tested Hypothesis 2 that reforms reducing the barriers to entry, growth, and exit for entrepreneurs will lower applicants' probability of being selected into venture accelerators.

Table 2 presents the effects of institutional reforms on applicant quality, as measured by revenue, employees, and patents. These results show that applicant quality increased after institutional reforms that lowered entry, growth, and exit barriers for entrepreneurs. Start-up revenues for applicants, for instance, were 37% higher after reforms lowering barriers to entry ($b = 0.312$, $p = 0.159$, two-tailed test; Table 2, panel A, column 1), 94%

higher after reforms lowering barriers to growth ($b = 0.661$, $p = 0.006$, two-tailed test; Table 2, panel B, column 1), and 366% higher after reforms lowering barriers to exit ($b = 1.538$, $p = 0.000$, two-tailed test; Table 1, panel C, column 1). Further, the head count of employees was 12% higher for applicants after the institutional reforms lowering barriers to entry ($b = 0.111$, $p = 0.019$, two-tailed test; Table 2, panel A, column 2),

Table 2. Difference-in-Differences Estimates: Quality of Start-up Applicants

Panel A: Entry barriers reduced in 2017						
	Log(Revenues + 1)		Log(Employees + 1)		Log(Patents + 1)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	4.935		0.985		0.111	
Treated	6.028		1.527		0.11	
Diff (T-C)	1.093	0.000	0.542	0.000	-0.001	0.918
After						
Control	5.581		1.004		0.126	
Treated	6.986		1.657		0.134	
Diff (T-C)	1.405	0.000	0.653	0.000	0.007	0.551
Diff-in-Diff	0.312	0.159	0.111	0.019	0.009	0.614
N	13,743		13,745		13,745	
Panel B: Growth barriers reduced in 2017						
	Log(Revenues + 1)		Log(Employees + 1)		Log(Patents + 1)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	5.043		1.035		0.11	
Treated	5.63		1.355		0.116	
Diff (T-C)	0.587	0.001	0.32	0.000	0.006	0.654
After						
Control	5.641		1.026		0.123	
Treated	6.89		1.625		0.14	
Diff (T-C)	1.248	0.000	0.599	0.000	0.016	0.201
Diff-in-Diff	0.661	0.006	0.279	0.000	0.01	0.588
N	13,743		13,745		13,745	
Panel C: Exit barriers reduced in 2017						
	Log(Revenues + 1)		Log(Employees + 1)		Log(Patents + 1)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	5.101		1.063		0.112	
Treated	5.161		1.116		0.105	
Diff (T-C)	0.061	0.685	0.054	0.099	-0.007	0.556
After						
Control	5.57		1.052		0.117	
Treated	7.168		1.61		0.156	
Diff (T-C)	1.599	0.000	0.558	0.000	0.038	0.003
Diff-in-Diff	1.538	0.000	0.505	0.000	0.045	0.010
N	13,743		13,745		13,745	

Notes. Means estimated by linear regression; p-values based on two-tailed hypothesis tests. Employee head count includes both full-time and part-time employees.

32% higher after reforms lowering the barriers to growth ($b = 0.279$, $p = 0.000$, two-tailed test; Table 2, panel B, column 2), and 66% higher after reforms lowering barriers to exit ($b = 0.505$, $p = 0.000$, two-tailed test; Table 1, panel C, column 2). Finally, concerning innovation, applicants' count of patents was 1% higher after reforms lowering barriers to entry ($b = 0.009$, $p = 0.614$, two-tailed test; Table 2, panel A, column 3), 1% higher after reforms lowering

barriers to growth ($b = 0.01$, $p = 0.588$, two-tailed test; Table 2, panel B, column 3), and 5% higher after reforms lowering the barriers to exit ($b = 0.045$, $p = 0.010$, two-tailed test; Table 2, panel C, column 3).

Table 3 presents the effects of institutional reforms on applicants' human capital, as measured by the founding team's education, experience, and gender composition. The results show that applicants' human capital increased after institutional reforms lowering

Table 3. Difference-in-Differences Estimates: Human Capital of Start-up Applicants

Panel A: Entry barriers reduced in 2017						
	Team education		Team experience		Female co-founders	
	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value
Before						
Control	1.842		2.068		0.468	
Treated	1.792		2.228		0.507	
Diff (T-C)	-0.05	0.002	0.16	0.000	0.039	0.006
After						
Control	1.79		2.103		0.478	
Treated	1.798		2.049		0.524	
Diff (T-C)	0.007	0.673	-0.054	0.195	0.046	0.002
Diff-in-Diff	0.058	0.015	-0.214	0.000	0.007	0.74
<i>N</i>	5,431		3,515		13,745	
Panel B: Growth barriers reduced in 2017						
	Team education		Team experience		Female co-founders	
	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value
Before						
Control	1.84		2.094		0.473	
Treated	1.776		2.113		0.485	
Diff (T-C)	-0.064	0.001	0.018	0.711	0.012	0.475
After						
Control	1.79		2.104		0.478	
Treated	1.799		2.044		0.525	
Diff (T-C)	0.009	0.586	-0.06	0.152	0.047	0.002
Diff-in-Diff	0.074	0.005	-0.078	0.226	0.035	0.119
<i>N</i>	5,431		3,515		13,745	
Panel C: Exit barriers reduced in 2017						
	Team education		Team experience		Female co-founders	
	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value
Before						
Control	1.835		2.099		0.475	
Treated	1.821		2.079		0.473	
Diff (T-C)	-0.014	0.413	-0.02	0.652	-0.002	0.879
After						
Control	1.764		2.082		0.49	
Treated	1.876		2.101		0.498	
Diff (T-C)	0.112	0.000	0.019	0.688	0.008	0.606
Diff-in-Diff	0.126	0.000	0.039	0.547	0.01	0.628
<i>N</i>	5,431		3,515		13,745	

Note. Means estimated by linear regression; *p*-values based on two-tailed hypothesis tests.

barriers to entry, growth, and exit. The founding teams' education level, for example, was 3% higher after the barriers to entry were reduced ($b = 0.058$, $p = 0.015$, two-tailed test; Table 3, panel A, column 1), 4% higher after the barriers to growth were reduced ($b = 0.074$, $p = 0.005$, two-tailed test; Table 3, panel B, column 1), and 7% higher after the barriers to exit were reduced ($b = 0.126$, $p = 0.000$, two-tailed test; Table 3, panel C, column 1). The founding teams' prior work experience was about 10% lower after the barriers to entry were reduced ($b = -0.214$, $p = 0.000$, two-tailed test; Table 3, panel A, column 2), about 4% lower after the barriers to growth were reduced ($b = -0.078$, $p = 0.226$, two-tailed test; Table 3, panel B, column 2), and about 2% higher after the barriers to exit were reduced ($b = 0.039$, $p = 0.547$, two-tailed test; Table 3, panel C, column 2). Finally, concerning the teams' gender composition, the proportion of teams with female co-founders was 1% higher after the barriers to entry were reduced ($b = 0.007$, $p = 0.74$, two-tailed test; Table 3, panel A, column 3), about 6% higher after the barriers to growth were reduced ($b = 0.035$, $p = 0.119$, two-tailed test; Table 3, panel B, column 3), and about 2% higher after the barriers to exit were reduced ($b = 0.01$, $p = 0.628$, two-tailed test; Table 3, panel C, column 3).

Table 4 presents the effects of institutional changes on the number and heterogeneity of applicants and on the probability of being selected into a venture accelerator. The results show that the number and heterogeneity of applicants increased and that applicants' probability of being selected decreased after the institutional reforms. The number of applicants increased by 169% after the barriers to entry were reduced ($b = 128.23$, $p = 0.000$, two-tailed test; Table 4, panel A, column 1), by 181% after the barriers to growth were reduced ($b = 136.84$, $p = 0.000$, two-tailed test; Table 4, panel B, column 1), and by 78% after the barriers to exit were reduced ($b = 58.853$, $p = 0.000$, two-tailed test; Table 4, panel C, column 1).

Applicant heterogeneity (industry and stage) increased by about 6% after the barriers to entry were reduced ($b = 4.995$, $p = 0.000$, two-tailed test; Table 4, panel A, column 2), by 8% after the barriers to growth were reduced ($b = 6.301$, $p = 0.000$, two-tailed test; Table 4, panel B, column 2), and by about 8% after the barriers to exit were reduced ($b = 6.647$, $p = 0.000$, two-tailed test; Table 4, panel C, column 2). The probability of being selected into a venture accelerator decreased by 5% after the barriers to entry were reduced ($b = -0.049$, $p = 0.003$, two-tailed test; Table 4, panel A, column 3), by about 6% after the barriers to growth were reduced ($b = -0.064$, $p = 0.000$, two-tailed test; Table 4, panel B, column 3), and by about 7% after the barriers to exit were reduced ($b = -0.066$, $p = 0.000$,

two-tailed test; Table 4, panel C, column 3). These results support Hypothesis 2 that institutional reforms decreased applicants' probability of being selected by increasing both the number and heterogeneity of new applicants to venture accelerators.

4.3. Quality of Accelerated Cohorts

The final set of analyses, presented in Table 5, tested Hypothesis 3 that institutional reforms will improve the quality of start-up cohorts for accelerator managers. The results support this hypothesis and suggest that cohort quality increased in terms of revenue, employee head count, and innovation. The average revenue of incoming cohorts was 1,009% higher after reforms lowering entry barriers ($b = 2.406$, $p = 0.000$, two-tailed test; Table 5, panel A, column 1), 2,322% higher after reforms lowering growth barriers ($b = 3.187$, $p = 0.000$, two-tailed test; Table 5, panel B, column 1), and 349% higher after reforms lowering exit barriers ($b = 1.501$, $p = 0.005$, two-tailed test; Table 5, panel C, column 1). Further, selected start-up cohorts had on average 58% more employees after reforms that lowered the barriers to entry ($b = 0.455$, $p = 0.001$, two-tailed test; Table 5, panel A, column 2), 56% more employees after reforms lowering the barriers to growth ($b = 0.443$, $p = 0.002$, two-tailed test; Table 5, panel B, column 2), and 67% more employees after reforms lowering the barriers to exit ($b = 0.51$, $p = 0.000$, two-tailed test; Table 5, panel C, column 2). Institutional improvements also increased the patent count for selected start-up cohorts by about 2% after reforms lowering barriers to entry ($b = 0.022$, $p = 0.571$, two-tailed test; Table 5, panel A, column 3), and 3% after reforms lowering barriers to exit ($b = 0.028$, $p = 0.408$, two-tailed test; Table 5, panel C, column 3). These results support Hypothesis 3.

Figure A2 in Online Appendix A confirms that the underlying mechanism behind the effects for Hypothesis 3 was a shift in the quality distribution for start-up applicants after the institutional reforms. As this figure shows, before the institutional changes, there were more applicants with no employees or revenues, and fewer applicants with revenues and early employees. After the changes, there were more applicants with revenue and employees. These changes suggest that the average quality of applicants increased following the institutional reforms.

4.4. Robustness Checks

Several robustness checks evaluated the validity of these results. The first check looked at changes in cohort sizes before and after the institutional reforms to see if the results were driven by changes in cohort intake. The second check looked at changes in the total number of accelerators before and after the

Table 4. Difference-in-Differences Estimates: Changes in the Number and Heterogeneity of Applicants, and Changes in the Probability of Being Selected

Panel A: Entry barriers reduced in 2017						
	Applicants		Heterogeneity		Pr(Selected)	
	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value
Before						
Control	76.32		81.463		0.187	
Treated	61.609		87.863		0.121	
Diff (T-C)	−14.711	0.000	6.4	0.000	−0.066	0.000
After						
Control	65.208		75.747		0.247	
Treated	178.728		87.143		0.132	
Diff (T-C)	113.52	0.000	11.395	0.000	−0.115	0.000
Diff-in-Diff	128.231	0.000	4.995	0.000	−0.049	0.003
<i>N</i>	13,745		13,745		13,745	
Panel B: Growth barriers reduced in 2017						
	Applicants		Heterogeneity		Pr(Selected)	
	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value
Before						
Control	76.356		81.892		0.182	
Treated	55.544		87.091		0.13	
Diff (T-C)	−20.812	0.000	5.199	0.000	−0.052	0.000
After						
Control	65.333		75.806		0.246	
Treated	181.358		87.306		0.131	
Diff (T-C)	116.026	0.000	11.5	0.000	−0.116	0.000
Diff-in-Diff	136.837	0.000	6.301	0.000	−0.064	0.000
<i>N</i>	13,745		13,745		13,745	
Panel C: Exit barriers reduced in 2017						
	Applicants		Heterogeneity		Pr(Selected)	
	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value	Coeff.	<i>p</i> -value
Before						
Control	66.537		82.927		0.172	
Treated	110.568		80.34		0.196	
Diff (T-C)	44.031	0.000	−2.587	0.001	0.023	0.034
After						
Control	71.848		78.22		0.222	
Treated	174.732		82.28		0.18	
Diff (T-C)	102.885	0.000	4.06	0.000	−0.042	0.001
Diff-in-Diff	58.853	0.000	6.647	0.000	−0.066	0.000
<i>N</i>	13,745		13,745		13,745	

Note. Means estimated by linear regression; *p*-values based on two-tailed hypothesis tests.

institutional reforms, to see if the results were driven by the entry or failure of accelerators in the sample. The third check evaluated the plausibility of the core assumption behind the DD models of common pre-treatment dynamics (“parallel trends”). The fourth check looked at additional start-up performance metrics to test for changes in cohort quality using the log of wages paid, log of profit, and log of the planned

equity raises over the next 12 months for start-ups. The fifth check looked at a split sample by equity funding, to see if the results depended on the type of funding that accelerators provided. The final check estimated triple-differences (DDD) models to evaluate the results of simultaneous changes in multiple barriers (entry, growth, and exit) within the sample. The online appendices present the results from these analyses.

Table 5. Difference-in-Differences Estimates: Quality of Accelerated Cohorts

Panel A: Entry barriers reduced in 2017						
	Log(Revenues + 1)		Log(Employees + 1)		Log(Patents + 1)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	6.492		1.168		0.124	
Treated	6.748		1.432		0.117	
Diff (T-C)	0.256	0.563	0.264	0.007	−0.007	0.797
After						
Control	5.995		1.127		0.118	
Treated	8.657		1.846		0.133	
Diff (T-C)	2.662	0.000	0.719	0.000	0.015	0.583
Diff-in-Diff	2.406	0.000	0.455	0.001	0.022	0.571
N	2,587		2,588		2,588	
Panel B: Growth barriers reduced in 2017						
	Log(Revenues + 1)		Log(Employees + 1)		Log(Patents + 1)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	6.588		1.184		0.119	
Treated	5.796		1.338		0.166	
Diff (T-C)	−0.792	0.111	0.154	0.162	0.047	0.134
After						
Control	6.065		1.156		0.115	
Treated	8.459		1.753		0.147	
Diff (T-C)	2.395	0.000	0.597	0.000	0.031	0.26
Diff-in-Diff	3.187	0.000	0.443	0.002	−0.016	0.697
N	2,587		2,588		2,588	
Panel C: Exit barriers reduced in 2017						
	Log(Revenues + 1)		Log(Employees + 1)		Log(Patents + 1)	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Before						
Control	6.284		1.161		0.118	
Treated	7.548		1.355		0.145	
Diff (T-C)	1.264	0.000	0.194	0.013	0.027	0.236
After						
Control	5.845		1.097		0.108	
Treated	8.61		1.802		0.163	
Diff (T-C)	2.765	0.000	0.704	0.000	0.055	0.030
Diff-in-Diff	1.501	0.005	0.51	0.000	0.028	0.408
N	2,587		2,588		2,588	

Notes. Means estimated by linear regression; p-values based on two-tailed hypothesis tests.

4.4.1. Alternative Explanations. There are two potential alternative explanations for the results. The first is that decreased cohort sizes could have both lowered applicants' probability of being selected and increased the quality of selected cohorts. The results presented in Table A2 in Online Appendix A, however, do not support this alternative explanation. They do not show significant changes (at the $p < 0.05$ level) in cohort sizes for accelerators in the sample following

reductions in entry barriers ($p = 0.202$), growth barriers ($p = 0.216$), or exit barriers ($p = 0.059$). These results suggest that changes in cohort sizes do not explain the observed patterns.

The second explanation is changes in the total number of accelerators after institutional reforms. If more accelerators entered after the institutional changes, then the results could understate the effects of institutional reforms on the probability of

being selected. If more accelerators failed after the institutional reforms, then the results could overstate these effects. The estimates from these robustness checks, however, do not support either of these explanations. Indeed, as Table A2 in Online Appendix A shows, there was no statistical change in the total number of accelerators after reductions in entry barriers ($p = 0.516$), growth barriers ($p = 0.864$), and exit barriers ($p = 0.565$). This stability in the number of accelerators, however, could be due to the short period of observation. Thus, it is possible that, over longer periods of observation, institutional reforms could encourage more accelerators to enter in response to the increased demand among entrepreneurs.

4.4.2. Tests of Common Pre-Treatment Dynamics. The common pre-treatment dynamics, or parallel trends, assumption underlying the models requires that the unobserved differences between the treatment and control groups were the same over time. This assumption is testable given the data using the Mora-Reggio hypothesis test for common pre-treatment dynamics, where $H_0: q = q - 1$ (Mora and Reggio 2013). The failure to reject this null hypothesis means that the underlying assumption of parallel trends is plausible given the data. To conduct these tests, I used the *didado* routine in Stata 15 SE (Mora and Reggio 2015). I implemented this test using the earlier data on selected cohorts, because the data on applicants was not available beyond the one-year window pre/post-2017. To implement this test in Stata, I estimated differences in the trends among start-ups before and after the reforms lowering the barriers to entry in 2017, as shown in Figure A1 in Online Appendix A. Table A3 in Online Appendix A reports the results of the formal statistical tests of the null hypothesis of common pre-treatment dynamics. The outcomes of interest are the main start-up quality measures: log revenues, log head count of employees, and log patents. I also tested for trends in several other quality indicators: log wages paid, log profits, and log planned equity raise over the next 12 months (in US\$). The results reported in Table A3 fail to reject the null hypothesis of common pre-treatment dynamics at the $p < 0.05$ level. These results imply that the parallel trends assumption is plausible given the data.

4.4.3. Additional Performance Metrics. Table A4 in Online Appendix A presents the robustness checks for tests of several additional applicant quality metrics: log wages paid, log profit, and log planned equity raise over the next 12 months. Each of these metrics captures different dimensions of start-up quality that may not be reflected in revenues, employee head count, or patents (which are relatively rare).

First, the log of wages paid is an early indicator of start-up performance based on the expenditure on attracting and retaining talented early employees. This metric is indicative of higher growth potential, through investment in the human capital of the company. Second, the log of the gross profit margin is an indicator for whether the start-up had a viable business model formula. Profitability, in general, was relatively rare in this sample. About 11% of start-ups in the sample had no operating revenues or costs, and about 30% had a negative return on investment (the venture lost money and did not generate revenue). Of the ventures that were profitable, the majority had a profit margin of between zero and 5% (28% of all applicants). Only 10% of applicants in the sample had a profit margin of more than 20%. Third, the log of the planned equity raised over the next 12 months (after applying to an accelerator) is a good indicator for the founders' aspirations for their company. This variable was measured in US\$, log-adjusted for skew. The average planned equity raise for start-ups in the sample was \$1.4 million, with a standard deviation of \$5.9 million. The modal planned equity raise was zero.

The robustness checks show that reductions in entry barriers had a positive effect on the quality of accelerator applicants as measured by wages paid ($b = 1.612$, $p < 0.01$). The results are similar for reductions in growth and exit barriers. Further, reductions in exit barriers had a positive effect on the quality of applicants in terms of their planned equity raised over the next 12 months ($b = 1.258$, $p < 0.001$). The coefficients for the effects on profits are positive, but not statistically significant.

4.4.4. Accelerator Heterogeneity. Table A5 in Online Appendix A shows the results from the split-sample analyses by equity funding that assess the robustness of the findings to heterogeneity in the sample of accelerators, specifically to whether accelerators take equity in the companies. A potential concern with the heterogeneity in accelerators is that high-potential applicants could have self-selected into accelerators that provided equity funding. Whereas 55% of accelerators in the sample provided some form of equity funding to start-ups, these accelerators did not account for a majority of the applicants, primarily due to their geographic concentration in high-income economies such as Canada, Australia, and the United Kingdom. Indeed, these accelerators accounted for only 12% of applicants in the sample. The majority of applicants (88%) were located in emerging and developing economies (a feature of the sampling frame and focus of the data collection). Equity funding is not a dominant feature of the start-up landscape in these economies, and early-stage start-ups are typically not equity-funded

from either venture accelerators, angel investors, or venture capitalists.

As Table A5 shows, the identification of the effects comes primarily from applicants in economies where there was no equity funding. The estimated coefficients for the effects of institutional changes in this subsample are stronger than in the full sample, with a larger increase in both the number and the quality of applicants following reductions in entry, growth, and exit barriers. Correspondingly, the estimated decreases in the selection probability of applicants in the subsample of non-equity-funded applicants were also larger in size than in the full sample: 5.9 (vs. 4.9) percent decrease in the probability of being selected after entry barriers were reduced, 7.2 (vs. 6.4) percent decrease in the probability of being selected after growth barriers were reduced, and 8.4 (vs. 6.6) percent decrease in the probability of being selected after exit barriers were reduced. These results suggest that the main effects cannot be explained in terms of high-quality applicants self-selecting into accelerators that provided equity funding.

4.4.5. Multiple Institutional Changes. Tables A6–A7 in Online Appendix A show the results from robustness checks looking at the effects of multiple simultaneous changes in entry, growth, and exit barriers using triple differences (DDD) models. The goal of these analyses was to check whether the results were driven by more favorable start-up conditions overall. If the driver was ecosystem-level change, then the effects should be amplified by simultaneous changes in multiple barriers. The results appear to support this explanation.

Table A7 reports the estimated effects looking at changes in the number and composition of new applicants. As this table shows, the effects of simultaneous changes in multiple barriers were larger than the effects of changes in only one type of barrier. These results suggest that the effects were superadditive. For example, reducing entry and exit barriers together was associated with double the increase in the number of new applicants to venture accelerators than reducing entry barriers alone. Simultaneous decreases in both entry and growth barriers were also associated with larger increases in the number of new applicants (a proxy for new early-stage entrants) and larger decreases in the average probability of being selected. This evidence suggests that the observed effects were attributable to ecosystem-wide improvements in the policy and regulatory environment.

5. Discussion

5.1. Institutional Theory and Entrepreneurship

This study has sought to fill an essential gap in the existing literature on institutions and entrepreneurship—

namely, how do institutional changes affect early-stage start-up selection? Answering this question involved answering two related questions. First, how do institutional reforms affect entrepreneurs' perceived value of applying to venture accelerators? Second, how do institutional reforms affect the size and composition of the applicant pool and selected cohorts?

This study showed that policy and regulatory reforms improved the perceived benefits of venture accelerators among entrepreneurs. Reforms that lowered entry, growth, and exit barriers for entrepreneurs increased the perceived value of venture accelerators for networking and skills development. These results suggest that the benefits that entrepreneurs derive from accelerators depend on their institutional conditions. Further, the findings showed that institutional reforms increased the number and heterogeneity of new applicants to venture accelerators. These changes in the applicant pool lowered applicants' probability of being selected by increasing competition for a limited number of spots and lowering applicants' fit to the selection criteria of accelerator managers through increased heterogeneity. In the aggregate, these dynamics improved the quality of selected cohorts, due to both a shift in the quality of new applicants and increases in the perceived value of partnering with accelerators to develop high-growth start-ups.

These findings contribute to research on institutional theory and entrepreneurship (cf. Eesley 2016, Eberhart et al. 2017) by evaluating how institutional reforms affect start-up selection and showing the cognitive implications of policy and regulatory reforms for entrepreneurs (Sine et al. 2005, Sine and David 2010, Tolbert and Hiatt 2010). First, concerning the research on institutional theory and entrepreneurship, the findings show that multiple institutional reforms were beneficial for start-up selection and were superadditive in their effects. Lowering both entry and exit barriers, for instance, increased the number of applicants to venture accelerators by more than single improvements. These changes heightened the competition for a limited number of spots in incoming cohorts. Second, concerning the cognitive implications, this study sheds light on the relationship between regulative and cognitive institutions (e.g., perceptions, beliefs) governing market interactions (Sine et al. 2005, Sine and David 2010, Tolbert and Hiatt 2010). The findings showed that institutional reforms improved entrepreneurs' perceptions of the value of venture accelerators. These findings demonstrate the cognitive effects of institutional reforms and suggest an important link between policy and regulatory changes and entrepreneurial cognition and actions.

5.2. Cross-National Differences in Entrepreneurship

In addition to the contributions mentioned above, this study also contributes to studies of cross-national differences in entrepreneurship (Klapper et al., 2006, Ardagna and Lusardi 2010, de Mel et al. 2010). Scholars in this area have sought to understand how entrepreneurs' environments influence their proclivity toward transformative (high-growth) entrepreneurship (Klapper et al. 2010, Lerner and Schoar 2010, Schoar 2010). Answers to this question have broader implications for promoting high-growth entrepreneurship, particularly in emerging and developing economies, which have historically struggled with subsistence and informal entrepreneurship (de Mel et al. 2010, Klapper et al. 2010, Assenova and Sorenson 2017).

Regarding this literature, this study shows that the quality of the pipeline of start-ups that become candidates for further investment, growth, and scaling depends critically on institutional reforms that remove the barriers to new firm entry, growth, and exit. The direct implication of this finding is that the quality of high-growth entrepreneurship within regions over time depends on streamlining the process of starting new firms and obtaining operating permits, improving access to capital, and reducing the frictions and losses involved with firm failure. These policy and regulatory reforms can stimulate more capable entrepreneurs to enter and create the right incentives for market actors to select, invest in, and develop high-growth start-ups.

The findings also contribute to a nascent but growing literature within entrepreneurship on the external enablers of entrepreneurship in different environments (Davidsson 2015, Davidsson et al. 2018). This study suggests that policy and regulatory reforms are essential external enablers of high-growth entrepreneurship in many emerging and developing economies. These economies have historically had high rates of subsistence-based and informal entrepreneurship (Klapper et al. 2010, Schoar 2010, Assenova and Sorenson 2017). As other scholars have argued, institutions—including government laws and regulations—are decisive for the direction that entrepreneurs take with their firms.

Recognizing and studying the role of these external enablers of entrepreneurship is vital to our understanding of cross-national variation in the form and value of entrepreneurial activity. The findings from this study suggest that new venture selection among nascent firms is contingent upon institutional conditions. Unlike later-stage firms, when factors such as network connections and geographic co-location to venture capitalists can buffer firms from these external shocks, early-stage ventures may be especially vulnerable to regulatory changes within their

operating environments. These changes can affect both initial selection outcomes and long-run growth prospects. Thus, the observed variation in the form and value of entrepreneurship across countries could be attributable to differences in these external enablers, rather than entrepreneurs' ability or preferences.

5.3. Organizational Sponsors and Local Ecosystem Development

Finally, this study contributes to research on organizational sponsors of early-stage ventures and the conditions that enable these sponsors to select and develop cohorts of high-growth start-ups. Many types of sponsors play different—often complementary—roles in start-up ecosystems. These sponsors include venture accelerators, venture incubators, venture capitalists, and angel investors. The literature on organizational sponsors has shown that these organizations are vital for the development of new ventures (e.g., Smith and Hannigan 2015, DaSilva and Gurtner 2017, Cohen et al. 2019). These studies have identified many benefits to partnering with venture accelerators, including opportunities to develop entrepreneurs' personal and professional networks, funding opportunities, and access to expert mentors (e.g., Yu 2015, Cohen et al. 2018, Assenova 2020). Therefore, the resources that accelerators provide have ecosystem-wide benefits for developing a pipeline of valuable companies (Hallen et al. 2014, Hochberg 2016).

Although sponsors can select their business models and program designs (Pauwels et al. 2016, Ganamotse et al. 2017, Cohen et al. 2019), they often operate in larger institutional environments that are mostly outside their control yet affect their activities and effectiveness. Therefore, recent research has called for understanding how these external regulatory environments enable or constrain sponsors' capacity to select and develop high-growth cohorts (Cohen et al. 2019). This study evaluated the effects of policy and regulatory reforms affecting entry, growth, and exit barriers for entrepreneurs. The findings showed that institutional changes shifted the quality of applicants, thereby improving incoming cohorts for accelerator managers. These changes increased the quality of the pipeline of early-stage firms that accelerator managers invested in and developed within their local ecosystems. The results suggest that the effectiveness of accelerators depends critically on removing regulatory barriers to high-growth entrepreneurship. Institutional reforms can encourage more and more promising entrepreneurs to pursue venture acceleration as a path toward high-growth venture development, thereby improving the quality of selected start-ups in many emerging and developing economies around the world.

5.4. Limitations and Future Research

There are several limitations to this study. First, the data come from a sample of entrepreneurs who self-selected into applying to venture accelerators. This point is critical to recognize because readers should interpret the findings in light of the non-representative nature of the sample concerning other types of entrepreneurs who do not apply to venture accelerators. Second, data availability on rejected applicants, which covered only 2016 onward, presents a limitation on the analyses. These data limitations do not enable a more prolonged study of the long-term consequences of institutional reforms beyond a one-year window. Thus, institutional reforms may result in increases (or decreases) in the number of new accelerators within a region or changes in cohort sizes within existing accelerators in the long term. More years of data collection are needed to evaluate these longer-term effects. Third, this study addresses selection issues only partially by looking at a limited set of quality indicators for start-up applicants. It is not easy to identify the precise formula used by different accelerators to select applicants and what criteria they weigh more heavily in their assessments. Finally, this study evaluated only a few regulatory changes that affected entrepreneurs and possibly omitted other reforms. The reforms in each country could have differed in their substance and implementation. Therefore, looking at regional variation in reform implementation is an important area for future work. Future research can also examine the implications of regulatory reforms for later-stage firms and sponsorship from angel investors and venture capitalists. These are fruitful directions for understanding the generalizability of these findings and the role that environmental conditions, chance, and timing play in start-up selection and performance.

6. Conclusion

The aim of this study was to understand how institutional changes in entrepreneurs' external environments influenced early-stage start-up selection, and thereby the pipeline of companies that become candidates for further growth and scaling in a region over time. The findings showed that reforms that reduced the barriers to entry, growth, and exit for new firms lowered start-ups' average probability of being selected into venture accelerators. In the aggregate, these changes increased the quality of start-up cohorts for accelerator managers and improved the pipeline of early-stage firms that received resources to grow and develop. These findings suggest that institutional reforms are essential for improving the pipeline of early-stage start-ups in economies that have high barriers to entrepreneurship, such as those in Sub-Saharan Africa, Southeast Asia, and Latin America.

Institutional reforms lowering entry, growth, and exit barriers for entrepreneurs appear to increase the quality of cohorts that receive resources such as mentoring, network connections, and funding from venture accelerators by encouraging entry by more—and more capable—entrepreneurs. The direct implication of these findings is that governments can support high-growth entrepreneurship by reducing these barriers. Creating more favorable policies and regulations can help channel accelerators' resources toward more promising early-stage start-ups. Thus, institutional reforms can stimulate higher economic and societal value creation through new venture acceleration, generating more significant employment, higher wages, and greater innovation through early-stage companies.

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Endnotes

¹ As measured by the ease of obtaining credit index. This index ranges from 0 to 100, with higher values indicative of greater ease of funding new companies and thereby lower barriers to firm growth. In the United States, one of the most institutionally favorable environments for securing financing, this index takes on a value of 20, which is the highest in the world. Thus, the relative ease of obtaining credit for entrepreneurs, even in institutionally developed economies like the United States, is comparatively low. Therefore, access to financing is still a significant impediment for entrepreneurs in most low-income economies, and even in many high-income economies around the world.

² The accelerator directory is accessible online at <https://www.galidata.org/accelerators/directory>.

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