ENTREPRENEURSHIP AS A DRIVER OF INNOVATION IN THE DIGITAL AGE

ANALYSIS OF DATA FROM 17 ADB REGIONAL MEMBERS

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ABSTRACT

This paper explores economy- and regional-level determinants of the productivity potential of new entrepreneurial firms using data from Asian Development Bank regional members. Results show that new entrepreneurial firms constitute a highly heterogeneous group in terms of their productivity potential and that this potential is shaped by the economy's national system of entrepreneurship. This system consists of both economy-level institutional conditions, as well as the resource and knowledge dynamics that operate at the level of regional entrepreneurial ecosystems. Economy-level institutional conditions shape the productivity potential of the economy's population of new entrepreneurial firms through their effect on who chooses to become an entrepreneur and what strategic goals the resulting new firms decide and are able to pursue. The regional-level entrepreneurial dynamics condition the extent to which new entrepreneurial ventures are able to realize this potential through business model innovation. This recognition is important because it suggests that to be effective, an economy's entrepreneurship policy framework needs to address both economy-level institutional conditions as well as regional-level entrepreneurial ecosystem dynamics. The two require different policy approaches and pose distinctive challenges.

Keywords: digital entrepreneurship, productivity, entrepreneurial policy, new firms

JEL codes: O30, O38, L26, M13

1 Introduction

Public media often assumes a positive association between entrepreneurship, innovation, and economic development. In reality, this association is more complex than often thought. There is plenty of evidence that: (i) most “entrepreneurs” are not innovative, most “entrepreneurs” do not create new jobs in any significant number, and most “entrepreneurs” lack the means to be productive. These facts have been so widely established by the world’s largest comparative data collection effort on individual-level entrepreneurial activity, the Global Entrepreneurship Monitor (Reynolds, Bosma, and Autio 2005), that they can be safely regarded as “stylized” (Levie et al. 2014).

This does not mean, however, that there is no link between entrepreneurship, innovation, and economic development, only that the associations are complex. An equally wide body of evidence highlights another “stylized fact” regarding entrepreneurship: “entrepreneurs” are a highly heterogeneous group of individuals and teams, as are the new businesses they create. David Birch discovered that of all new firms, only a small minority—what he subsequently termed “gazelles”—were responsible for a disproportionate share of employment generation in any cohort of new firms (Birch, Haggerty, and Parsons 1997). This finding has been independently confirmed by others and has also been found not to be sector-specific (Autio 2011; Autio and Hoeltzl 2008). This observation is considered today as arguably the most robust and most generally (although not universally) applicable “law” describing regularities in growth patterns in firm populations (Coad et al. 2014; Decker et al. 2015; Henrekson and Johansson 2010; Coad and Hölzl 2009; Autio and Hoeltzl 2008; Mason and Brown 2013).[1] In the European Union

[1] Note, however, that recent evidence claims that the contribution of high-growth firms to job creation seems to have attenuated in the United States (US) since 2000 (Decker et al. 2015).

(EU), this pattern was confirmed in the employment dynamic of European small and medium-sized enterprises (SMEs) after the 2008 financial downturn, as 11% of European SMEs created over half of the new jobs by SMEs in EU28 from 2008 to 2012 (Muller et al. 2015).

These observations underline a key insight: in entrepreneurship, quality matters. Not all new firms are born equal. While some innovate, most do not. While some use new technologies, most do not. While some grow, most do not. While some offer significant potential to contribute to total factor productivity, most do not. To illustrate these points, our dataset of entrepreneurial start-ups from a set of regional members of the Asian Development Bank (ADB) shows that although only 0.4% of the entrepreneurial new businesses had reached the size of 250+ employees by the age of 42 months, these accounted for 44% of new jobs created by this group. In contrast, new businesses that employed up to two people represented 54% of all new businesses, yet created only 9% of total jobs (Table 2). This raises obvious questions on what drives this heterogeneity and whether it is possible to design policy measures such that they better facilitate the productivity potential of new entrepreneurial firms—and thus better harness this potential for economic development.[2]

In this paper, we address this question from several perspectives. First, we highlight the heterogeneity of new firm populations in terms of their productivity potential and discuss types of new and entrepreneurial firms against this lens. Second, we illustrate empirically the highly skewed distribution of this productivity potential in new firm

[2] We are not implying that small micro firms are not important. Although their job creation impact is limited, they nevertheless support an important number of jobs and livelihoods, particularly in situations where there might be few alternatives to the individual.

populations using empirical data from ADB members, as foreshadowed above. Third, we explore reasons for this skewed distribution in the economies and the region. We develop a framework that identifies two major regulators of entrepreneurs' productivity potential: institutional conditions (including entry regulations) within the economies and regional resource and knowledge dynamics that operate in regional entrepreneurial ecosystems. We explore and illustrate the operation of the economy-level dynamic using primary interview data from 17 ADB regional members. We illustrate the operation of the regional entrepreneurial ecosystem dynamic using primary data from two regional entrepreneurial ecosystems in Thailand: Bangkok and Chiang Mai. Finally, we discuss implications of the above for entrepreneurship policy in ADB regional members. Specifically, we address the regional entrepreneurial ecosystem aspect of the "national system of entrepreneurship" and reveal its intimate connectivity with a global transformative trend—that of digitalization. Drawing on this, we present recommendations for entrepreneurship policy design in the digital age.

2 New Entrepreneurial Firms: A Heterogeneous Phenomenon

Entrepreneurial new firms are new firms started and owner-managed by individuals or groups of individuals. Such firms are a highly heterogeneous group that engage in a broad range of different activities. These activities differ in terms of their substantive content (i.e., what the business does), the location-specificity of the firm's activities and its customer demand, the dominant form of specialization, and the dominant form of innovation (if any). Combined, these characteristics set up the productivity potential of the new business—i.e., its ability to contribute to economic development. To understand the entrepreneurial new firm sector, it is important to recognize the major forms of this heterogeneity.

Firm-level *productivity* represents the efficiency with which it converts inputs (e.g., capital, labor) into value added (Gal 2013). By firm-level *productivity potential* we refer to the potential efficiency that is realistically achievable by a given firm. Whether the entrepreneurial firm realizes this potential will depend on, e.g., resource availability and market environment. Firms efficient in converting inputs into value added will be more efficient in using their input resources, and they will also be more profitable relative to the industry average. High aggregate firm-level productivity will contribute to a more effective economy-level utilization of capital and labor, thereby contributing to higher total factor productivity (TFP) and economic development at the economy level.

New entrepreneurial firms can vary considerably in terms of their productivity potential, and even some categorization is possible on this basis. Generally speaking, by far, the biggest group of new businesses is composed of self-employed small businesses that provide employment for the owner(s) and possibly one or two employees. Such firms

typically specialize in low-tech services such as food vendors, small shops, small restaurants, small repairs and handyman jobs, maintenance, personal transportation, and so on. Such businesses provide an important occupational outlet for low-skilled labor in the absence of alternative occupational opportunities. Another group in this category is composed of professional self-employed, such as freelancers, lawyers, consultants, dentists, who provide knowledge-intensive services. For such businesses, the potential productivity impact is greater, and some successful ones may well enter a rapid growth path if they discover a scalable concept that can be scaled, e.g., through franchising. Low-tech service businesses typically compete on the basis of personal and business reputation and relationships, drawing on local assets (e.g., business premises) to establish their presence in the local market and service local demand. While such businesses can be an important source of jobs in the local economy, their productivity potential is usually quite low.

Another prevalent type of entrepreneurial businesses (excluding agricultural ones) is composed of low- to medium-technology manufacturing SMEs. These typically inhabit industry clusters where they specialize in niches found in local supply chains. Characteristic of this kind of activity is localized co-specialization in the supply chain, as the businesses exploit co-location benefits to optimize their productive interactions (Malmberg and Maskell 2002; Maskell 2001). As these interactions take place between suppliers and users, this activity encourages vertical networking (between firms in successive stages of the supply chain) among horizontally competing businesses – firms in the same stage of the supply chain being potential substitutes to one another (Autio, Nambisan, et al. 2018). This networking pattern means that the opportunities tend to be

niches within the local supply chain, with only the supply chain outputs potentially exported outside the region.

High-technology new ventures differ from low- to medium-technology SMEs by the patterns of innovative activity they exhibit. Whereas the dominant form of innovation in low- to medium-technology SMEs is process innovation (i.e., optimization of productive interactions between supply chain businesses) combined with limited product innovation, the dominant form of innovation in high-technology new ventures is technology-push product innovation. High-technology new ventures are mostly found in regional high-technology clusters where they translate advances in basic and applied research into innovative high-technology products. As high-technology new ventures create value through technology-based innovation, their productivity potential tends to be higher than that of low- to medium-tech SMEs.

It is useful to distinguish one category of high-technology businesses that exhibits distinctive properties: that of digital new ventures. High-technology new ventures are technology developers: they develop and commercialize technological advances in a technology-push mode by investing in technology-push (research and development) R&D. As opposed to being technology developers, digital new ventures excel in exploiting affordances opened up by advances in digital technologies and infrastructures (Autio, Szerb, et al. 2018). They do this in two ways: (i) by creating software products and applications and software-based services delivered through the Internet (i.e., software as a service, or SaaS) and (ii) through new ventures that leverage the Internet and digital resources obtainable therein to innovate new ways of creating, delivering and capturing customer value. The first type relies on digital software competences to code and offers

various algorithmically-based functionalities (e.g., accounting software, gaming software). The second type leverages digital capabilities and digital infrastructure to re-organize and re-invent more conventional services (e.g., digital marketplaces; digitally organized personal transport services such as the Grab service; or digitally organized accommodation services such as Airbnb). Although both types rely on digital capabilities, these represent the core competence for the first type and only a supporting competence for the second type. While for the first type, the dominant pattern is software innovation (a form of technology-push innovation), for the second type the dominant form of innovation is business model innovation i.e., the innovative re-organization and coordination of activities for the creation, delivery, and capture of customer value (Autio, Nambisan, et al. 2018). This activity represents a form of combined process innovation (in the form of reorganized and reconfigured service creation and delivery) and service innovation (in the form of new types of services such as mobility as a service [MaaS] applications).

The different types of entrepreneurial and new businesses are summarized in Table 1. As can be seen, new and entrepreneurial businesses vary considerably in terms of their dominant activity, their patterns of innovative activity, the location specificity of their activities, resources, and demand, as well as in terms of their resulting productivity potential and ability to contribute to economic development. As is clear from the table, the different categories also differ in terms of their clustering patterns and the types of policy initiatives required for their facilitation. We will return to policy implications later in this paper.

Table 1: Categorization of New and Entrepreneurial Businesses on the Basis of Their Productivity Potential

Type of Business	Description of the Business	Specialization and Innovation Drivers	Location Specificity of Activities	Location Specificity of Demand	Productivity Potential
Local service businesses	Low-technology service providers such as personal services, cafes and restaurants, transport services, construction and maintenance services	Reputation based on service quality or price, location specificity, business premises, personal relationships, branding	Highly localized with local sourcing of resources and supplies	Highly localized	Low
Low- to medium-technology SMEs	Low- to medium-technology manufacturing businesses operating in supply chain niches or manufacturing specific products (e.g., parts and component suppliers, furniture manufacturers, similar	Mainly through process innovation in the form of specialized manufacturing assets and co-specialized investment in user-supplier interactions; also through product innovation and branding	Mainly localized supply chain relationships	Localized (for supply chain interactions), regional, national, and even international for specific products	Low to medium
High-technology new ventures	High-technology businesses that commercialize technology-based products	Mainly product innovation by translating advances in basic and applied research and development into new, innovative products	Typically depend on localized spill-over of knowledge from research-intensive activities and local specialized resources such as specialized human capital	Typically national and international, sometimes even global	High
Software businesses	Software development businesses who code useful functionalities in algorithmic form (e.g., accounting software, smartphone applications)	Product innovation in the form of codification of useful functionalities in software packages	Increasingly tapping non-localized spill over of knowledge and ideas distributed through digital platforms. In addition, rely on regional specialized resources such as human capital and funding	National, international, and global, especially if the software is offered through application software platforms such as Google Play	High

Continued on the next page

Type of Business	Description of the Business	Specialization and Innovation Drivers	Location Specificity of Activities	Location Specificity of Demand	Productivity Potential
Digitally enhanced service businesses	Businesses that rely on digital technologies and infrastructure for the delivery and coordination of digital and nondigital services (e.g., personal transportation and delivery websites, bookkeeping services)	Business model innovation in the form of digitally enhanced organized, and coordinated services	Tapping into partly localized insights regarding what works in digitally enhanced business model innovation derived from business model experiments. In addition, rely on regional specialized resources such as human capital, funding, new venture accelerators	National, international, and global, depending on the type of service (typically need to connect with localized resources such as cab drivers, physical accommodation providers, similar)	Medium to high, depending on ability to establish platform leadership

Source: Authors.

3 Firm-Level Productivity Potential in ADB Regional Members: Illustrative Evidence

Many formulations exist for measuring firm-level productivity (Holl 2011; Baily and Solow 2001). In practice, most measures require firm-level data that may not be widely enough available to enable comprehensive cross-economy comparisons (Gal 2013), making it necessary to use appropriate proxies. In the following, we approximate firm-level productivity potential by focusing on its employment growth expectations and innovative activity. Employment growth expectations should reflect the firm's experience regarding its ability to generate returns from its labor, and innovative activity should reflect its ability to generate value added from its resource inputs.

We use data from the Global Entrepreneurship Monitor (GEM) to illustrate heterogeneity in firm-level productivity in a set of ADB regional members. Our dataset covers 200,335 interviews from 17 ADB regional members from 2006 to 2016.[3] The interviews were conducted among representative random samples of 16- to 64-year-old individuals in the 17 regional members and weighted to be representative of the working-age population in their respective economies.

In total, our sample includes 14,753 (population weighted) entrepreneurial businesses, owned and managed by individuals and teams of individuals that had not paid salaries or wages to anyone for longer than 42 months. These we call "baby businesses" to be consistent with the GEM terminology. In addition, our sample includes

[3] Our dataset covers all ADB regional members for which GEM data is available: Bangladesh; Georgia; Hong Kong, China; India; Indonesia; Kazakhstan; Malaysia; Pakistan; the Philippines; the People's Republic of China; Singapore; the Republic of Korea; Taipei,China; Thailand; Tonga; Vanuatu; and Viet Nam.

21,570 (population weighted) established entrepreneurial businesses that had been operation (i.e., paid salaries or wages) for longer than 42 months.

Table 2 shows the employment size of both baby businesses and established businesses at the time of the interview. We can see that micro businesses in the smallest size category dominate both samples (i.e., baby businesses and established businesses): of the baby businesses, 53.7% qualified as micro businesses that employed at most two employees including the owner-manager(s). Of the established businesses, the corresponding share was 53.8% of the sample total. In contrast, entrepreneurial businesses with 250 or more employees represented only 0.4% of both baby businesses and established businesses in the sample. However, the contributions of these two categories to total employment generated by baby and established businesses in the sample were dramatically different. Whereas micro businesses had generated 8.8% of the total employment by baby businesses and 8.7% by established businesses, baby businesses had generated 44.1% and established businesses with over 250 employees 43.1% of the total employment by the sample.[4]

Table 2: Current Employment in Baby Businesses and Established Businesses in 17 ADB Regional Members

	Baby Businesses (up to 42 months old)				Established Businesses (older than 42 months)			
Size (Employees)	**n**	**% of n**	**Total Employees**	**% of Employees**	**n**	**% of n**	**Total Employees**	**% of Employees**
0–2	7,922	53.7	11,139	8.8	11,615	53.8	15,722	8.7
3–29	5,486	37.2	23,984	19.0	7,956	36.9	35,288	19.5
10–49	1,108	7.5	19,348	15.3	1,661	7.7	29,251	16.1
50–249	183	1.2	16,313	12.9	254	1.2	22,927	12.6
250+	54	0.4	55,743	44.1	84	0.4	78,209	43.1
Total	**14,753**	**100.0**	**126,527**	**100.0**	**21,570**	**100.0**	**181,398**	**100.0**

ADB = Asian Development Bank.
Source: Global Entrepreneurship Monitor.

[4] Note that the data were winsorized with a maximum of 2,000 employees per business.

The same skewness applies when we look at the expected employment generation—i.e., the self-reported number of expected employees within 5 years' time. These are shown in Table 3. As can be seen, the same pattern holds as above: based on employment generation expectations, the group of microbusinesses constitutes the largest group of both baby businesses (44.3% of the sample total) and established businesses (46.8%). Baby businesses represented 0.9% and established businesses expecting to employ 250 or more people were 0.6% of their respective sample totals. These totals are mirrored by the expected employment impact, with micro businesses expecting to generate 3.4% of the total employment by baby businesses and 5.5% by established businesses. Businesses with 250 or more expected employees are responsible for 56.9% of total employment by baby businesses and 46.7% of total employment by established businesses. For expected employment generation, the distribution of baby businesses is more skewed toward the larger firm category than for established businesses, perhaps reflecting the greater optimism by these, or alternatively, the greater realism of established businesses.

Table 3: Expected Number of Employees in 5 Years by a Sample of Baby Businesses and Established Businesses in 17 ADB Regional Members

	Baby Businesses (up to 42 months old)				Established Businesses (older than 42 months)			
Size (Employees)	**n**	**% of n**	**Total Employees**	**% of Employees**	**n**	**% of n**	**Total Employees**	**% of Employees**
0–2	6,542	44.3	8,663	3.4	10,091	46.8	13,681	8.7
3–29	5,687	38.5	25,963	10.2	8,548	39.6	39,240	19.5
10–49	1,939	13.1	33,279	13.1	2,382	11.0	41,382	16.1
50–249	451	3.1	41,908	16.4	427	2.0	39,189	12.6
250+	135	0.9	145,150	56.9	122	0.6	116,831	43.1
Total	**14,753**	**100.0**	**254,961**	**100.0**	**21,570**	**100.0**	**250,324**	**100.0**

ADB = Asian Development Bank.
Source: Global Entrepreneurship Monitor.

Similar skewness is also visible in the use of new technologies by the sample firms. The respondents were required to indicate whether the technologies required by the products, services, and processes of their businesses had been available for less than 1 year, between 1 and 5 years, or longer than 5 years. While this question is necessarily more open-ended, it nevertheless shows that firms using technologies that were less than 5 years old represented the majority of established businesses, with the pattern slightly more skewed toward new technology use for baby businesses, as seems natural.

Table 4: Use of New Technologies by a Sample of Baby Businesses and Established Businesses in 17 ADB Regional Members

	For how many years have the technology required by this product or service been available?			
	Baby Businesses (up to 42 months old)		**Established Businesses** (older than 42 months)	
	n	**% total**	**n**	**% total**
Less than 1 year	3,208	23.6	2,008	10.6
Between 1 and 5 years	3,997	29.4	2,756	14.6
More than 5 years	6,370	46.9	14,116	74.8
Total	**13,575**	**100.0**	**18,880**	**100.0**

ADB = Asian Development Bank.
Source: Global Entrepreneurship Monitor.

The same pattern also shows for entrepreneurial businesses that offer new products unfamiliar to all or some of the customers. Of the baby businesses, 16.8% indicated that their product or service was new and unfamiliar to all of their customers. For established businesses, this percentage was 14.4%. Of the baby businesses, 34.2% indicated their product or service was new and unfamiliar for 34.2%; for established businesses the corresponding figure was 25.0%. For roughly half of baby businesses and 61% of established businesses, none of their customers found their product or service new or unfamiliar.

Table 5: Unfamiliarity of the Firm's Product or Service for Customers in a Sample of Entrepreneurial Businesses in 17 ADB Regional Members

	Do all, some, or none of your customers consider your product or service to be new and familiar?			
	Baby Businesses (up to 42 months old)		Established Businesses (older than 42 months)	
	n	% total	n	% total
All	2,268	16.4	2,757	14.4
Some	4,730	34.2	4,785	25.0
None	6,816	49.3	11,583	60.6
Total	**13,814**	**100.0**	**18,880**	**100.0**

ADB = Asian Development Bank.
Source: Global Entrepreneurship Monitor.

Tables 4 and 5 confirm that most new businesses are neither innovative or use new technologies. Note that the threshold for qualifying as "product innovator" or "new technology user" in this case was quite low, as it did not require, e.g., patenting activity or formal investment in R&D. Combined, Tables 2 to 5 confirm that while most new and entrepreneurial businesses do not meet even the relatively soft criteria for innovativeness, the growth impact of new firms tends to be highly skewed within any given cohort of new businesses.

These observations are not unique to ADB regional members only. In fact, they resonate well with stylized facts formulated based on data derived from other economies. In their review of EU evidence, and subsequently closely echoed by Coad et al. (2014), Autio and Hoeltzl (2008) summarized their conclusions in the form of the following stylized facts regarding 'high-impact' firms (i.e., ones that make a difference for economic development, therefore exhibiting high realized productivity potential):

(i) **High-impact firms matter**. Studies suggest that anything from between 3% and 10% of any new cohort of firms will end up delivering from 50% to up to 80% of the aggregate economic impact of the cohort over its lifetime (Storey 1994; Birch,

Haggerty, and Parsons 1997; Autio 2007; Audretsch 2002; Acs, Parsons, and Tracy 2008; Henrekson and Johansson 2008; Hölzl 2006).

(ii) **High-impact firms are rare**. A direct corollary of the above is that high-impact firms are rare—implying that directly targeted policy measures should be selective, at least in principle (Autio and Rannikko 2016).

(iii) **High-impact firms can be found everywhere**. The review conducted by the EU 'Gazelles' panel confirmed findings from earlier reviews that high-impact firms are not confined to high-technology sectors only. Instead, firm growth distributions exhibit remarkable similarities across economies and industry sectors (Hölzl and Friesenbichler 2008).

(iv) **High-impact firms innovate**. Although formal R&D and product innovation are not a requirement for achieving high growth, studies suggest that high-impact firms are nevertheless innovative, and this innovation may come in many forms (e.g., service innovation, new business concepts, innovative business models).

In addition to these, perhaps a frustrating stylized fact is that high-impact firms tend to be difficult to identify before the fact. While it is easier to identify businesses that are not likely to deliver any meaningful economic impact, "picking winners" can be fiendishly difficult even for venture capital professionals (Autio and Rannikko 2016). Combined with the above stylized facts, this presents a dilemma for policy: given that high-impact firms are difficult to identify ex ante; that they can be found in virtually any sector; that they innovate; and they are relatively rare, what kinds of policy interventions would be best suited to support them?

On the surface, this dilemma seems to suggest several specific insights. We lay these out here and return to them at the end of this paper:

(i) First, sector-specific initiatives may not be entirely efficient in nurturing high-impact entrepreneurial firms, given that these can be found in virtually any sector. Effective nurturing of entrepreneurial firms' productivity potential would likely work better by focusing on systemic conditions that affect new entrepreneurial firms regardless of their sector context.

(ii) Second, effective nurturing of new entrepreneurial firms' productivity potential will need to facilitate innovation by these firms, in addition to their growth.

(iii) Third, trying to 'pick winners' may not be an effective approach, at least if implemented mechanistically (i.e., targeting promising candidates for support and then following these until the end of the support initiative). Indeed, Autio and Rannikko (2016) demonstrated that a "retaining winners" approach might work better, where a stage-gate approach involving extensive public–private collaboration is applied, with the requirement that the firms meet regularly reviewed milestones to be retained in the support initiative.

In the empirical analysis that follows, we build on these three insights to explore systemic influences on new entrepreneurial firms' productivity potential. Specifically, we draw on the concept of "national systems of entrepreneurship" to elaborate a two-level model that captures such influences (Acs, Autio, and Szerb 2014). National systems of entrepreneurship are institutional and resource conditions that prevail in the economy and influence the quality of the economy's entrepreneurial dynamic, its productivity potential in particular. In our framework that guides our empirical analysis, we distinguish between

two levels of conditions that we expect to conform with the three previously highlighted insights.

First, we look at the effect of institutional conditions that prevail within the regional member, defined as the quality and structural composition of the economy's institutional framework (Djankov et al. 2003; Acemoglu and Robinson 2012; Baumol 1996). An economy's institutional framework includes both formal institutional arrangements such as the economy's law-making, regulatory, and law-enforcing systems, as well as informal institutions such as culture and social norms (Baumol 1996). At the economy level, institutional conditions influence the economic and social trade-offs individuals face when deciding whether or not to pursue opportunities for entrepreneurship (Autio, Pathak, and Wennberg 2013), as well as their post-entry growth intentions and aspirations (Autio and Acs 2010). Thus, an economy's institutional conditions influence *who* becomes entrepreneur (for example, an entrepreneur's human capital has been shown to exercise an important influence on the productivity potential of their venture) and what kinds of decisions they pursue after they have started their business (e.g., whether to pursue innovation and growth). Importantly, these conditions tend to influence virtually all existing and potential entrepreneurs (thereby sidestepping the 'picking winners' dilemma), regardless of industry sector (thereby being sector agnostic).

As the second level of our framework, which is shown in Appendix 1,[5] we explore the impact of regional-level knowledge and resource dynamics, building on recent theorizing on the emergent phenomenon of entrepreneurial ecosystems (Autio, Nambisan, et al. 2018). Since the mid-2000s, entrepreneurial ecosystems have emerged

[5] The appendixes are available at http://dx.doi.org/10.22617/WPS240231-2.

and multiplied all over the globe as a novel type of regional cluster to exploit entrepreneurial opportunities opened up by the global trend of digital transformation. This transformation is driven by relentless advances in digital technologies and infrastructure (notably, the internet), which keep creating opportunities to re-think societal, economic, and organizational processes and arrangements for the (co-)creation, delivery, capture, and distribution of economic and societal value (Autio, Szerb, et al. 2018). In addition to its distinctive structural elements and its distinctive organization and coordination of resources around the processes of entrepreneurial stand-up, start-up, and scale-up, entrepreneurial ecosystems are distinguished from conventional clusters by the nature of their shared knowledge base (Autio, Nambisan, et al. 2018). Regional entrepreneurial ecosystems cultivate a shared knowledge base composed of experience-based information regarding “what works” in terms of harnessing advances in digital technologies and the internet for business model innovation—i.e., radical re-think of how firms organize for the creation, delivery, and capture of customer and stakeholder value. We will explore how related knowledge dynamics pan out in regional entrepreneurial ecosystems in the ADB region. With reference to the three policy insights listed above, these dynamics drive an important form of innovation, are sector agnostic, and involve intense private sector participation that drives stage-gate retention of those entrepreneurial ventures that keep proving their productivity potential.

4 Economy- and Regional-Level Determinants of Firm-Level Productivity Potential: Empirical Evidence

We consider both economy-level and regional determinants of the productivity potential of entrepreneurial ecosystems. An important thesis in our discussion in the previous section has been that different forms of entrepreneurial activity vary significantly in their economic impact, and the productivity potential of entrepreneurial action, as such, is shaped by both the economic and the regional context within which it takes place. We consider the hypothesis that economy-level institutional conditions shape the productivity potential of new entrepreneurial firms through their impact on individual-level entry decisions and their impact of post-entry choices regarding whether or not to pursue innovation and growth. We use GEM data from 17 ADB regional members to explore this hypothesis. At the regional level, which is shown in Appendix 2, we consider the impact of the quality of the regional entrepreneurial ecosystem on the innovativeness of the entrepreneurial firm's business models. We explore the hypothesis that the more sophisticated a given region's entrepreneurial ecosystem, the more sophisticated this knowledge base should be, and therefore, the more innovative the business models of the new ventures that emerge from that ecosystem should be. We use case studies of entrepreneurial ecosystems from Thailand to explore this hypothesis.

4.1 Institutional Conditions, Entry Regulations, and Informal Entrepreneurship

We conduct two analyses exploring the effect of an economy's institutional conditions and entry regulations on the productivity potential of new entrepreneurial firms, using the formal registration status of the firm as a proxy of this potential. In the first analysis we

explore institutional determinants of informal entrepreneurial activity in the economy—i.e., the creation of new firms that do not register with relevant business registers. Using the formal–informal status as a proxy of the productivity potential of entrepreneurial activity, we explore which institutional conditions are the most strongly associated with the choice of whether or not to register a new business. Informality provides a good proxy of the productivity potential of entrepreneurial action because informal businesses are less likely to accumulate property, invest in innovation, and grow their operation.

As our second analysis, we explore the cross-level effects of an economy's density of informal entries, its institutional conditions and entry regulations on the propensity of individual-level entrepreneurial action to innovate, use new technologies, export, and grow their employment size. In addition to the effect of institutional conditions and entry regulations, we hypothesize that the density of informal entrepreneurial entries constitutes a negative externality and a source of unfair competition, which, in itself, reduces the willingness of formal- and informal-sector entrepreneurs to innovate and grow their businesses.

Combined, the two analyses constitute evidence (although not conclusive) of a causal link between the quality of an economy's institutions and its productivity potential as operated through the quality of the economy's entrepreneurial dynamic. We next elaborate on our theoretical reasoning, our empirical sample, and our analysis methods.

4.1.1 Institutional Conditions and Informal Entrepreneurial Entry

An economy's formal institutions constitute an important regulator of the entrepreneurial choice (Levie et al. 2014)—including the decision of whether or not to register the new

business with official trade and employment registries (De Soto 1989; Thai and Turkina 2014). This choice is likely to have an important effect on the productivity potential of the entrepreneurial business (Djankov et al. 2002b; Autio and Fu 2015; Williams and Nadin 2010). If the entrepreneur registers his or her business, it gains a status as a legal and judicial entity. This status enables the entrepreneurial business to enter into contractual relationships, to own and accumulate property, to invest, and to enforce contracts by judicial means. A registered status also makes it easier to share ownership and thus limit individual-level liability. As the business is able to accumulate property and its owners are less exposed to potential downside risks, it should be better able to invest in risky activities such as the pursuit of innovation and growth.

These benefits do not automatically follow the formal status, nor is this status necessarily without risks. With legal status comes responsibilities, such as the liability to pay taxes and license fees and comply with business regulations. A registered status makes the firm's operations more visible and transparent, therefore reducing its ability to escape such costs. If the economy's institutional conditions are weak, the act of registering the business may expose it to unwanted attention by officials and politically connected competitors who may exploit institutional voids to extract disproportionate fees and prevent unwanted competition. Thus, especially in economies where institutional conditions are deficient, many entrepreneurs may choose to "fly under the radar" by not registering their businesses.

There is considerable empirical evidence to highlight the association between an economy's institutional conditions and the relative size of its informal sector (Joo 2011). ILO (2011) found that the informal sector provided almost 40% of non-agriculture

employment across low and middle-income economies, including 58% of non-agricultural employment in South and East Asia. However, much of this evidence relates to the informal economy in general and not informal entrepreneurship in particular, and direct evidence on informal sector entrepreneurship remains surprisingly lacking (Williams and Nadin 2010; Desai 2011).

We produce such evidence drawing on empirical data from 17 ADB regional members. We first update and extend the analysis by Autio and Fu (2015), who demonstrated that the quality of an economy's political and economic institutions constituted an important regulator of formal and informal activity. In this paper, we update and extend the analysis by extending the time series, including new economies, and by exploring the impact of specific institutional arrangements. We also extend the analysis beyond the economy and consider the influence of institutional conditions on the innovativeness, export orientation, and growth orientation of individual-level entrepreneurial efforts.

We model the choice of whether or not to register a new business as an individual-level occupational choice whose opportunity costs are regulated by the economy's institutional framework. For the individual, the allocation of one's human capital and effort into entrepreneurship comes with significant trade-offs (O'Brien, Folta, and Johnson 2003). Because individuals only have limited resources to allocate when making occupational choices (e.g., human, financial, and social resources of their own), and assuming individuals seek to maximize the return on their occupational investment, we can assume that entrepreneurs choose to register their business based on their calculations of the balance of anticipated costs and benefits associated with this choice

(Autio and Acs 2010; Autio and Fu 2015). When the perceived benefits and costs of the informal option outweigh those associated with formal entrepreneurship, we can expect to see a larger number of informal enterprises and vice versa.

We suggest that three sets of institutional conditions are particularly relevant for the new business registration decision: an economy's rule of law, the strength of its property rights regime, and the economy's procedures for registering a new business. An economy's rule of law regime reflects the degree to which the government and private actors are accountable under the law; the degree to which laws are impartial, public, and stable; the degree to which the legislative process is open and transparent; and the degree to which legal disputes can be resolved justly and impartially in courts of justice. A strong rule of law regime ensures enforceability of contracts and property rights and deters corrupt misappropriation of corporate property, thereby encouraging new businesses to register. An economy's property rights regime defines the degree to which titles to both physical and intellectual property are transparent, enforceable, and protected under the economy's established system of laws and regulations. A strong property rights regime allows businesses to accumulate property and enforce associated rights, thereby protecting them against unfair misappropriation. Strong rule of law and property rights protection regimes should encourage the registration of new businesses and discourage informal operations.

In addition to legal institutions, also entry regulations should influence trade-offs associated with the decision to register a new business. Whereas the rule of law and property protection regimes operate through the better reinforcement of the legal rights of a new business, entry regulations have a direct impact upon the ease of actually

registering the business. Onerous entry regulations make it both costly and time-consuming to register the new business, creating an incentive to save time and money by side-stepping these. In addition, onerous entry regulations create opportunities for corrupt officials to profit at the expense of the new business, either by offering shortcuts in return for financial favors, or by offering opportunities to fine the business for claimed conflicts with entry regulations. In our analysis, we specifically focus on three categories of entry regulation: (i) the number of procedures required to register a new business; (ii) the cost of registering (as a percentage of GDP per capita); and (iii) minimum paid-in capital requirements (as a percentage of GDP per capita). We elaborate on the data sources in the methods section. The considerations above lead us to formulate the following hypotheses for empirical testing:

H1: The stronger an economy's rule of law regime, the higher the entry density of formally registered businesses and the lower the entry density of informal businesses should be.

H2: The stronger an economy's property protection regime, the higher the entry density of formally registered businesses and the lower the entry density of informal businesses should be.

H3a: The greater the number of procedures required to register a new business, the lower the entry density of formally registered businesses and the higher the entry density of informal businesses should be.

H3b: The greater the cost of registering a new business, the lower the entry density of formally registered businesses and the higher the entry density of informal businesses should be.

H3c: The greater the minimum required paid-in capital, the lower the entry density of formally registered businesses and the higher the entry density of informal businesses should be.

4.1.2 Data

We use publicly available data from the GEM dataset to conduct our analysis (Reynolds, Bosma, and Autio 2005). Specifically, we use GEM data from the years 2006 to 2016 for all ADB regional members for which the data are available. Our dataset covers a total of 200 335 (unweighted) interviews among working-age individuals (16 to 65 years old) for the following regional members: Bangladesh; Georgia; Hong Kong, China; India; Indonesia; Kazakhstan; Malaysia; Pakistan; the Philippines; the People's Republic of China; Singapore; the Republic of Korea; Taipei,China; Thailand; Tonga; Vanuatu; and Viet Nam. The sizes of samples per year are shown in Table 6.

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Table 6: Samples in the Dataset

	Year the Survey was Administered												
Economy	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**	**% Total**
Bangladesh						2,000						**2,000**	**1.0**
China, People's Republic of	2,399	2,666		3,608	3,677	3,690	3,684	3,634	3,647	3,822	3,974	**34,801**	**17.4**
Georgia									2,016		2,016	**4,032**	**2.0**
Hong Kong, China		2,058		2,000							2,027	**6,085**	**3.0**
India	1,999	1,662	2,032				2,700	3,000	3,360	3,413	3,400	**21,566**	**10.8**
Indonesia	2,000							4,500	5,520	5,620	3,480	**21,120**	**10.5**
Kazakhstan		2,000							2,099	2,106	2,100	**8,305**	**4.1**
Korea, Republic of			2,000	2,000	2,001	2,001	2,000	2,000		2,000	2,000	**8,500**	**4.2**
Malaysia	2,005			2,002	2,010	2,053	2,006	2,000	2,000	2,000	2,005	**18,081**	**9.0**
Pakistan					2,007	2,002	2,000					**6,009**	**3.0**
Philippines	2,000							2,500	2,000	2,000		**8,500**	**4.2**
Singapore	4,011					2,000	2,001	2,000	2,006			**12,018**	**6.0**
Taipei,China					2,001	2,012	2,009	2,007	2,000	2,000	2,000	**14,029**	**7.0**
Thailand	2,000	2,000				2,000	3,000	2,362	2,059	3,000	3,000	**19,421**	**9.7**
Tonga				1,184								**1,184**	**0.6**
Vanuatu					1,182							**1,182**	**0.6**
Viet Nam								2,000	2,000	2,000		**6,000**	**3.0**
Total	**16,414**	**10,386**	**4,032**	**10,974**	**12,878**	**17,758**	**19,400**	**26,003**	**28,707**	**27,961**	**26,002**	**200,335**	**100.0**

Source: Global Entrepreneurship Monitor.

GEM defines entrepreneurship as any attempt to create a new business, by individuals, including self-employment. More specifically, GEM qualifies an individual as "new entrepreneur" if the person is an owner-manager of a new business that has paid salaries for at least some employees (including the owner-manager[s]) for longer than 3 months but no longer than 42 months. We call the businesses started by new entrepreneurs as "baby businesses." Furthermore, GEM qualifies a person as an "established entrepreneur" if the person is an active owner-manager in an independent business that has paid salaries for someone for longer than 42 months. We call the businesses started by established entrepreneurs as "established businesses." The numbers of baby businesses and established businesses per economy are shown in Table 7.

Table 7: Number of Baby Businesses and Established Businesses in the Economy Samples

Economy	Baby Businesses	% Total	Established Businesses	% Total
Bangladesh	133	0.9	231	1.1
China, People's Republic of	3,264	22.3	3,624	16.8
Georgia	132	0.9	292	1.3
Hong Kong, China	205	1.4	279	1.3
India	876	6.0	1,448	6.7
Indonesia	2,738	18.7	3,339	15.4
Kazakhstan	358	2.4	380	1.8
Korea, Republic of	733	5.0	1,547	7.2
Malaysia	674	4.6	1,254	5.8
Pakistan	147	1.0	246	1.1
Philippines	950	6.5	915	4.2
Singapore	408	2.8	388	1.8
Taipei,China	625	4.3	1,239	5.7
Thailand	2,203	15.0	4,939	22.8
Tonga	124	0.8	42	0.2
Vanuatu	326	2.2	311	1.4
Viet Nam	748	5.1	1,161	5.4
Total	**14,644**	**100.0**	**4,032**	**100.0**

Source: Global Entrepreneurship Monitor.

GEM applies harmonized data collection methods across the participating economies (Reynolds, Bosma, and Autio 2005). Over 70% of the data have been collected by telephone surveys. These are complemented by face-to-face interviews using multi-stage randomized cluster sampling designs. As GEM samples from the adult-age population and does not consider the entrepreneurial firm's registration status, it provides information on the economy's overall entry density, including both formal and informal entrepreneurial businesses.

We combine GEM data with World Bank Group Entrepreneurship Survey (WBGES) data to construct our economy-level estimates for formal and informal entry density. The WBGES is a cross-national comparable dataset, available from 2004 onwards, which provides a population-adjusted density of new business registrations in an economy, based on information from the official business registrars. Data collection

for the WBGES is done primarily through telephone interviews and correspondence with participating business registries.

4.1.3 Variables

We have two dependent variables. The prevalence rate of formal entrepreneurship is the population density of the working-age population who has registered a new business in the current year. This measure was computed using new business registration data from the WBGES dataset. The prevalence rate of informal entrepreneurship is the population density of new firms that were not registered with authorities in the current year.

We use three measures of entry regulations: (i) number of procedures required to register and launch a new business, (ii) cost of new business registration (as percentage of GDP per capita purchasing power parity [PPP]), (iii) paid-in minimum capital for new business registration (as percentage of GDP per capita PPP). All three measures are taken from the World Bank Doing Business database (Djankov et al. 2002a). A procedure is defined as any interaction with external parties during the new business registration process (e.g., government agencies, lawyers, auditors, or notaries). The cost of registration covers all official fees and fees for legal or professional services if required by law and is measured as a percentage of per capita GDP. Minimum capital is the amount that the entrepreneur needs to deposit in a bank or with a notary before registration and up to 3 months following incorporation, and is measured as a percentage of per-capita GDP.

Property rights protection reflects the ability of individuals to accumulate private property secured by laws that are fully enforced by the state. It also assesses the risk that

private property will be expropriated, the independence of the judiciary, and the existence of corruption within the judiciary. We use the index for protection of property rights from the Economic Freedom of the World Index, reported annually by the Fraser Institute (Gwartney, Lawson, and Hall 2012).[6] The index ranges from 0 to 10, with higher values indicating stronger property protection.

The rule of law reflects the strength and impartiality of the legal system of a society, the extent to which it is respected, and the quality of its enforcement (Gwartney, Lawson, and Hall 2012). We adopted the index of "legal system integrity" from the annual report of the Fraser Institute. This index is based on the "law and order" component of the Political Risk of the International Country Risk Guide (ICRG), which includes two parts. The "law" sub-component assesses the strength and impartiality of the legal system, and the "order" sub-component assesses popular observance of the law (Howell 2011).The index ranges from 0 to 10, with the higher value indicating a stronger rule of law.

A number of macroeconomic factors have been shown to be associated with entrepreneurship. An economy's growth rate and general level of development have been shown to be positively associated with the entry of new firms (Kawai and Urata 2002; Lee et al. 2011). We therefore control for economic growth using annual GDP growth. We control for economic development using per capita GDP (billions of United States dollars) in an economy, adjusted for PPP. To address potential multicollinearity between per capital GDP and institutional variables (as more developed economies also tend to have higher quality institutions) we followed Estrin, Korosteleva, and Mickiewicz (2012) and

[6] As a robustness check, we also ran our analysis using the property rights index from the Heritage Foundation and achieved similar results. Although the Heritage Foundation has a political agenda, the quality of its index data is widely acknowledged, particularly for politics-neutral aspects such as property protection.

used dummy variables indicating five quintiles of per capita GDP distribution. The data for both are taken from the World Bank.

The population size and population growth of an economy reflect the size and growth of the market and are measured by counting all residents regardless of legal status or citizenship and the population's annual percentage growth rate. The data for both measures come from the World Bank. We also control for the rate of established entrepreneurship, taken from GEM, which reflects the population prevalence of owner-managers of new firms older than 42 months.

In the analysis, the continuous dependent, independent, and control variables were all standardized to a mean of zero and a standard deviation of 1 to increase the comparability of the estimated coefficients and make the interpretation of regression results easier.

We calculate our estimate of informal entrepreneurship using GEM and WBGES data. We use the GEM estimate of the population prevalence of new entrepreneurs (i.e., owner-managers of new, operating entrepreneurial businesses less than 42 months old) and the WBES count of new business registrations. We estimated yearly rates of overall entry into entrepreneurship (i.e., total entrepreneurship) 'x' by assuming the following:

(i) The total entry rate of new entrepreneurial ventures 'x' has been constant over the past 3.5 years for a given economy.

(ii) The survival rate over time takes an exponential form: $e^{\lambda t}$, in which 't' refers to the age of the firm in the year of observation. 'λ' refers to the rate parameter of the exponential distribution.

(iii) The survival rate of the year of observation is 0,5 (data collection in June, no exit is assumed within the first 0,5 years).

We solve the following two simultaneous equations to get 'x' and 'λ':

$$\begin{cases} y_{new} = x * (0{,}5 + \sum_{t=1}^{3} e^{-\lambda t_{-1}}) \\ y_{estab} = \int_{3}^{+\infty} e^{-\lambda t_{-1}} \end{cases}$$, in which

- '$\mathrm{y_{new}}$' is the density of new entrepreneurs, measured as the population prevalence of owner-managers of new businesses that have paid any salaries, wages, or other payments to the owners for up to 42 months.
- '$\mathrm{y_{estab}}$' is the population density of established entrepreneurs, i.e., owner-managers of new businesses older than 42 months.
- 'x'[7] is total entry density of new entrepreneurs in a given year of observation.
- 'λ' is the rate parameter of the exponential distribution of the survival rate.

The World Bank Enterprise Survey (WBGES) dataset provided the entry density of incorporated (i.e., registered) businesses within the working-age population (indicated as 'z'). The unit of observation in the GEM data is an individual (indicated as 'x'). To harmonize these datasets, we obtained the total entry of entrepreneurship—i.e., 'x'', by dividing 'x' by the average number of owners of a new venture on a economy-year basis. This data is from GEM. With this harmonization, the unit of 'x'' became the new venture, and thus, consistent with WBES data. Finally, the entry density of informal entrepreneurship was calculated by subtracting the entry density of registered businesses ('z') from the total entry density of new entrepreneurial ventures ('x'').

[7] We focus on actual new ventures: 'x' therefore excludes nascent entrepreneurs. We also distinguish self-employed entrepreneurs from new ventures with more than one employee when testing our hypotheses.

4.1.4 Method

We tested hypotheses (i), (ii), and (iii) regarding the impact of institutions on entry into formal and informal entrepreneurship using panel regression. If economy-level variables change little or not at all over time, this could undermine the use of panel regression techniques and suggest the use of OLS regressions in a pooled dataset instead. Therefore, we computed the ratio between the range of economy-level time series and the range of the entire dataset for the same variable, to show the extent to which a given variable varied at the economy-level, relative to the overall variance in the dataset (Levie and Autio 2011). The results indicated significant variance for all institutional variables and thus supported the use of panel regressions.[8] As an additional check, the Hausman test suggested a strong preference for a random effects specification over fixed effects. Random effects specification is more efficient when there is no systematic difference in the coefficients estimated from both models. We therefore adopted the random effects model using maximum likelihood estimation. Finally, we checked variance inflation factors (VIFs) for all variables; all were well within the allowed ranges.

4.1.5 Findings

The findings of the economy-level panel regression are shown in Table 8. FE indicates the population density of formal business registrations. IE indicates the population density of informal business entries. The first model shows the effect of entry regulations on both FE and IE [hypothesis (iii)]. The second model shows the effect of property right

[8] We also performed pooled ordinary least squares (OLS) regressions to check the robustness of our findings. This change did not materially affect our findings.

protections on FE and IE. The third model shows the effect of the rule of law on both FE and IE. The final model is the full model with all variables included.

As we can see in the first model, regulation of entry did not seem to have much effect in our sample. Only one statistically significant effect is shown: a negative association between the number of registration procedures and FE indicating that onerous entry regulations may inhibit FE, without necessarily re-channeling this entrepreneurial effort into the informal economy, as we did not see a corresponding increase in IE. The cost of registration and paid-in minimum capital did not show statistically significant associations with either FE or IE.

The second model supports our second hypothesis: the stronger the property rights protection regime, the lower the population density of informal entrepreneurial entries. However, we could not observe a statistically significant corresponding positive effect on formal entries. The effect is thus asymmetric. It may be that although stronger property protection attenuates the need to go informal, the positive unmeasured effects on the formal sector may be large enough to absorb potential informal entrepreneurs as employees rather than de novo formal entries.

The third model supports our first hypothesis: the stronger the rule of law, the lower the population density of informal entries. Also, a noticeable positive association was found for formal entry density, which, although not statistically significant due to sample size, was indicated at about half the effect size relative to the effect on informal entries.

Table 8: Institutional Influences on Formal and Informal Entrepreneurship Density Rates

Variable	FE	IE	FE	IE	FE	IE	FE	IE
Starting a business: number of procedures	-0.285**	0.120					-0.279**	0.284
	(0.102)	(0.251)					(0.103)	(0.185)
Starting a business: registration cost	0.002	-0.104					0.007	-0.137
(% per capita income)	(0.039)	(0.114)					(0.041)	(0.105)
Starting a business: paid-in minimum capital	0.016	-0.042					0.003	0.129
(% per capita income)	(0.039)	(0.112)					(0.043)	(0.115)
Property right protection			0.052	-0.345**			0.067	-0.346**
			(0.076)	(0.117)			(0.080)	(0.115)
Rule of law					0.216	-0.401*	0.242	-0.415**
					(0.183)	(0.182)	(0.177)	(0.159)
Population size	-0.058	-0.120	-0.241	-0.125	-0.378	0.006	-0.087	-0.021
	(0.392)	(0.186)	(0.323)	(0.124)	(0.289)	(0.172)	(0.355)	(0.137)
Population growth (%)	-0.082	0.123	-0.154*	0.230*	-0.133*	0.139	-0.086	0.190+
	(0.060)	(0.127)	(0.063)	(0.107)	(0.062)	(0.115)	(0.063)	(0.101)
Development stage	0.030	0.584+	0.039	0.906**	-0.013	0.682*	-0.019	0.923***
(second quintile of GDP per cap at ppp)	(0.137)	(0.311)	(0.146)	(0.292)	(0.152)	(0.294)	(0.144)	(0.277)
Development stage	-0.090	-0.662+	0.104	-0.444	0.034	-0.333	-0.107	0.079
(third quintile of GDP per cap at ppp)	(0.180)	(0.391)	(0.185)	(0.354)	(0.187)	(0.396)	(0.188)	(0.390)
Development stage	-0.281	-0.573	0.080	-0.224	0.038	-0.093	-0.275	0.589
(fourth quintile of GDP per cap at ppp)	(0.228)	(0.465)	(0.210)	(0.375)	(0.209)	(0.436)	(0.232)	(0.485)
Development stage	-0.453	-0.831	0.232	-0.254	0.185	-0.226	-0.453	1.123
(fifth quintile of GDP per cap at ppp)	(0.327)	(0.615)	(0.251)	(0.462)	(0.250)	(0.529)	(0.330)	(0.689)
GDP growth (%)	-0.023	0.026	-0.023	0.070	-0.030	0.029	-0.036	0.067
	(0.026)	(0.084)	(0.029)	(0.086)	(0.030)	(0.082)	(0.028)	(0.080)
Established firm rate (%)	0.022	0.416**	0.017	0.365***	0.000	0.270*	0.022	0.254*
	(0.060)	(0.130)	(0.066)	(0.109)	(0.066)	(0.134)	(0.062)	(0.117)
Constant	0.294	0.316	0.049	-0.009	0.095	0.008	0.345	-0.541+
	(0.390)	(0.312)	(0.347)	(0.271)	(0.326)	(0.296)	(0.337)	(0.327)
Observations	58	58	58	58	58	58	58	58
Number of country	11	11	11	11	11	11	11	11
Standard errors in parentheses								
*** p<0.001, ** p<0.01, * p<0.05, + p<0.10								

FE = formal entrepreneurship, GDP = gross domestic product, IE = informal entrepreneurship, PPP = purchasing power parity.
Source: Authors' calculations.

4.1.6 Discussion

In the previous section, we investigated the effects of an economy's institutional conditions, specifically entry regulation, property rights protections, the rule of law, and formal and informal entrepreneurship. Entry regulation (e.g., Djankov et al. 2002a), property rights (e.g., Autio and Acs 2010), and rule of law (e.g., Levie and Autio 2011; Kus 2010) have been shown to regulate the level and quality of overall entrepreneurial

activity. However, empirical findings have not been consistent and observed patterns have sometimes been challenging to explain. For example, Aidis, Estrin, and Mickiewicz (2009) demonstrated that the rule of law was an important determinant of entrepreneurial entry, but its importance was moderated by the economy's level of economic development. In contrast, Hartog, Stel, and Storey (2010) reported that economies with a stronger rule of law exhibited lower levels of business ownership rates. Klapper, Laeven, and Rajan (2006) showed that costly regulations hampered the creation of new firms, forced new entrants to be larger, and prompted incumbent firms to grow more slowly. In a later study by Klapper, Lewin, and Delgado (2009), cheaper, more efficient business registration procedures were associated with higher levels of entrepreneurial activity. In contrast, Capelleras et al. (2007) compared Spain and the United Kingdom and found some evidence that fewer value added tax (VAT)-registered new firms were started in heavily regulated Spain. However, when both VAT-registered and other firms were included, these differences disappeared.

We suspect that some of the inconsistencies in received literature may be due to received studies failing to distinguish between nuances such as registered and unregistered forms of entry. This is an important omission, given the high variance in the density of informal entries and also in the ratio between formal (i.e., registered) and informal entries. Our empirical analysis supports our theoretical model to a large extent: the weaker the protection of property and the weaker the rule of law, the more likely entrepreneurs will choose the option of informal entrepreneurship. Among the three key dimensions of entry regulation, the number of registration procedures exhibited a significant effect on formal registrations but did not show a corresponding effect on

informal entries. It is notable that these effects showed up in a relatively small economy sample, our analysis focusing on regional members of ADB. Together with the strong influence of property rights protection and the rule of law, we thus have evidence suggesting that “rules of the game” matter for the allocation of entrepreneurial effort—and therefore for the productivity potential of resulting new entrepreneurial businesses (Baumol 1996; Murphy, Schleifer, and Vishny 1991).

5 Facilitating the Productivity Potential of New Entrepreneurial Firms in the Digital Era: Conclusions and Policy Challenges

In this paper, we set out to explore economy- and regional-level determinants of the productivity potential of new entrepreneurial firms, using data from ADB regional members. Our key messages have been that new entrepreneurial firms constitute a highly heterogeneous group in terms of their productivity potential and that this potential is shaped by the economy's national system of entrepreneurship. This system consists of both economy-level institutional conditions, as well as the resource and knowledge dynamics that operate at the level of regional entrepreneurial ecosystems. Economy-level institutional conditions shape the productivity potential of the economy's population of new entrepreneurial firms through their effect on who chooses to become an entrepreneur and what strategic goals the resulting new firms decide and are able to pursue. The regional-level entrepreneurial dynamics condition the extent to which new entrepreneurial ventures are able to realize this potential through business model innovation. This recognition is important because it suggests that to be effective, an economy's entrepreneurship policy framework needs to address both economy-level institutional conditions as well as regional-level entrepreneurial ecosystem dynamics. The two call for different policy approaches and present distinctive challenges.

As such, the importance of high-quality institutions and effective entry regulation is already widely recognized and relatively well-understood. To encourage investment in innovation by entrepreneurs, governments need to nurture effective and high-quality institutions that support effective protection of property and sound rule of law: a high quality of both of these factors ensures that more entrepreneurs enter the formal sector and are able and willing to invest in innovation and growth. High-quality institutions need

to be supported by efficient regulation of entrepreneurial firm entry procedures so as to minimize costs of entry and compliance and encourage formal-sector activity. Our economy- and cross-level analyses have illustrated the operation of these important economy-level determinants of entrepreneurs' productivity potential.

Economy-level policies need to be combined with effective regional-level policies, particularly ones that facilitate the recent, yet global phenomenon of entrepreneurial ecosystems. This is a novel, regional-level phenomenon that presents novel and distinctive challenges for policy, ones that are far less well-understood relative to economy-level policies. Yet, it is the effectiveness of regional-level entrepreneurial ecosystem policies that ultimately determines the success of the economy-level entrepreneurship policy framework in nurturing and unlocking the productivity potential of entrepreneurs. Given that the entrepreneurial ecosystem phenomenon is characteristically a digital-era phenomenon, they also likely hold the key to nurturing total factor productivity in the digital era.

Our case analysis of two regions in Thailand suggests that it is ultimately the entrepreneurial ecosystem knowledge dynamic that drives business model innovation in new entrepreneurial ventures and makes them key agents in re-structuring economies for the digital age. While many Asian economies have traditionally emphasized investment in manufacturing as key to total factor productivity, the key to successful digital transformation is designing effective entrepreneurial ecosystem policies to fully harness the innovative potential of entrepreneurs in driving this transformation.

This is not a trivial challenge. While conventional economy-level policies can be delivered in a top-down mode through sector-specific government agencies,

entrepreneurial ecosystems require more bottom-up and participative approaches. This is because conventional policies are designed to fix static market failures that are easily observable from outside the system and can be addressed with top-down policy action (Autio and Levie 2017). For example, the failure of firms to conduct R&D is easily observable, static, and straightforward to fix with an R&D subsidy. In contrast, entrepreneurial ecosystem failures are typically interaction failures: because the regional entrepreneurial ecosystem fails to support intense and high-quality interactions among ecosystem stakeholders, its resource and knowledge dynamics suffer, and the productivity potential of new ventures within the ecosystem is curtailed. Resulting from deficient interactions, such failures are dynamic, not static, and less straightforwardly amenable to being fixed through top-down policy action. Because regional entrepreneurial ecosystems are loose communities composed of hierarchically different participants, top-down policy actions are not likely to be very effective, and more participative, facilitative, and bottom-up approaches are required instead, ones that seek to build a deep understanding of the ecosystem dynamics, recognize bottlenecks, and mobilize action among ecosystem stakeholders toward fixing those bottlenecks. The resulting increase in the entrepreneurial ecosystem dynamic should then start boosting the innovative and productivity potential of its constituent entrepreneurial businesses.

These considerations suggest the following tangible policy conclusions:

(i) Because of their importance in advancing the digital economy and total factor productivity, entrepreneurial ecosystems should be a key focus of government policy for innovation, digitalization, entrepreneurship, and industry.

(ii) ADB regional members should adopt a two-level policy structure for entrepreneurship policy:

(a) At the economy level, policy should focus on building high-quality institutions and a smooth regulatory regime to encourage creating entrepreneurial businesses with high innovation and productivity potential. The economy-level policy framework should coordinate across policy domains and agencies and have sufficient authority to also effect harmonization between digitalization policy, entrepreneurial ecosystem policy, innovation policy, and industrial policy.

(b) At the regional level, the focus should be on nurturing and facilitating regional entrepreneurial ecosystems. Key principles at this level should include: (1) a bottom-up, facilitative approach; (2) close engagement with all stakeholders of the regional entrepreneurial ecosystem; (3) nurturing close communities of entrepreneurs, accelerators, financiers, large businesses, mentors, public agencies, educational institutions, and regional agencies; (4) nurturing open interactions and knowledge sharing among entrepreneurs regarding their business model experiments; and (5) encouraging active public-private sector interactions.

(iii) ADB regional members should develop metrics for mapping regional entrepreneurial ecosystems, profiling them, and monitoring their development. Ideally, they should also initiate regional entrepreneurial ecosystem development initiatives that identify bottlenecks that hold back the ecosystem dynamic and

mobilize action toward fixing them. The monitoring tools should be easy to use yet comprehensively profile the ecosystems in question.

(iv) ADB regional members should recognize that entrepreneurial ecosystem policy requires close coordination with digitalization policy. A solid investment in digital skills and capabilities is key to nurturing and harnessing the productivity potential of entrepreneurship in the digital era.

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Entrepreneurship as a Driver of Innovation in the Digital Age

Analysis of Data from 17 ADB Regional Members

This paper examines how new entrepreneurial firms' productivity potential is influenced by the economy and regional factors using data from ADB regional members. It finds that new firms are diverse and depend on the economy's institutional conditions and regional dynamics, which promote entrepreneurship and innovation. The paper suggests that entrepreneurship policy should target both the economy and regional aspects, which require different strategies and face different challenges.

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