Research Policy 43 (2014) 476–494

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

National Systems of Entrepreneurship: Measurement issues and policy implications

Zoltán J. Ács[a,1], Erkko Autio[b,c,*,1], László Szerb[d,1]

[a] School of Public Policy, George Mason University, Fairfax, VA 22030, USA
[b] Imperial College Business School, London SW7 2AZ, UK
[c] Aalto University, Department of Industrial Engineering and Management, 02150 Espoo, Finland
[d] University of Pécs, Faculty of Business and Economics, Rákóczi 80 H-7622, Pécs, Hungary

ARTICLE INFO

Article history:
Received 6 February 2012
Received in revised form 5 August 2013
Accepted 30 August 2013
Available online 11 October 2013

Keywords:
Systems of Entrepreneurship
National Systems of Innovation
Economic development
Institutions
Index methodology
Penalty for Bottleneck

ABSTRACT

We introduce a novel concept of National Systems of Entrepreneurship and provide an approach to characterizing them. National Systems of Entrepreneurship are fundamentally resource allocation systems that are driven by individual-level opportunity pursuit, through the creation of new ventures, with this activity and its outcomes regulated by country-specific institutional characteristics. In contrast with the institutional emphasis of the National Systems of Innovation frameworks, where institutions engender and regulate action, National Systems of Entrepreneurship are driven by individuals, with institutions regulating who acts and the outcomes of individual action. Building on these principles, we also introduce a novel index methodology to characterize National Systems of Entrepreneurship. The distinctive features of the methodology are: (1) systemic approach, which allows interactions between components of National Systems of Entrepreneurship; (2) the Penalty for Bottleneck feature, which identifies bottleneck factors that hold back system performance; (3) contextualization, which recognizes that national entrepreneurship processes are always embedded in a given country's institutional framework.

1. Introduction

Since the days of Schumpeter (Schumpeter, 1934), economists have agreed that entrepreneurs are somehow important for economic development. Schumpeter famously stated that entrepreneurs are 'agents of creative destruction', who introduce change to the economic landscape by constantly undermining and challenging established industry incumbents. Subsequently, researchers have argued a whole array of economic benefits generated by entrepreneurs, ranging from innovation (Acs and Audretsch, 1988) to job creation (Blanchflower, 2000; Parker, 2009) to productivity (van Praag, 2007) to, e.g., facilitation of technology transfer and knowledge spill-overs from research to industry (Acs et al., 2009a; Grimaldi et al., 2011; Plummer and Acs, 2012; Terjesen and Wang, 2013). Whatever the specific contribution, the broad consensus is that entrepreneurship matters. To provide policy-makers with means of facilitating the economic contributions of entrepreneurship, it is therefore important to provide them with up-to-date measures of the phenomenon.

This is where things get tricky, however. What do we actually mean when we talk about 'entrepreneurship'? A standard way of kicking off any doctoral seminar in entrepreneurship is to start with a debate on how entrepreneurship should be defined. Should it be defined as activity such as self-employment or new firm creation (e.g., Reynolds et al., 2005)? Or as firm-level behavioral disposition such as 'entrepreneurial orientation' (e.g., Lumpkin and Dess, 1996)? Or as an individual-level cognitive attribute such as opportunity perception (e.g., Shane and Venkataraman, 2000)? In spite of years of research, entrepreneurship is a fiendishly difficult concept to pin down. This makes measurement challenging.

The measurement challenge becomes even more complex when discussing entrepreneurship in countries (e.g., Audretsch, 2007b; Djankov et al., 2003; Reynolds et al., 2005). If we have difficulty defining entrepreneurship as an individual- or firm-level phenomenon, what hope do we have of deciding what 'entrepreneurship' means as a country-level phenomenon? Although pinning down the concept is even more complicated at the country level, received approaches to measuring entrepreneurship at the country level usually side-step the consideration of definitional questions. Instead, they proceed direct to providing country-level measures without providing adequate theoretical or conceptual grounding for the measurement approaches chosen. The result is a plethora of measures of country-level 'entrepreneurship' that often do not really speak to one another.

* Corresponding author at: Imperial College Business School, London SW7 2AZ, UK. Tel.: +44 7786226452.
E-mail addresses: zacs@gmu.edu (Z.J. Ács), erkko.autio@imperial.ac.uk (E. Autio), szerb@ktk.pte.hu (L. Szerb).
[1] Authors listed alphabetically.

0048-7333/$ – see front matter © 2013 Published by Elsevier B.V.
http://dx.doi.org/10.1016/j.respol.2013.08.016

A major reason underlying the country-level measurement problem is that entrepreneurship has never received adequate treatment as a country-level phenomenon. To cite an example, the core works of the National Systems of Innovation literature hardly ever even evoke the term 'entrepreneurship'—and even then, usually as anecdotal examples or in reference to Schumpeter's Mark I and Mark II models (e.g., Freeman, 1995; Lundvall et al., 2002). Similarly, received economic growth theories are silent about entrepreneurship (e.g., Acs and Sanders, 2012; Romer, 1986). This perhaps explains why arguably the largest number of country-level entrepreneurship indicators are simple aggregates of individual-level activity—and why a 'systemic' understanding of the role of entrepreneurial activity in national and regional economies remains under-developed (Gustafsson and Autio, 2011; Radosevic, 2007).

In this paper, we build the argument that, at the country level, entrepreneurship should be treated as a systemic phenomenon, similar to the way the literature on 'National Systems of Innovation' treats country-level infrastructures, policies, and institutions when considering factors that determine a country's ability to produce and take advantage of scientific discoveries and technological innovation (Kenney, 2000; Lundvall et al., 2002; Nelson, 1993). We think that adopting a systemic approach to considering the entrepreneurial performance of countries is important not only because it provides a more realistic portrayal of the phenomenon, but also, because it helps researchers and policy-makers think in systemic terms and take a broad perspective when considering both individual- and country-level indicators of entrepreneurial action. A systemic approach is also helpful when designing policies to nurture and leverage entrepreneurship for sustainable economic development. Although there have been numerous studies at the regional level – notably, in high-technology clusters such as the Silicon Valley and Route 128 – (see, e.g., Adams, 2011; Kenney and von Burg, 1999; Klepper, 2010) there have been virtually no studies applying a systemic approach to understand the entrepreneurial performance of countries (for an exception, see Busenitz et al., 2000).

We do three things in this paper. First, we review ongoing attempts to measure entrepreneurship at the national level, highlighting their distinctive features, strengths, and shortcomings. Second, we provide a conceptual discussion of the notion of 'National Systems of Entrepreneurship' and elaborate why and how country-level entrepreneurship should and does exhibit systemic characteristics. Third, we propose a method to characterize National Systems of Entrepreneurship in a way that captures key systemic properties—notably, imperfect substitutability between the constituent parts of the system as well as the existence of possible bottleneck factors that hold back system performance.

In what follows, we propose a definition of National Systems of Entrepreneurship that addresses some of the challenges of the current implied definitions—i.e., de-contextualization and decomposition. We argue that National Systems of Entrepreneurship cannot be properly understood without considering *both* population-level processes (attitudes, ability, and aspirations) *and* the institutional context within which these processes are embedded. Furthermore, any systemic approach to measure country-level entrepreneurship has to allow system components to interact to produce system performance. This implies that system performance can be held back by *bottleneck factors*—i.e., poorly performing system components. Following these principles, we construct a Global Entrepreneurship and Development Index (GEDI), which consists of three sub-indices (reflecting attitudes, ability, and aspirations) and a total of fifteen individual pillars that reflect the various aspects of the dynamic interaction that drives productive entrepreneurship in a given country.

2. Defining National Systems of Entrepreneurship

Although the systems approach to understanding innovation remains attractive in social sciences, there have been shifts in emphasis over the years. Early on, one of the main missions of the 'National Systems of Innovation' (NSI) literature was to debunk the linear model of innovation and emphasize and illustrate the interactive, iterative, and cumulative aspects of innovation processes in national contexts (e.g., Freeman, 1987, 1988; Freeman and Lundvall, 1988; Lundvall, 1988; Lundvall et al., 2002). This concept became influential because its focus on institutions and structure gave policy-makers a framework to understand and facilitate national innovation performance (Nelson, 1993). However, with its focus on structure, the NSI literature tended to overlook individual agency (Hung and Whittington, 2011). This meant that the NSI framework was only poorly equipped to understand emergence in innovation systems (Gustafsson and Autio, 2011). Therefore, while this 'techno nationalist' (Montresor, 2001; Niosi et al., 1993; Ostry and Nelson, 1995) emphasis on national institutions was attractive in the 1990s and early 2000s, the last decade has witnessed a steady increase in interest in the role of entrepreneurship and individual agency in driving innovation in countries (Acs et al., 2009a; Audretsch et al., 2006; Mueller, 2006).

2.1. National Systems of Innovation

The concept of National Systems of Innovation burst onto the policy scene in the early 1990s with the publication of three books (Edquist and Johnson, 1997; Lundvall, 1992; Nelson, 1993). The main theoretical underpinnings were that knowledge is a fundamental resource in the economy, that knowledge is produced and accumulates through an interactive and cumulative process of innovation that is embedded in a national institutional context, and that the context therefore matters for innovation outcomes (Lundvall, 1999). In the NSI literature, the notions of interaction and knowledge accumulation shifted emphasis from individual R&D processes towards the institutional and industrial structure within which those processes were embedded. A key message was that it is this structure (rather than individual R&D processes) that ultimately determines the innovation productivity of nations. Some of the most influential works in this area were that of Richard Nelson, who conducted an international research project comparing 15 countries using a similar methodology (Nelson, 1993); of Bengt-Åke Lundvall, who drew attention to user-producer interactions in innovation systems (Lundvall, 1992), and Chris Freeman, whose early studies of the 'Japanese system of innovation' provided an influential intellectual guidepost for subsequent research (Freeman, 1988). The systems approach was subsequently expanded to consider also technologies, institutions, organizations, and industries in addition to countries (Edquist and Johnson, 1997; Malerba and Breschi, 1997).

It is important to understand what a 'system' means in the NSI literature. According to Rosenberg and Nelson (1994: 4–5), the term 'system' connotes: "*. . .a set of institutions whose interactions determine the innovative performance. . .of national firms. There is no presumption that the system was, on some sense, consciously designed, or even that the set of institutions evolved works together smoothly and coherently*." The system concept, "*. . .is that of a set of institutional actors that, together, plays the major role in influencing innovative performance*". Systems constitute of multiple components that work together to produce system performance. In the NSI literature, systems are not created. Rather, they are inherited, evolving structures, and the key task of the researcher is to understand this structure so the system could be rigged to deliver improved performance.

It is perhaps a little surprising, if not even ironic, that although the NSI literature was heavily influenced by the Schumpeterian