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National innovation system, social entrepreneurship, and rural economic growth in China

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ABSTRACT

This research examines the roles of government policies within the national innovation system (NIS) in promoting effective social entrepreneurial action and enhancing economic growth in rural sectors. We investigate government's role in promoting effective social entrepreneurial action within the NIS framework in rural sectors through a change in technology policy and NSI structure. We analyze longitudinal data that tracks China's NIS, government-led R&D investments and labor mobility and rural economic growth during the 1998–2009 period. The results provide robust support for the positive effect of the NIS on rural economic growth, and this positive relationship varies across the coastal and interior regions of China. The idea of this perspective piece is, the positive impact is stronger for high levels of labor mobility and R&D expenditure, especially for rural areas in China.

1. Introduction

Scholars, especially economists, were interested in how government policies centered on technology create differing tangible value in different societies (Arrow, 1962; Dosi, 1988; Freeman, 1987; Lucas, 1988; Mansfield, 1980; Mansfield et al., 1981; Romer, 1986; Schumpeter, 1934, 1942; Solow, 1956). For example, Solow (1956) discussed the differential role that technology and its management plays varies between differing countries and its multiplication power generates country based GDP at differing levels. (i.e. why was the US multiplicative factor so much better than most of the countries in the world at that time.) The systematic approach to government policies and entrepreneurial activity has subsequently received sustained research interest (David et al., 2000; Furman and Hayes, 2004; Furman et al., 2002; Hu and Mathews, 2005, 2008; Lee and Park, 2006), which has led to several related concepts such as national innovation system (NIS) and regional innovation systems (RIS) (Braczyk et al., 1998; Cantner et al., 2010; Chung, 2002; Kramer et al., 2011), sectoral innovation systems (Dolfsma and Seo, 2013; Kirchhoff, 1989; Malerba, 2002), technological road mapping (Carvalho et al., 2013; Linton and Walsh, 2004; Walsh, 2004), and industry clusters (Porter, 1998; Porter and Stern, 2002). Economists help us analyze how the macro structure of a region and country influence the quantity and quality of entrepreneurship (Minniti and Lévesque, 2008).

The role government and public policies play in fostering entrepreneurial activity is evident in the work on entrepreneurship and policy conducted by Minniti and her colleagues. According to Minniti (2008), government policies that shape the institutional environment in which entrepreneurial activities are embedded (Minniti, 2008). Government policies and institutional environments fundamentally influence the allocation of entrepreneurial efforts and reduce constraints on entrepreneurship (Baumol, 1990; Bowen and De Clercq, 2008; Minniti, 2008). Moreover, the relationship between government policy and entrepreneurial activity varies across countries and regions (Dutz et al., 2000; Minniti, 2008).[1] We seek to add to this literature by focusing on (a) how government NIS-related policies may be instrumental in fostering entrepreneurial activities and (b) whether their effects are consistent across coastal and inland regions. This study is important, because despite a substantial body of literature on NISs, little has paid attention to the effects of government-led NISs on entrepreneurial activities and economic growth. As Balzat and Hanusch (2004: 205) note, "A clearer and more explicit combination of the NIS approach with economic growth is still lacking. While the linkage between technical change and economic growth has long been studied through

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[1] Dutz et al. (2000) explored the relationship between entrepreneurship and economic development in low-income countries, whereas Acs and Szerb (2007) suggested that middle-income countries should focus on increasing human capital, upgrading technology availability, and promoting enterprise development.

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distinct models of economic growth, modern concepts of innovation such as that of innovation systems have thus far not been tied with economic growth in an analytical way. We believe that this constitutes a gap in the literature." Moreover, most studies have examined these systems in highly industrialized economies (e.g., Dodgson et al., 2011; Freeman, 1987; Lundvall and Nielsen, 1999; Park and Park, 2003). Although a few recent studies analyzed NISs in developing economies (e.g., Chang and Shih, 2004; Chung, 2002; Hu and Mathews, 2008; Hung and Whittington, 2011; Liu and White, 2001), the effects of NIS-related policies on entrepreneurship activities and subsequent economic growth remain unclear.

While entrepreneurship, regardless its context, is influenced by institutions and public policy (Minniti and Lévesque, 2008), social entrepreneurship (SE), however, differs from commercial entrepreneurship in the way that the explicit aim to benefit the community or the creation of social value,[2] rather than the distribution of profit, has been considered as its core mission[3] (Defourny and Nyssens, 2010). Although there is a renewed need to understand the effects of institutions and public policy on social entrepreneurship and economic growth (Seelos and Mair, 2009), scant attention has been paid to the role of government's technology policies in spurring social entrepreneurship and boost economic growth. This is surprising, because governments depending on typology can influence the allocation of resources to social entrepreneurial actions through technology policies, NIS and other means. We add to the literature by examining the role of social entrepreneurship in a national innovation system setting. We view the policies that Chinese government has used to encourage the role of social entrepreneurship in their national innovation system. We understood this study to elucidate how China's national innovation system positively influences rural economic growth and how this relationship varies between the coastal provinces and the interior provinces.

We view the policies that the Chinese government has used in their NISs that encourage the role of social entrepreneurship. This view is based on three elements. First, China's rural economic growth provides an ideal setting for exploring these research questions. The rural sector is an important part of the nation's overall economic growth (Naughton, 2007). Rural production has contributed approximately 15% of nominal gross domestic product (GDP) in the 1998–2010 period (see Fig. 1), but rural unemployment has constituted more than 50% of total unemployment. Thus, rural labor productivity in China has clearly been low. We undertook this study to elucidate how China's NIS positively influences rural economic growth and how this positive impact varies depending on R&D expenses and labor mobility across its coastal and interior regions. The findings shed light on the more general question of how NISs and government policies work together to promote sustainable economic growth in developing economies.

Second, rural economic development holds a pivotal position in China's economic system and therefore is highly associated with the nation's overall economic development. Although rural economic development is not easily quantified, it can be captured to some extent by rural labor productivity and labor income, due to their relative visibility and stability (Golley and Meng, 2011; Knight et al., 2011). As a result, the relationship between rural and overall economic growth in China has been intensively studied. For example, Fan et al. (2003) showed that rural economic growth (as reflected by rural labor productivity) is closely related to economic growth in the nation as a whole. More relevant, there seems to be a strong connection between rural economic growth and innovation. Fig. 2 shows the generally positive relationship between R&D expenditure and agricultural output per worker, indicating that R&D has contributed to rural economic development.

Third, China's NIS policy has focused on the rural sector (Perkins and Yusuf, 1984). This focus has paid off over the last two decades. During the 1995–2010 period, R&D expenditure in China increased at an annual rate of approximately 22% and R&D employment increased by approximately 8% annually. The number of patents granted increased from 171,619 in 2000 to 740,620 in 2010 (National Bureau of Statistics, 2011b). Thus, China provides an ideal context to examine the policies that the Chinese government has used to encourage the role of social entrepreneurship in their national innovation system. It also allows us to investigate that this effect varies across the coastal provinces and interior provinces.

We utilize the fixed- and random-effect methods to review government policy and its results in our study. Specifically, we review the time covering the 1998–2009 period. The results support the link between the NIS approach and economic growth, and this positive effect becomes stronger for regions with high levels of R&D expenditure and labor mobility. Moreover, the positive effects of application-oriented R&D (e.g., product and process R&D) are stronger in the interior region, while labor mobility is more effective along the coast. In the next section, we review the literature on mainstream economic theories of technology innovation and NIS. From this literature review, we propose hypotheses relating China's NIS to government policies and rural economic development, after which we discuss our data and research design. We conclude with a discussion on the findings and their implications for theory and practice.

2. Theoretical background

2.1. Innovation economics

As early as 1956, Solow formulated his neoclassical growth theory by introducing technological progress into his models to allow for long-term economic growth. He proposed that technology was a public good, freely available for everyone without charge, and that technological progress was exogenous. He then showed how growth in an economy's capital stock, growth in the labor force, and advances in technology interacted to affect a nation's total output (Solow, 1956). In this perspective, poor countries were predicted to catch up with richer ones (Abramovitz, 1986; Barro, 1991; Baumol, 1986).

A few years later, Arrow (1962) departed radically from Solow's (1956) assumptions and suggested that technological progress was endogenous to "learning by doing" in the capital-goods industry. Romer (1986) extended that approach by introducing formal R&D that produces innovation, and Lucas (1988) introduced human capital (mostly education and skills) as another important input. In addition, Aghion and Howitt (1992), Grossman and Helpman (1991), and Romer (1990) have all argued that firms are willing to finance product and process innovation only because doing so can prevent the immediate diffusion of new knowledge, leaving time to profit from their innovation.

Schumpeter (1934) highlighted the important role of entrepreneurs and their impact on the business cycle. He linked growth to a theory of business cycles and considered innovation a force sustaining long-term economic growth. When an economy reaches a stationary state, entrepreneurs disturb the equilibrium by "creating innovations" that drive economic development. He then introduced the concept of "creative destruction" and tied this to business cycles[4] (Schumpeter, 1942).

Dosi (1988) and Nelson and Winter (1982) introduced evolutionary models of growth and technological progress. Building on Schumpeter's (1942) ideas on creative destruction, they proposed that new firm

[2] The creation of social value is about resolving social issues such as generating income for the economically disadvantaged or delivering medical supplies to poverty-stricken areas of the global. In other words, the creation of social value is about engaging with social problems and trying to generate solutions for these problems. (Thompson, 2002).

[3] Viewing social entrepreneurship as a mission-driven business is increasingly common among business schools).

[4] Schumpeterian followers formed a three-cycle schema: Kondratief cycles (a period of approximately 54 years), Juglar wave (a period of approximately 9–10 years), and Kitchin wave (a period of approximately 40 months).