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Innovation policies of Cyprus during the global economic crisis: Aligning financial institutions with National Innovation System

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ABSTRACT

Previous research has overlooked the complementarity between National Innovation Systems and financial institutions. This paper extends the literature on National Innovation Systems, arguing that innovation policies should incorporate the particular needs of a nation's innovation system and the current conditions of that nation's financial environment. This development is important because the financial environment is malleable and subject to exogenous events, such as the recent global financial crisis. The relationship between a National Innovation System and the financial environment is presented through an analytical framework, which can be used to assess and instigate national innovation policies. The analytical framework is demonstrated using the case of Cyprus, which was on the frontline of the European debt crisis. By integrating the views of leaders from the Cypriot manufacturing and service sectors with widely available reports and indices concerning innovation performance, we demonstrate that the lack of a developed financial environment impedes national innovation performance. This research introduces policy and managerial implications for innovation, especially within the context of underdeveloped National Innovation Systems, which focus on improving innovation performance by enhancing the availability of financial instruments and the access that entrepreneurs have to them.

1. Introduction

In the wake of the recent financial crisis in 2008, finance has become an increasingly significant barrier to innovation (Mason and Harrison, 2015). Restrictions in credit in many countries around the world have decreased the availability of finance for all firms, and particularly, for innovative firms (Lee et al., 2015). The difficulty in accessing external finance highlights the importance of financial resources for innovation and underlines the critical role of institutions in providing innovation investments. However, the National Innovation System (NIS) framework has been unjustifiably disconnected from the financial environment and has not scrutinised the impact of the financial environment on innovation performance measured at the national level (Freeman, 1995; Lundvall, 1992; Nelson, 1993). In this paper, we address the significant gap in knowledge concerning the ways in which the NIS, a conceptual framework pioneered by Freeman (1987) to instigate and evaluate innovation policies within a national institutional setting (Filippetti and Archibugi, 2011), accommodates financial market institutions. The present paper addresses this research gap by developing an analytical framework which connects the financial environment with national innovation policies.

Individual firms play a crucial role in the development of innovation, but the process of nurturing innovation involves continuous interactivity between firms, banks and other critical social and economic actors (Feinson, 2003). The NIS emphasises that national firms are not isolated 'islands', but members of networks which operate within a national infrastructure in order to produce and innovate (Hadjimanolis and Dickson, 2001; Lundvall and Borrás, 2005). However, the National Innovation System (NIS) framework has not paid sufficient attention to the financial institutions of a country and their vital importance for innovation (Freeman, 1995; Lundvall, 1992; Nelson, 1993). Schumpeter (1934) emphasised the paramount importance of credit as a catalyst for entrepreneurship and new product development. Entrepreneurial ideas cannot be converted into innovation unless entrepreneurs can gain access to financial resources, and so financial markets are an antecedent of innovation and a critical component in an NIS (Brown et al., 2009; Hsu et al., 2014; King and Levine, 1993).

Financial development and financial institutions should be regarded as catalysts for the acceleration of economic development (Lechman and Marszk, 2015). It is therefore essential to assess the impact of innovation policies and financial institutions on the access that

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companies have to finance, especially within the context of the 2008 financial crisis which restricted the availability of capital resources to entrepreneurs (Mason and Harrison, 2015). It is necessary to scrutinise the relationship between an NIS and its financial environment, because, on the one hand, the financial environment provides the conditions for innovation performance within a country (Beck and Demirguc-Kunt, 2006), and, on the other hand, innovation policies can reduce the financial barriers encountered by firms (Patel, 1995). A well-functioning financial and institutional context helps to improve firms' credit (Beck and Demirguc-Kunt, 2006), but what happens in countries with a less developed NIS and a poor financial environment remains uncertain.

This paper develops an analytical framework that addresses the complementarity between an NIS and funding instruments, arguing that a strong innovation system requires a strong financial environment, and vice versa. The analytical framework is illustrated by the case of Cyprus, a country with a less developed NIS which has been at the frontline of European sovereign debt crisis since 2009 (Financial Times, 2013; The Economist, 2013). The study is based on in-depth interviews with entrepreneurs and on secondary data, with the aim of answering the following questions: i. What is the current relationship between an NIS and its financial environment? ii. How can innovation policies align a nation's financial institutions with its NIS, in order to boost innovation performance?

The case of Cyprus, which exemplifies the Eurozone sovereign crisis in an extreme form (Consiglio and Zenios, 2015), is a suitable context in which to illustrate this significant gap in our knowledge. The Republic of Cyprus witnessed a severe financial crisis which was exacerbated in 2013, when an international bail-out by the European Commission (EC), European Central Bank (ECB) and International Monetary Fund (IMF) was agreed with the Cyprus Government. A new bail-in strategy was tested internationally for the first time in Cyprus. More specifically, a bail-in was agreed involving unsecured senior debt from the two largest banks of the country, the Bank of Cyprus and the Laiki Bank, and as a result of the crisis the Laiki Bank closed. The secured bail-out and bail-in to combat the crisis in the Cypriot banking system has had detrimental effects on the economy and on the innovation performance of firms (e.g., The Economist, 2013). Cyprus experienced the largest falls in innovative enterprises in the EU as the innovative performance of companies shrank. It is possible for public financial support to mitigate the effect of such a crisis on innovation (Paunov, 2012), but in Cyprus state aid and public procurement have been almost nonexistent. In addition, the absence of venture capital, business angels and crowdfunding platforms have also been significant barriers to innovation in the country.

By considering innovation as a catalyst for economic growth and as a response to an economic crisis, we argue that innovation policies designed at a national level should also aim to improve the financial environment in which firms operate. The NIS, in tandem with a developed and stable financial environment, can contribute to innovation performance at both company level and the national level. The paper is organised as follows: Section 2 explores the literature, while Section 3 explains the research method used; Section 4 presents the empirical findings; and Section 5 discusses theoretical, policy and managerial implications for innovation.

2. The National Innovation System and the financial environment

Existing studies have investigated, on the one hand, the relationship between the NIS and innovation (e.g., Freeman, 1995; Lundvall, 1992; Nelson, 1993); and, on the other hand, the impact of financial instruments on companies' ability to innovate (e.g., Agrawal et al., 2015; Block and Sandner, 2009; Cumming et al., 2017; Grilli et al., 2017). By synthesising these two bodies of literature, we bridge the gap between the NIS and the financial environment within a specific national context.

2.1. National Innovation System and innovation

The National Innovation System (NIS) is a conceptual framework pioneered by Freeman (1987), which frames innovation within a national institutional setting (Filippetti and Archibugi, 2011). This systemic approach defines innovation as an interactive process, in which the competence of a firm matters, along with the competence of suppliers, customers, knowledge institutions and policy-makers. The links and the quality of interactions between them are important, as they combine with the surrounding physical, technological and institutional infrastructure to support innovation and competence-building for firms (Lundvall and Borrás, 2005; Patel and Pavitt, 1997; Woolthuis et al., 2005).

The national institutional setting has a major impact on the performance of firms (e.g., Freeman, 1995), and therefore a well-developed NIS will affect the persistence of innovation within companies. The system of innovation approach can be used to delineate, evaluate and influence the process of innovation (Chang and Chen, 2004). An NIS relates innovation policy to companies' ability to innovate, and therefore to a country's economic growth (Edquist, 1997; Freeman, 1995). In this way, a country's NIS "expresses the importance of forging liaisons and links between the various networks related to innovation in increasing an economy's capacity to innovation" (Marques et al., 2006:1).

Interactions between different actors in the innovation systems are essential to produce, accumulate and diffuse knowledge in order to introduce innovation and promote competitiveness (Johnson and Lundvall, 1994; Lundvall and Archibugi, 2001). However, although an NIS places emphasis on the areas of the national infrastructure which facilitate knowledge distribution, insufficient emphasis is placed on the financial setting. As a result, the NIS approach does not sufficiently address the financial innovation system, which is outlined in the next section of the paper.

2.2. Financial environment and innovation

Schumpeter (1934: 126) argues that the money market is the "headquarters of capitalism", and for this reason called the banker the "ephor" of the exchange economy (Schumpeter, 1934 [1912]: 74). As innovation must be financed, finance must likewise be at the centre of any theory of capitalist economies (Grilli et al., 2017; Wonglimpiyarat, 2011). Developed financial markets are a fundamental condition for innovation (Brown et al., 2009; Hsu et al., 2014; King and Levine, 1993). Studies of the financing of innovative companies point to the existence of a funding gap which exists because innovation is "a bet on the future, and most attempts fail" (Mazzucato, 2013:851).

Filippetti and Archibugi (2011:10) argue that a robust financial sector for innovation "is not only an engine in times of growth, but also as a buffer during a downswing". The relationship between innovation and economic fluctuations has been largely addressed in previous research. The most common view is that innovation is cyclical, increasing during economic booms and declining during economic busts (Archibugi et al., 2013; Filippetti and Archibugi, 2011; Francois and Lloyd-Ellis, 2003; Kleinknecht and Verspagen, 1990). In particular, an economic crisis produces the significant negative effect of financing constraints on innovation. Internal sources of finance, such as retained profits, are reduced because of decreasing demand for products, which is the primary impact of the crisis (Paunov, 2012). The transaction costs of raising external funds are high, due to the reluctance of financial institutions to fund activities characterised by high levels of uncertainty and risk (Grabowski, 1968; Grilli et al., 2017).

In the wake of the global financial crisis in 2008, finance has been an increasingly significant barrier to innovation (Mason and Harrison, 2015). Earlier studies found a differential treatment of the price of credit, with innovative firms being penalised the most (Mina et al., 2013). Such restrictions in credit have decreased the availability of

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