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National innovation systems, capabilities and economic development

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ABSTRACT

This paper focuses on the role of capabilities in economic development. In recent years, the quality and availability of data on different aspects of development have improved, and this provides new opportunities for investigating the reasons behind the large differences in economic development. Using factor analysis on data for 25 indicators and 115 countries between 1992 and 2004, we identify four different types of “capabilities”: the development of the “innovation system”, the quality of “governance”, the character of the “political system” and the degree of “openness” of the economy. Innovation systems and governance are shown to be of particular importance for economic development.

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1. Introduction

Not long ago most economists believed that differences in development levels across countries were to be explained by one single factor, namely differences in the amount of accumulated capital per worker (Solow, 1956, see Fagerberg, 1994 for an overview). However, from the 1960s onwards the idea that differences in development are mainly caused by technological differences received increasing support (Gerschenkron, 1962). This view was, of course, consistent with the perspective on growth developed by Schumpeter (1934, 1943), and during the 1980s a lot of new work on cross-country differences in levels of development and growth performance inspired by this perspective emerged (Freeman et al., 1982; Fagerberg, 1987, 1988; Dosi et al., 1990; Verspagen, 1991). The focus on technology as the driving force of growth and develop-

ment has also been taken up by advocates of the so-called “new growth theory” (Lucas, 1988; Romer, 1990; Aghion and Howitt, 1992).

Authors that emphasize the crucial role of technology for development tend to stress that catching up in technology is by no means a free ride. According to this perspective, countries that do not succeed in developing appropriate technological capabilities and other complementary factors should be expected to continue to lag behind. Concepts such as “social capability” (Ohkawa and Rosovsky, 1974; Abramovitz, 1986), “technological capability” (Kim, 1980, 1997), “absorptive capacity” (Cohen and Levinthal, 1990) and “innovation system” (Lundvall, 1992; Nelson, 1993; Edquist, 1997) have been suggested and a burgeoning empirical literature has emerged focusing on these aspects of development (see Fagerberg and Godinho, 2004; Archibugi and Coco, 2005 for overviews). However, as we show in the next section of this paper, there is a big overlap between several of these concepts and the relationship between conceptual and empirical work in this area is often weak.

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To some extent this reflects that, until recently, there was a lack of appropriate data that could be used to put numbers on the various aspects emphasized by the theoretical literature. But in recent years, the quality and availability of data on different aspects of development have improved, and this may give researchers a new opportunity for investigating the reasons behind the large differences in economic performance. In the third section of the paper we therefore, following the theoretical work in this area, proceed to an empirical analysis of the capabilities needed to succeed in development. Rather than picking individual indicators and combine them in an essentially arbitrary way we follow [Adelman and Morris \(1965, 1967\)](#) and [Temple and Johnson \(1998\)](#) in mapping the most central elements with the help of factor analysis. The underlying assumption behind this approach is that indicators reflecting the same dimension of the reality will tend to be correlated. The results, presented in the fourth section of the paper, clearly illustrate the multidimensional character of “capabilities”, resulting in four different dimensions, which we label “innovation system”, “governance”, “political system” and “openness”, respectively. Finally, we explore the extent to which cross-country differences in capabilities may help us understand why some countries excel economically while other continue to be poor. We show that what matters most for success is a well-functioning innovation system and good governance.

2. Capabilities and development: lessons from the literature

The first systematic attempts to study the relationships between technology, capabilities and development were made by economic historians who wanted to understand why some countries managed to catch-up with the richer ones while other countries continued to be poor. More than 40 years ago Alexander Gerschenkron pointed out that technological catch-up, although potentially highly lucrative, is an extremely challenging venture ([Gerschenkron, 1962](#)). Based on a study of the performance of a number of European countries relative to the then leading country – Great Britain – he concluded that to succeed in technological catch-up less advanced countries had to develop what he called “new institutional instruments”, e.g., organizations capable of identifying the most promising options ahead and muster the necessary resources for exploiting these opportunities. Gerschenkron’s work is often associated with his focus on investment banks, which he saw as critical in mobilizing resources for development. However, as [Shin \(1996\)](#) points out, it is possible to see his writings as an attempt to arrive at a more general understanding of the conditions for catch-up, focusing on the instruments – or capabilities to use a more recent term – that need to be in place for successful catch-up to take place. Shin also emphasizes the historically contingent nature of the capabilities needed for catch-up. For example, the factors that constrained German catch-up towards the end of the nineteenth century are not necessarily the same as those experienced by Japan in the early post World War Two period or other Asian countries more recently. Hence, while

the need for well-developed capabilities may be quite general, their precise nature may well differ between historical time periods.

Moses Abramovitz, arguing along similar lines as Gerschenkron, suggested that differences in countries’ abilities to exploit the potential for catch-up may to a large extent be explained by differences in what he called “social capability”. What he had in mind was not so much individual skills, important as these may be, but rather what organizations in the private and public sector are capable of doing and how this is supported (or hampered) by broader societal factors. These are some of the aspects of social capability that he emphasized as being particularly important¹:

- managerial and technical competence;
- a stable and effective government, capable of supporting economic growth;
- financial institutions and markets capable of mobilizing capital on a large scale;
- the spread of honesty and trust in the population.

The concept “social capability” soon became very popular in applied work but there have not been many attempts to develop empirical measures reflecting the factors that Abramovitz considered to be important. In later work, he pointed out that the concept was “vaguely” defined and expressed pessimism with respect to the possibilities for adequate measurement ([Abramovitz, 1994b](#), p. 24 and 36). In practice, it has often been assumed to be synonymous with educational attainment ([Baumol et al., 1989](#)) which, although arguably an important element, is a much more narrow perspective than what Abramovitz had in mind.

The works of Gerschenkron and Abramovitz focused mainly on evidence from Europe and the United States. However, from the 1970s onwards several studies of catch-up (or lack of such) in other parts of the world emerged. For example, there is by now an ample literature demonstrating that the catch-up of not only Japan ([Johnson, 1982](#)) but also other so-called “newly industrializing countries” in Asia ([Amsden, 1989](#); [Wade, 1990](#); [Kim, 1997](#)) were associated with conscious capability building as envisaged by Gerschenkron and Abramovitz. The argument that capability building is a precondition for successful catch-up has received further backing from a series of empirical studies of industrialization processes in Asia and Latin-America undertaken during the 1970s and 1980s ([Kim, 1980](#); [Fransman, 1982](#); [Fransman and King, 1984](#); [Dahlman et al., 1987](#); [Lall, 1987, 1992](#)). The successful catch-up of a number of “newly industrializing” countries in the 1970s and 1980s (the NICs) also served as inspiration for the development of new perspectives on the dynamics of the global economy that put the development of appropriate technological activities (or capabilities) at the core of the analysis ([Fagerberg, 1987, 1988](#); [Dosi et al., 1990](#); [Verspagen, 1991](#); for an overview see [Fagerberg and Godinho, 2004](#)).

One case which received much attention was the rise of Korea from being one of the poorest countries in the

¹ See Abramovitz (1986, pp. 387–390; 1994a, pp. 34–35; 1994b, p. 88).

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