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Financial market development and the effectiveness of R&D investment: Evidence from developed and emerging countries

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ABSTRACT

Does financial market development enhance the effectiveness of R&D investment in an economy? To address this question, we apply three distinct approaches including (i) ordinary least square method, (ii) cross-country instrumental variable regression approach, and (iii) panel regression method. By using a dataset of both developed and emerging countries, we find that financial market development significantly contributes to the effectiveness of total R&D investment. This finding remains robust across different model specifications and individual estimation methods. Our finding provides an important guidance to policy makers in implementing a sound financial environment that can facilitate the total contribution of R&D investment.

1. Introduction

Financial economists have argued that investment in research and development (R&D) results in higher production efficiency and increased productivity at the firm, industry, and the country level.[2] Lichtenberg (1993), for example, finds that the contribution of private-sector R&D on productivity

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2 See Mansfield (1988) and Meliciani (2000).

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growth is seven times larger than that on fixed investment. Likewise, Kafouros (2008) finds that industrial research generates revenues that are significantly higher than returns that other investments yield. Nonetheless, R&D investment, in general, differs from capital investment in inventory and fixed assets along several important dimensions. First, due to information asymmetry, investors often derive little or no information regarding the productivity and the value underlying a particular R&D investment. This asymmetry in information is stronger in emerging economies because of inadequate coverage by analysts, low reporting requirements, and the low quality of auditing. Second, there is no organized market for R&D capital in both developed and emerging countries. Therefore, there are no equilibrium market prices on R&D capital from which information about the quality of R&D investments can be derived. Third, the values of R&D investments become diluted in an environment where the laws related to copyrights or patents are weak and their enforcement is lax. Therefore, information asymmetry between R&D investors (i.e., public, private and foreign entities) and their stakeholders (i.e., lenders, equity-holders, taxpayers), as well as weak provision for legal action in an economy, might enable the former to either expropriate or misallocate resources, which in turn may reduce the quality of R&D investment. While a well-functioning financial market can produce information *ex ante* about possible investments, as well as monitor investments and exert corporate governance after providing finance (see Greenwood and Jovanovic, 1990; Stulz, 2000), the question remains whether financial market development can improve the effectiveness of R&D investment in an economy. The aim of our study is therefore to shed further light on the importance of financial sector development in securing higher value of R&D investment.

We analyze this issue using country-level data. Although similar insights could be applied to firm-level fundamental data, investigating the same question at the firm-level in an international context poses bigger challenges as the reliability of corporate financial data is limited. Many researchers have criticized emerging financial markets for low requirement and unacceptable quality of accounting disclosures in their respective countries (see Liu and Zhang, 1996). Further, poor governance practices inside the organization, particularly in several emerging countries, always raise questions regarding the accuracy of R&D investment reported by individual firms worldwide (see Millar et al., 2005). As such, countries that have higher disclosure and better reporting standards (i.e., countries with more developed financial markets) are also more likely to provide more comprehensive and accurate data. This could introduce serious sample selection biases to our estimated models. Finally, international accounting standards significantly vary between developed and emerging countries, and therefore it is difficult to ensure the comparability of financial information including profitability measures among individual firms operating in different economies (see Ding et al., 2007). These limitations encourage us to examine our research question at the country-level by considering aggregate data of R&D investment and macroeconomic indicators, which are relatively more reliable and readily available.

We organize the rest of the paper as follows. We review some relevant literatures to highlight the key contribution of our paper in Section 2, and describe data sources, variables, and research methodology in Section 3. We discuss the main empirical findings in Section 4, and conclude the paper in Section 5.

2. Contribution to literature

R&D projects are harder to value due to greater uncertainty associated with the amount and timing of their future economic benefits (see Choi et al., 2000). This is even more difficult in an environment with high level of asymmetric information. Extant literature suggests that financial market development could mitigate the problem of asymmetric information and ensure efficient capital allocation. As such, this is important to understand whether a well-developed financial market, backed by a well-structured legal environment, can be an effective channel in securing higher value of R&D investment.

A significant amount of empirical and theoretical works have been done in determining the relationship between R&D investment and economic growth since the early works of Schultz (1953) and Griliches (1958). In a nutshell, these papers credit R&D for its substantial role in improving productivity and, hence, in economic growth of a country. Bravo-Ortega and Marin (2011), for example, find that a