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Are ivory towers truly ivory? Knowledge spillovers and firm innovation



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ABSTRACT

Using a sample from 1980 to 2009, we find that firms headquartered near a knowledge center, as defined by 196 leading American research universities experience higher market-to-book ratios and higher stock volatility. The overall evidence is consistent with knowledge spillovers fostering firm innovation and growth in an increasingly knowledge-based economy and bringing good volatility and higher market valuation to the firm. Surprisingly, this effect comes only marginally through firm R&D and further investigation into other possible channels for the documented links is required. Robustness checks include controls for metropolis effects and utility patents filed.

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1. Introduction

A vast body of literature in finance reports the financial consequences of firm location. For example, location influences a firm's financing and investment decisions (John, Knyazeva, & Knyazeva, 2011; Loughran & Schultz, 2005), the quality of corporate financial reporting (Kedia & Rajgopal, 2009), CEO pay (Francis, Hasan, John, & Waisman, 2010), analysts' forecasting accuracy (Malloy, 2005), information resolution for bank lending (Agarwal & Hauswald, 2010; Richards, Acharya, & Kagan, 2008), and

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“local bias” in investments and individual investors’ portfolio decisions (Coval & Moskowitz, 1999; Stotz, Wanzenried, & Döhnert, 2010). Despite this rather crowded geography literature, no one has looked at how nearby knowledge and education centers affect corporations. We do so in this paper and use geographic distance to gauge the flow of information – or knowledge between firms and nearby research universities.

We believe geographic proximity to a knowledge center can affect corporations because in the 21st century, it is the *economic exploitation of understanding*, as opposed to the use of machinery or natural resources alone, that plays a pivotal role in wealth creation in virtually all sectors of the economy¹ (Becker, 1964; Nelson & Phelps, 1966). Supporting this view is the finance literature that links education and knowledge to firm innovation and performance. For instance, Christoffersen and Sarkissian (2009) find that fund managers located in cities where knowledge transfers are easy achieve better performance, and Ayyagari, Demirgüç-Kunt, & Maksimovic (2011) show that highly educated managers innovate more.

When we think of knowledge spillover and innovation, inevitably we first think of pharmaceutical and high tech industries, R&D expense and patents. Innovation, however, need not be restricted to technological aspects as managerial ability also affects total firm productivity (Bloom et al., 2013). Firms with better management practices tend to have better performance on a wide range of dimensions: they are larger, more productive, grow faster, and have higher survival rates. Firms that more intensively use human capital, as measured by more educated workers, tend to have much better management practices (Bloom and Van Reenen, 2007, 2010).

Controlling for industry and year, we show that firms located near a research university experience higher growth and market valuation, most likely due to knowledge spillover through research and teaching. Consistent with knowledge-based innovation, we also find that they also spend more money on R&D and experience higher stock volatility. Since knowledge-based innovation is an intangible and is very difficult to measure, we therefore attempt to focus on the research side and test this effect through the R&D intensity of companies.² Subsequent analysis reveals that the explanatory power of distance is only marginally through firm R&D, but that distance captures knowledge beyond R&D. Moreover, we find evidence indicating that the benefits from knowledge spillovers are not limited to technological inventions (related to R&D), and mostly likely reflect better human capital utilization and superior management ability. Finally, firms close to a research university also have higher idiosyncratic volatility, which potentially conveys information risk. Our results survive robustness checks including controls for distance to the nearest metropolis and patent filing activity. Our findings are also robust to alternate specifications, including various measures of knowledge centers, spillover, R&D, and volatility.

Leaning on a well-established literature on university spillovers, we argue that knowledge spills over from leading research universities into firms in the region, boosting the firm’s knowledge intensity.³ That is, this paper uses the distance from firm headquarters to the nearest knowledge center as a proxy for knowledge spillover, and identifies knowledge-based innovation at the firm, including those beyond technological innovations, as a contributing factor to firm growth and stock volatility.

Following the geography literature, we define a firm’s location as the location of its headquarters. We do so because the headquarters are close to corporate core business activities, including R&D, and are the center of information exchange between the firm and its suppliers, service providers, and

¹ The insight that knowledge and education matter for economic growth dates back to Nobel Laureate Gary Becker (1964) who popularized the idea of education and training as “investments.” In a similar vein, Nelson and Phelps (1966) assert that educated people make good innovators because education enhances one’s ability to receive, decode, and understand information. In this sense, knowledge serves as the foundation for innovation.

² While research/knowledge is the logical link that makes distance relevant, we do not argue that teaching activities does not contribute to the knowledge spillover. Our belief is that if distance can capture knowledge spillover, we will most likely detect it with universities known for their research excellence (highly ranked).

³ Knowledge intensity is an all-inclusive term that includes the firm’s own R&D effort as measured by R&D expense and the knowledge spillover from nearby research universities as measured by geographic distance. The distinction between firm R&D and knowledge spillover is that the former is within the firm while the latter is an external force. Firms may increase their in-house R&D to digest or commercialize knowledge produced by universities.

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