Local Spillovers in Innovative Activity: Evidence from Market Entry Activity

Proposal for NBER Innovation Policy Research Grant

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The use of new ideas, and thus their transmission, is thought to be of primary importance for growth (Jones and Romer (2009)). A growing body of research suggests that knowledge spillovers are facilitated by proximity and are thus important generators of innovation and local economic growth. For example, citations to firm and university patents come from disproportionately local sources and decline with distance (Jaffe et al. (1993), Belenzon and Schankerman (2010)), and inventors migrate to locations of breakthrough inventions (Kerr (2010)), suggesting disproportionately local use of innovation. Various mechanisms through which new ideas are transferred locally have been proposed (e.g. Duranton and Puga (2001), Murray (2002), Hellman (2007), Agrawal et al. (2010)), and these new ideas have been connected to local industry growth (Furman and MacGarvie (2007), Hausman (2012)), but it remains a challenge to establish a clear causal link between the origin and use of new ideas that is totally clean of feedback effects. An ideal experiment would shock localities with new ideas and then measure the local innovation and industry growth outcomes that result. Finding or creating such an experiment, of course, is difficult.

In this study, we use the location decisions of firms to examine the effect of changes in the level of innovation in the surrounding locale. Obviously, the location decisions of plants or research facilities is likely endogenous to underlying characteristics of localities that may determine innovative outcomes. Here, we take advantage of a quasi-natural experiment to examine whether innovative activity in a firm spills over to other firms located in its vicinity. Our identification strategy, first used in Greenstone and Moretti (2004) and Greenstone, Hornbeck and Moretti (2010), utilizes the revealed rankings of profit-maximizing firms to identify a valid counterfactual for what would have happened in the absence of entry by the entering firm.

When firms are considering where to open a large plant, they typically begin by considering dozens of possible locations. They subsequently narrow the list to roughly 10 sites, among which 2 or 3 finalists are selected. A regular feature titled "Million Dollar Plants" in the journal "Site Selection" reports the county that the plant ultimately chose (i.e., the 'winner'), as well as the one or two runner-up counties (i.e., the 'losers'). The losers are counties that have survived a long selection process, but narrowly lost the competition. The identifying assumption is that the losers form a valid counterfactual for the winners, after adjustment for differences in pre-existing trends; consistent with this, Greenstone and Moretti (2004) and Greenstone, Hornbeck and Moretti (2010) show that the finalist counties exhibit similar pre-decision trends along several relevant economic dimensions,[1] lending credibility to the identifying assumption that the losers form a valid counterfactual for the winners.[2]

[1] Before the announcement of the winner county, winning and losing counties have similar trends in wage bill, employment, per capita income, employment-population ratio and several other observable characteristics, including property values. As Greenstone and Moretti (2004) show in the model in their paper, assuming that property markets are forward-looking, this suggests that not only are winning and losing counties similar in the years before the announcement, but the expected future changes in economic activity that are capitalized into property values are also ex-ante similar (as in a standard Roback (1982) model). Presumably, such changes include changes in innovative output.

[2] In our work, we will also examine other pre-trends that are more closely related to innovative activity, to further bolster the validity of our approach.

We plan to examine a number of outcome variables to establish the presence (or non-presence) of innovation spillovers. First, we will look at subsequent patenting and citation weighted patenting at other firms in the area following the entry of a new firm, as well changes in quantities of inventors and research and development expenditures. Second, we will examine movement of inventors from the entering firm to other firms in the local market. We will expect any effects to be larger for companies in similar industries or patent technology spaces. Additionally, we expect one of the coauthors (Hausman) to have access to the Census LBD database (currently pending final IRS approval), which will allow measurement of a variety of additional outcomes. One important form of innovation spillovers may occur via entry of new, innovative firms; this effect can only be measured well in the confidential Census data.

A number of dimensions of heterogeneity in entering firms will be useful in identifying spillover effects: (1) the presence of patent inventors at the newly opened plant/facility versus not, indicating whether R&D or other innovation is produced directly at this facility; (2) the presence of other companies that can feasibly be considered to be in the same (or similar) technology space as measured by patent technology classes; (3) the presence of other companies that can feasibly be considered to be in the same (or similar) industry, or in upstream or downstream related industries; and (4) variation in patenting rates for entering companies.

In addition, a growing debate in the urban economics literature centers on understanding how the firm structure in an industry may facilitate or inhibit innovation and growth. The presence of many small or new firms in a locality is generally considered to facilitate innovation and growth because of the mixing of many new ideas and the general dynamism of the area. Having a few large, dominating firms is in many cases thought, on the other hand, to stifle an innovative spirit; it may be more comfortable to continue living the quiet life working for a large company, for example, than to start something new and risky. But it may be that large firms have elements that are also productive in the innovative process, such as the scale and scope to take on development of projects that may be too risky or costly for an entrepreneur to undertake. Large firms also tend to generate a large number of new ideas in the course of their own R&D, only a small fraction of which are chosen for development (even a large firm needs some amount of focus). Some of their sidelined ideas may be taken on by employees who spin off a new company to develop a related idea. Both of these properties of large firms suggest that a mix of large and small/new firms in an area may be ideal for producing, transferring, and developing innovation. Because the confidential Census data on firms depicts all the dynamics of entry, exit, and annual growth for large and small firms and establishments in every industry and specific geographic location, it is ideal for studying the role of firm size diversity in innovation. Thus, our setup will also allow us to answer questions such as whether existing industry structure affects innovation and growth spillovers when a county is hit by an 'innovation shock.'

We expect our work to contribute to the literatures on innovation spillovers and firm size diversity as well as to shed light on possible channels for the increase in productivity brought about by new plant entry that is documented in Greenstone, Hornbeck and Moretti (2010).

Because the confidential Census data can be used only in the Census RDC at 1050 Mass Ave, for Hausman, one important use for the grant funds is for travel from Israel to use the data. Another significant use of funds will be research assistance (mostly in the RDC), and finally, a small amount would be used for travel for the coauthors to work in the same location (one coauthor is in Israel, the other in the US).

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