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Are elite universities losing their competitive edge? ☆

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ABSTRACT

We study the location-specific component of research productivity for economics and finance faculty over the last three decades. We find that there was a positive effect of being affiliated with a top 25 university in the 1970s; this effect weakened in the 1980s and disappeared in the 1990s. The decline in elite university fixed effect is due to the reduced importance of physical access to productive research colleagues, which in turn seems due to innovations in communication technology. One implication is that knowledge-based organizations should find it more difficult to capture rents vis-à-vis workers. We find that faculty salaries increased the most where the estimated spillover dropped the most. Despite the loss in local spillovers, elite universities still enjoy an edge in *average* productivity because of agglomeration of top researchers in prestigious institutions with high long-term research reputations.

1. Introduction

Do higher performing firms contribute to the productivity of individual employees or do they simply attract more productive individuals? If more productive firms give rise to more productive individuals, how are firms able to sustain this competitive edge over time? Does the edge arise from positive spillovers from more productive coworkers? How does corporate culture affect worker productivity?

Although these are important issues in the theory of the firm, they have not been adequately studied empirically because of the difficulty in measuring individual productivity. For most firms, the observable product is the result of a conglomeration of inputs from many individuals. Such conglomeration makes the task of

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disentangling individual productivity virtually impossible. One environment, however, in which firm observable output can be assigned to individual members is that of university research, where individual output can be measured as the number of coauthor-adjusted pages published in academic journals.

In this paper we attempt to address these theory-of-the firm issues by examining research productivity in the top North American university economics and finance departments over the last three decades. To identify the university fixed effect as separate from the individual fixed effect, we trace faculty moves across universities by documenting the location of all faculty who have ever been affiliated with the top 25 schools over the last three decades.

The results have implications not only for the higher education industry, but also for other knowledge-based industries in which individual productivity is recognizable and individual reputation is important. Examples of such industries are widespread, including the financial, professional, scientific, and technical services industries. Key players in these industries have a fundamental characteristic in common with academic researchers: Achievement and success in knowledge-based production is often gauged against a professional standing outside the firm. Such a characteristic is readily apparent for principal scientists in company labs, journalists, investment bankers, fund managers, consulting or law firm partners, and even professional athletes. By examining university fixed effects on faculty research productivity, we hope to provide insights into issues such as how much the productivity of, for example, deal makers and traders in the investment banking industry is affected by their location choices, and how the location effect has changed over time.

We find that, in the 1970s, residence in an elite university had a sizable impact on individual productivity. During that time, a random economics faculty member moving from a non-top five university to a top five university would see her productivity increase by 1.68 *American Economic Review* (*AER*) impact-equivalent pages (our measure of quality-adjusted productivity) per year from an average of 2.79 pages. This is a 60% increase. In the 1990s, this effect all but disappeared. And the disappearance is not just a top five phenomenon. Of the top 25 economics departments studied, 17 (five) had a significantly positive (negative) impact on productivity in the 1970s. By the 1990s only two (nine) had a significantly positive (negative) effect. In finance, 16 (three) had a positive (negative) impact in the 1970s, and four (seven) for the 1990s. One might argue that classification of 25 universities as being elite is too broad. As a robustness check, we run all of our estimations based on only top five, top ten, top 15, and top 20 schools defined as elite. The conclusions do not change.

These results do not seem to stem from endogenous selection inherent in location decisions. We carefully consider four selection stories: quasi-retirement, non-promotion, complementarities, and tournaments. The patterns of post-move changes in recent productivity do not support any of these selection stories. Nevertheless, we formally address possible selection bias in faculty moves by estimating a two-stage selection model. We use a logit model to estimate the probability of moving as a function of age and a conditional logit model to estimate the probability of being at each location (given a move) as a function of the desirability of each location for individual faculty. Desirability is captured by the distance to the individual's origin (defined as the location of the undergraduate alma mater) and the relative productivity difference to incumbent faculty. Using the predicted unconditional probability of being at a location as an instrument for the university indicators, the results remain materially the same.

We then attempt to explain the cross sectional differences in university fixed effects by relating them to the quality of colleagues in each department and the differences in organizational culture. The quality of colleagues can generate positive spillovers through the exchange of expertise and feedback among colleagues (Laband and Tollison, 2000), including that from star faculty (Goyal, Van Der Leij, and Moraga, 2006; Azoulay and Zivin, 2006). A strong positive team effect on productivity was evident in the 1970s, where team is measured as the (lagged) average productivity of one's departmental colleagues. The positive team spillover effect remained positive in the 1980s and disappeared in the 1990s. In addition, the presence of editors of a major journal had a positive effect on the faculty productivity in the 1970s, which turned negative by the 1990s.

Organizational culture could likewise be important, but in this realm the influence from colleagues might not always be positive. Our primary measures of culture are the percentage of faculty in a department who have not published in top journals in the recent past and the quality of the Ph.D. program. Non-publishing faculty could set an example for others, helping re-direct journal-targeted research to other activities, which might be important for the department but are not gauged as research production in our definition. The percentage of non-productive colleagues has a strong negative effect on the university fixed effect. The quality of the Ph.D. program does not seem to matter. Although important in explaining the university fixed effects, organizational culture does not explain the decline of the university fixed effects over the last three decades.

We conjecture that the loss of elite university effects is due to advances in communication technology. While collaboration across universities was common even in the 1970s, local interaction was very important. Communication at a distance was costly from a monetary and a technical point of view. We argue that the Internet and the concomitant decline in communication costs have changed the localized nature of research interaction, giving faculty in remote places access to the latest developments in their research area and tools for communicating with distant colleagues for collaboration and feedback. Throughout the period, the costs of long-distance telephone calls and airfares declined, easing the burden of voice and person-to-person communication. Early innovations for exchanging written work included faxes and overnight mail deliveries. The arrival of the Internet in the