14 November 2015

Re: Ruben Gaetani

Dear Recruiting Committee:

It is a pleasure to recommend Ruben Gaetani, who is seeking a junior faculty position in your department.

Ruben's interests span economic growth, geography, and innovation. He has impressed with me with his creativity, ambition, big-data skills, and theoretical clarity. My bottom line: Ruben is worth a look by all economics departments, business schools, and policy schools, and especially those with interests in economic growth or innovation topics.

Ruben's job market paper tackles first-order questions about the geography of innovation, with new insights linking urban areas to the production of relatively novel ideas. The paper demonstrates his substantial empirical and modeling skills. The first part of the paper introduces four new facts linking innovation and geography, and the second part of the paper puts these facts together in an elegant general equilibrium model of spatial organization and economic growth.

The paper's facts are exciting. In short, Ruben shows that population density has little to say about the rate of patenting and much more to say about the type of patents produced. Areas with low population density can produce high rates of patenting per-capita, just like high-density areas. But high population density areas are especially likely to produce novel combinations of technological fields. Ruben establishes these findings through four facts.

First, Ruben shows that, conditional on producing patents, there is no relationship between patents per capita and population density. His analysis is at the county sub-division level, which gives him a more powerful microscope than studies that have used larger geographic blocks, like MSAs. Ruben is thus able to detect, for example, that places like Armonk, NY (home to IBM) produce patents at high rates, so that prior empirical studies emphasizing that invention per capita rises with population density hide substantial invention activity outside urban areas.

Second – the main result -- Ruben finds that high population density areas produce relatively novel combinations of technological areas. By looking at the referenced prior art in each U.S. patent, Ruben shows that low population density invention centers produce patents based on relatively conventional combinations of prior art, while high-density areas produce patents based on relatively novel combinations of prior art. This new finding is striking in the data.

Ruben's final two facts help complete the picture. He shows that the areas with greater population density produce patents in a greater diversity of technological fields (even though they don't produce more patents per capita compared to the low-population density invention centers). Finally, he shows that the novel combinations of prior art are built on the local set of technological categories. Thus, the data links the greater novelty of new inventions in urban areas to the specific, locally available knowledge. All told, these empirical facts provide a new and nuanced characterization of the linkages between geography and innovation.

Ruben's paper then provides a nice model in which these patterns – both population density and the nature of innovation – emerge together in equilibrium. The model balances the force of local knowledge spillovers, and the spillover advantage that density can afford, against congestion costs. Consistent with his evidence, urban areas can be seen as places that link and benefit from diverse ideas, while suburban or rural innovation centers are places where innovation is specialized in relatively narrow areas (e.g., through the R&D facility of a large corporation). The dense areas provide more opportunity for radical combinations of new ideas, and benefit from these greater innovative opportunities, but face greater congestion costs. The specialized, low-density areas provide less opportunity for radical combinations of new ideas, and smaller innovation benefits, but have lower congestion costs. The spatial equilibrium that emerges can then nicely explain the paper's facts. Armed with the theory, Ruben additionally considers welfare under counterfactual place-based policies.

Overall, I think this is an impressive and ambitious job market paper that makes significant contributions to understanding innovation and economic geography. This paper also demonstrates Ruben's substantial skills. The model is well done – rich in its predictions, intuitive in its mechanisms, and reasonable in its assumptions. Separately, the empirical work shows Ruben's skills in building and analyzing large data sets. He and his coauthor built geo-coded data from the full-text of the patents, which allowed them to capture the patent assignee and inventor addresses, which in turn allowed them to study geography at the relatively refined level of county sub-divisions. He further implemented computationally expensive algorithms to measure novelty (Uzzi et al. 2013) in thoughtful and speedy ways.

A second paper, "The Economic Effects of Scientific Shocks," further demonstrates Ruben's research trajectory and skills. Like his job market paper, this research begins with substantial micro-level data work, establishes novel facts, and then builds a general equilibrium growth model to inform the facts and their implications. Here, Ruben began by systematically linking citations from US patents to the Web of Science, a difficult exercise that allows him to trace patented inventions back to underlying scientific papers. He then studies the how the shock of major scientific breakthroughs affects the behavior of firms, looking both at firms' patenting behavior and their balance sheets. He finds substantial heterogeneity in firm responses (with a net increase in output after the scientific breakthrough) and has developed a model to explain these findings. While Ruben is still refining this paper, it has the potential to be another exciting contribution.
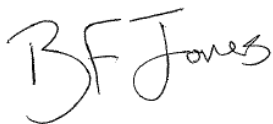
The most relevant comparison for Ruben is Ufuk Akcigit (University of Chicago), whose research also tends to develop new micro-founded facts around innovation and interpret these facts through general equilibrium growth models. While Akcigit is of course much more established than Ruben, my sense is that Ruben's skills are on par with Akcigit's at a comparable stage and makes Ruben a good fit for top ten economics departments.

At the same time, I think that Ruben's deep interest in innovation (including both patenting and basic science) will make him a very interesting colleague in a wide variety of settings, including policy and business schools, and especially those looking to extend their reach on innovation topics.

Overall, I think Ruben is an exciting researcher with upper-tail qualities. He is worth a serious look by all economics departments, business schools, and policy schools, and I recommend him enthusiastically.

Please let me know if I can be of further assistance.

Sincerely,

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