Rui Xu
124 Blackwelder Ct, Apt 108
Stanford, CA 94305
February 20, 2014

Dear Selection Committee:

I am writing to apply for the NBER Entrepreneurship Research Boot Camp 2014 posted on NBER website. I would like to attend and actively participate in the workshops because entrepreneurship is closely related to my research interests. I am particularly drawn to the macroeconomic impact of entrepreneurship in terms of productivity gains and long-term economic growth. This area of research is still developing and a growth model that's more consistent with firm level evidence is yet to be developed. I would welcome the opportunity to learn from the stellar set of professors in the boot camp as well as meet student peers with similar research interests.

In my application package, I included a two-page application essay, a list of courses I took at Stanford and a one-page resume. My advisor at Stanford, Professor Peter Klenow (klenow@stanford.edu), wrote a letter of recommendation to support my application and emailed it to Brett Maranjian. Should you have any questions regarding the application, I can be reached at 650-391-8652 or email: ruix@stanford.edu.

Thank you for your time and I look forward to hearing your response and attending the workshops.

Sincerely,
Rui Xu
ruix@stanford.edu
650-391-8652

Application Essay for NBER Entrepreneurship Research Boot Camp 2014

Rui Xu

March 28, 2014

I am currently a fourth year PhD student in Economics at Stanford University. I would like to attend and actively participate in the 2014 NBER Entrepreneurship Research Boot Camp. Entrepreneurship is closely related to my research interests. I am particularly drawn to the macroeconomic impact of entrepreneurship in terms of productivity gains and long term economic growth. Despite a number of endogenous growth models proposed in the 90s and some recent empirical studies that link entrepreneurship to productivity growth, this area of research is still developing and a growth model that's more consistent with firm level evidence is yet to be developed. I would welcome the opportunity to learn from the stellar set of professors in the boot camp as well as meet student peers with similar research interests.

My research at Stanford has been focused on innovation and long-term economic growth, and most recently high-skilled immigration and innovation. For innovation and growth research, I constructed an endogenous growth model with two research sectors and international knowledge spillovers to explain the cross-country patterns of expenditures on applied and basic research. The project I am currently working on studies the effects of high-skilled immigration on growth and welfare for both source and destination countries. In the model, endogenous growth comes from innovative or imitative research, and both types of research require labor with research talent. Assuming that the more advanced country is more innovative and efficient in doing research, allowing high-skilled immigration will lead to more global innovation to the benefit of both countries. On the other hand, a loss of talent in the source country will lead to lower rates of technology adoption, leaving the net effect on the source country ambiguous. By studying high-skilled immigration in a two-country general equilibrium with endogenous growth, I am able to provide quantitative esti-

mates of changes in welfare and growth for both countries, and draw important policy implications. This is the first model I know of that studies high-skilled immigration in the context of endogenous growth. One significant contribution of the project is the estimation of talent distribution using a new source of micro data. Research talent is assumed to be drawn from a Pareto distribution and the shape parameter is key, because the results of the model are quite sensitive to the parameter value. To get the maximum likelihood estimate of the shape parameter, I downloaded paper citation data of the top 200 scientists in each of the main 20 research fields using data from Essential Science Indicators from 2003-2013. Following the methodology of Thomson Reuters in ranking the top 100 chemists, I used average citations per paper for scientists with at least 25 papers to measure research talent and the Pareto shape parameter is estimated to be 3.11 with a standard error of 0.05. The shape parameter estimate will be 2.58 with a standard error of 0.04 if total citations for each scientist are used.

So far I have studied innovations and productivity growth with a mostly macroeconomic approach. Going forward, I hope to conduct more micro-founded research about innovation by studying the entrepreneurs who are central to the innovative process. For instance, I would like to study how entrepreneurs in developing countries adopt ideas and technology from developed countries to start new firms and their contributions to local innovations and productivity growth. In the context of global collaboration in R&D, I am also curious about the role played by fast growing countries like China and India and their contributions to the global innovation process. The boot camp would be a perfect starting point for me to get familiar with related empirical literatures and useful data sources.

In addition to my research in innovations and growth, I took a course on the Economics of Technology and Innovation at Stanford with Petra Moser and did extensive readings of empirical studies about technology and innovation. I also worked as a research assistant for Professor Josh Lerner and Ulrike Malmendier on the project "With a little help from my (random) friends: success and failure in post-business school entrepreneurship", from which I obtained useful insights about entrepreneurial venture creation. With my knowledge and strong interest in entrepreneurship and innovation research, I believe I will be able to contribute to discussions in the workshop, and benefit from all discussions, especially those about productivity, innovation and entrepreneurship papers.

I hope that you consider my application and give me the opportunity to learn from and contribute to the boot camp. I look forward to hearing your response and attending the workshops.

RUI XU

1-650-391-8652, ruix@stanford.edu
124 Blackwelder Ct., Apt. 108,
Stanford, CA, 94305

Education

STANFORD UNIVERSITY Stanford, CA
Ph.D. Candidate, Economics, 2010-ongoing (expected graduation date: Jun. 2015)

M.A., Economics, Jan. 2013

HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY (HKUST) Hong Kong
BSc in Economics and Finance, Minor in Math, Graduate with First Class Honors (May 2010)

UNIVERSITY OF CALIFORNIA, BERKELEY Berkeley, CA
Exchange Student in Economics (Jan. 2009 - Aug. 2009)

Research Fields and Main Advisor

Fields: Macroeconomics, Labor economics, Financial Economics
Advisor: Professor Peter J. Klenow

Research Interest

Innovation and technology, Innovation policy and subsidy, High-skilled immigration, Endogenous economic growth, Labor market mismatching and unemployment

Working Papers

Immigration and Global Innovation Mar. 2013 - now

The Industry-Occupation Mix of U.S. Employment and Unemployment Apr. 2013 - now

The Effect of University Mergers on Research Productivity in China Jun. 2012 - now

An Endogenous Growth Model with Two Research Sectors May. 2012 - now

Relevant Employment

Research

Research Assistant for Peter Klenow, Stanford University Sep. 2011 - now

Research Assistant for Ulrike Malmendier and Josh Lerner, UC Berkeley and HBS Jun. 2009-Jun. 2011

Teaching

TA for Peter Klenow, Stanford University, ECON52: (undergraduate-level) Macroeconomics Jan. - Mar. 2013

TA for Pablo Kurlat, Stanford University, ECON210: (graduate-level core) Macroeconomics Sep. - Dec. 2013

Fellowships and Awards

- Summer Research Fellowship from John M. Olin Program in Law and Economics, Stanford Law School Jun. - Aug. 2013
- Outstanding Teaching Award Jan. - Mar. 2013
- Fellowship for graduate student in economics, Stanford University Sep. 2010
- Champion of Undergraduate Research Award, HKUST May 2010
- Outstanding Student Award (top 3%), HKUST May 2010
- University scholarship, HKUST 2006 - 2010
- Travel award grant for 29th and 30th *International Symposium on Forecasting* Jun. 2009 and 2010
- First runner up in the International Public Forum Debate Tournament, Philadelphia Jun. 2005

Others

Programming: STATA, Matlab, C++, FORTRAN, Excel
Languages: English (fluent); Mandarin (native) and Cantonese (fluent)

List of Completed PhD Courses

March 29, 2014

- Graduate-level first year Microeconomics (taught by Paul Milgrom, Douglas Bernheim and Matthew Jackson)
- Graduate-level first year Macroeconomics (taught by Monika Piazzesi, Peter Klenow, Martin Schneider, Robert Hall, John Taylor and Pablo Kurlat)
- Graduate-level first year Econometrics (taught by Joseph Romano, Han Hong, Frank Wolak and Thomas MaCurdy)
- Advanced Macroeconomics I and II (taught by Peter Klenow and Chad Jones; Manuel Amador and Robert Hall)
- Labor Economics II and III (taught by Nicholas Bloom; Luigi Pistaferri)
- Dynamic Asset Pricing Theory (taught by Darrel Duffie)
- Financial Economics I (taught by Monika Piazzesi and Martin Schneider)
- Economic Development (taught by Pascaline Dupas)
- Economics of Technology and Innovation (taught by Petra Mozer)
- Social and Economic Networks (taught by Matthew Jackson)
- Quantitative Methods for Empirical Research (taught by Guido Imbens)

STANFORD UNIVERSITY

STANFORD, CALIFORNIA 94305-6072
DEPARTMENT OF ECONOMICS

Peter J. Klenow ph: (650) 725-8169
Landau Professor of Economics klenow@stanford.edu
Gordon Moore Senior Fellow at SIEPR www.klenow.com

March 31, 2014

Dear NBER Entrepreneurship Working Group:

I am writing to recommend **Rui Xu** for the 7th Entrepreneurship Research Boot Camp (ERBC) this summer.

Rui Xu is a 4th year Econ PhD student at Stanford. She has worked for me as a research assistant for the past two years. She also served as a teaching assistant this past fall for 1st year PhD macro – a reflection of the high esteem in which she is held by faculty and students. She is smart, organized, diligent, and motivated. She is more tortoise than hare, but in research "slow and steady" if often precisely what is needed to win the race. I have no doubt that she will read the 50 assigned papers carefully and invest her all in the ERBC.

Rui is researching the impact of immigrants on U.S. productivity growth. Her work so far has emphasized quantitative GE modeling. What she really needs is more empirical training. I think the ERBC would be great for her. The roster of presenters is perfect for getting her more up to speed on the facts, as well as how to connect them to models.

I think Rui's modeling focus would be nice to include in the mix of ERBC students. She will bring a tendency to think of GE effects, quantify them, and evaluating their welfare implications.

Rui's promising idea is that immigration helps mitigate a global misallocation of talent for innovation. Historically, many talented individuals have not been given the opportunity to contribute to innovation. This is true even within rich countries such as the U.S. (think of women and African-Americans). It has probably been true globally to an even greater degree. How many entrepreneurs has the world missed out on because they were born outside today's OECD? And how big are the gains from seizing these opportunities through recent and future high skilled migration?

To capture these forces, Rui is working on a two-country GE model with these features:

1. Heterogeneous talent for innovation. Without this it does not matter who is starging firms vs. working for them. But it presumably does matter. She plans to use the distribution of income to innovators in the U.S. (wages of researchers and entrepreneurs) to estimate the distribution of talent. The more heterogeneous (thick-tailed) this talent, the greater the potential growth gains from allowing immigration.

Micro evidence here is vital. So are the raw numbers of immigrant entrepreneurs and researchers relative to native ones.

2. A leader-follower structure between the destination and source countries. If destination countries do more innovating because of high-skilled immigration, source countries may carry out more or less technology transfer. There is more for them to transfer, and expats may be a conduit. But the talent they lose to out-migration could have been working on imitation and transfer at home. This may be the most challenging ingredient for her to quantify. If she could truly pin down international knowledge spillovers, this would be a major contribution in its own right. But I think it would be valuable to use standard functional forms and parameter values from the growth literature and see what they imply.

   In her setup, the leader country does more innovating for given research talent. She plans to enrich her model to include education to become an innovator. The leader country can provide superior education because of local knowledge. This could be one reason why the talented want to migrate from follower to leader countries as students.

3. Endogeneity of the talent cutoff for innovating vs. working to produce current output in both the destination and source countries. Here she can build on existing micro empirical work documenting the impact of immigration. The total impact on growth will depend in part on how much crowding out there is here. Even under complete crowding out of the *number* of innovators, however, their average quality can increase due to better global allocation of talent, leading to a higher growth rate in both the destination and source countries.

Again, the aim is to arrive at estimates of the growth impact of immigrants on countries such as the U.S. and China. If done well, such a study could garner some attention from policymakers and the media. And it would provide a useful platform for future research.

Rui can use the framework she develops to investigate many more interesting questions. What is the optimal high-skilled immigration policy for the U.S. and China, respectively? How much does it depend much on how each country weights the welfare of migrants? How does the *global* optimum compare to the noncooperative outcome?

To recap, I heartily recommend Rui Xu for the ERBC.

Yours Sincerely,

