Application for the NBER Entrepreneurship Research Boot Camp 2014

Xavier Jaravel

March 29, 2014

- Contact information:
  - Mail: Xavier Jaravel, 5 Waldo Avenue, Somerville 02143
  - Email: xjaravel@hbs.edu
  - Phone: 857-919-9732
- Recommendation letter writer:
  - William Kerr, Associate Professor of Business Administration, HBS Entrepreneurial Management Unit, wkerr@hbs.edu
- Please find enclosed:
  - A Curriculum Vitae
  - A list of all current and completed PhD-courses (course names and unofficial transcript)
  - A two-page essay

Xavier Jaravel

1050 Massachusetts Avenue, National Bureau of Economic Research, 02138 Cambridge, MA, USA
+1-857-919-9732, xjaravel@hbs.edu
French citizen, born 09/26/1989

Education

HARVARD UNIVERSITY, PhD in Business Economics — Cambridge, MA, USA
Fields: Public Finance, Macroeconomics and Econometrics. GPA: 3.9. — 2012-present

HARVARD UNIVERSITY, Undergraduate Exchange Student. — Cambridge, MA, USA
Concentrating in Applied Mathematics & Economics. GPA: 4.0. — 2010-2011

SCIENCES-PO PARIS, BA Economics & Political Science. — Paris, France
With highest distinction – *Summa Cum Laude*, best 1% of class. — 2008-2011

Research Experience

ECONOMICS DEPT., HARVARD UNIVERSITY — Cambridge, MA, USA
Research Assistant to Professor David Laibson. — Summer 2011- Fall 2012
Research Assistant to Professor Michael Kremer. — Summer 2012
Research Assistant to Professor Diego Comin. — Summer 2012
Research Assistant to Professor Marc Melitz. — Summer 2011- Summer 2012
Research Assistant to Professor Philippe Aghion. — Fall 2011-Summer 2012
Research Assistant to Professor Richard Hornbeck. — Spring 2011

ECONOMICS DEPT., MASSACHUSETTS INSTITUTE OF TECHNOLOGY — Cambridge, MA, USA
Research Assistant to Professor Daron Acemoglu. — Fall 2011-Fall 2012

Teaching Experience

ECONOMICS DEPT., HARVARD UNIVERSITY — Cambridge, MA, USA
Ec2410 Topics in Macroeconomics, *Guest Lecturer* for Professor Robert Barro. — Spring 2013

HARVARD COLLEGE — Cambridge, MA, USA
Ec1011a Microeconomic Theory, *Course Assistant* for Professor Edward Glaeser. — Fall 2011

HARVARD SUMMER SCHOOL — Cambridge, MA, USA
Ec10Sab: Principles of Economics, *Teaching Fellow* for Professors Acemoglu, Laibson, List and Watson. — Summer 2011

Publications

SUBMITTED
"Knowledge Spillovers, Growth and Innovation: Building on Cohen and Levinthal" (with Philippe Aghion)
"Education and Military Rivalry" (with Philippe Aghion, Dorothee Rouzet and Torsten Persson)

Skills

LANGUAGES: French (native), English (fluent), German (conversational).
COMPUTER: Dynare, GIS, LaTeX, Mathematica, Matlab, MS Office, Photoshop, R, STATA.
INTERESTS: modern art, piano, skiing.

List of current and completed PhD courses

- Fall 2012
  - Microeconomic Theory
  - Macroeconomic Theory
  - Public Economics and Fiscal Policy I
  - Psychology and Economics
  - History of Economic Thought
- Spring 2013
  - Microeconomic Theory
  - Macroeconomic Theory
  - Public Economics and Fiscal Policy II
  - Econometric Methods
  - Advanced Applied Econometrics
- Fall 2013
  - Advanced Macroeconomics I
  - Time Series Analysis
  - Labor Market Analysis
  - Nonlinear Econometrics
- Spring 2014
  - No courses: studying for field exams in public finance, macroeconomics and econometrics

Harvard University
Faculty of Arts and Sciences
Office of the Registrar
Graduate School

Sun 9 Mar 2014

This is a CONFIDENTIAL student record.

Jaravel, Xavier Laurent
108-0770-0, GAS 02, Active

Business Economics

Subject: Business Economics

2012-2013	COURSE	2F	HALF	FULL	CRED	COMMENT
20121 13390	ECON 2450a		A		0.50	
20121 38280	ECON 2030		A		0.50	
20121 44310	ECON 2010c		A		0.50	
20121 86560	ECON 2010a		A-		0.50	
20121 89713	ECON 2091		SAT		0.50	
20122 20410	ECON 2010d		A-		0.50	
20122 64780	ECON 2450b		A		0.50	
20122 67783	XBUS 4920		B+		0.50	
20122 72100	ECON 2140		A		0.50	
20122 76860	ECON 2144		A		0.50	
20122 86590	ECON 2010b		B+		0.50	

2013-2014	COURSE	2F	HALF	FULL	CRED	COMMENT
20131 19579	XMIT 14.385		A		0.50	
20131 44140	ECON 2142		A		0.50	
20131 48620	ECON 2810a		A		0.50	
20131 63930	XMIT 14.461		A		0.50	
20132 54125	XBUS 4921		--		0.50	
20132 71440	ECON 2530b		--		0.50	
20132 77000	TIME-R				0.50	
20132 77000	TIME-R				0.50	

I would like to attend the NBER Entrepreneurship Research Boot Camp in order to deepen my knowledge of the literature on innovation, productivity, entrepreneurship and management, and to discuss a number of research ideas with the professors and other participants. I am especially interested in the drivers of innovation. In ongoing work, I approach this question in three novel ways.

First, I started from the observation that empirical researchers have usually focused on the incentives facing firms whether from market incentives to capture monopoly rents, explicit government policies such as R&D tax credits and IP or other changes in the economic environment. But ultimately innovation depends on the decisions that individuals make, so a focus solely on the firm will miss important aspect. Many theories have focused on individual incentives, but the empirical work here is very sparse, especially for non-academics. This scarcity is fundamentally due to the lack of data. To investigate this issue we need to use individual-level information on whether and when a person innovates, the quality of the innovation and the career of the inventor before, during and after the innovation. With Raj Chetty, John Van Reenen and other coauthors, I have worked to compile a unique dataset which is based on a match between the USPTO patent data and administrative data. We obtained a matched employer-employee dataset with about 750,000 US inventors whose careers we follow for up to 16 years (and longer if we look at their patenting history back to 1976). This is the largest database ever compiled in this area. Using this unique dataset, we document several stylized facts that are relevant to understanding the consequences and causes of innovation for individuals. For instance, invention age peaks in the early 40s, and slightly earlier for the most cited patents; after the patent event, inventors of the most highly cited patents have signicantly higher incomes, especially those in the higher percentiles of the distribution; much invention happens across firms (about a quarter of all inventors in teams of two are in different firms); a large fraction of inventors come from families at the top of the income distribution, although conditional on being granted a patent inventors from less rich familiity are more highly cited on average. Being exposed to more material related to innovation and entrepreneurship during the NBER ERBC would be fruitful to develop new hypotheses and think of possible stylized facts to examine in this unique dataset.

Second, in joint work with Alex Bell I am exploring the existence and magnitude of knowledge spillovers among inventors. A series of recent papers have improved our understanding of knowledge spillovers in academia, but the evidence is mixed: Azoulay et al. (2010) find large positive spillovers of "superstars" in biomedical sciences on their collaborators; Borjas and Doran (2012) find that the wave of immigration of Russian mathematicians to the US in the 1990s mainly had a "crowding-out effect" on American mathematicians and no positive externalities; and Waldinger (2012) finds that the forced departure of German scientists from their universities didn't result in a decline in productivity of their peers, except for their PhD students. These studies all rely on citations as a proxy for productivity and their conflicting results suggest that knowledge spillovers might vary across fields. Using the new data on USPTO inventors described earlier, our paper provides for the first time micro-level empirical evidence on knowledge spillovers among inventors (70% of whom work in the private sector), using citations but also wages and adjusted gross income as measures of productivity. Premature deaths of about 2,000 inventors, defined as deaths occuring before the age of 60, are used as a source of exogenous variation in the structure of their coinventors' collaborative networks (this identification strategy is similar to Azoulay et al. (2010)). A number of important issues in the innovation and labor literatures can thus be revisited: are knowledge spillovers highly localized? Do they extend beyond the boundary of the firm? How heterogeneous are they across technology classes and what drives the heterogeneity? Do workers and firms share the rents from innovation? How accurately do firms observe the productivity of the inventors they employ? What characteristics of inventors determine the magnitude of knowledge spillovers?

We find that the premature death of a coinventor leads to a lasting 4% decline in wage, a lasting 3% decline in adjusted gross income (AGI) and a lasting 7% decline in citation-adjusted innovative output. We can reject the null hypothesis that the effect is entirely driven by "star inventors," which is interesting given that the existing literature has focused almost exclusively on superstars. In addition, we can reject the null hypothesis that knowledge spillovers (as measured by their effect on wage, AGI and citations) do not extend beyond the boundary of the firm. We also find that the effect of premature death on coinventors' citation records is very similar across technology classes; in contrast, there is large variation in the effect of coauthor death on coinventors' wages, suggesting that the appropriability of the returns to innovation by innovators varies across industries. This is still work in progress, but overall, the key result is that losing a coinventor has long-lasting consequences on an inventor's wage, AGI and citation record. The fact that inventors do not ever recover from the loss of their coinventor suggests that there are "multiplier effects" between inventors, which might result from learning. Identifying the magnitude of spillover effects between inventors is central for tax policy design, because the impacts of any policy may depend greatly not just on a given inventor's behavior but on a "multiplier effect" that affects the broader innovation process. We are currently exploring the heterogeneity in the treatment effect of losing a coinventor and studying various possible mechanisms. It would be fantastic to get feedback on this project from the professors teaching at the NBER ERBC.

Lastly, I believe there is a need for more experimental work on innovation and productivity. By working with the Singaporean Ministry of Finance on a study of the reverse mortgage market (mentioned in the press: http://www.channelnewsasia.com/news/singapore/mnd-to-study-if-reverse/1029158.html), I have established a network of contacts in Singapore, where "productivity" is an important theme on the policy agenda and where the government is often willing to organize RCTs. Therefore, I hope to be able to implement a RCT in Singapore to learn more about supply and demand policies that may help promote innovation (such as loans, R&D subsidies, mentoring policy, improving management, etc...). Discussing innovation, productivity and entrepreneurship with the speakers at the NBER ERBC would be very useful to further develop this research agenda.

Thank you for your consideration,



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WILLIAM R. KERR |
ASSOCIATE PROFESSOR OF BUSINESS ADMINISTRATION

It is my great pleasure to recommend Xavier Jaravel for the NBER Entrepreneurship Research Boot Camp. I met Xavier a little over a year ago and we have been discussing research ideas related to the innovation literature frequently since then. As I will describe in detail below, Xavier would be a great choice for an ERBC participant. He has proven to be exceptional in several respects and has a tremendous trajectory in front of him.

A first trait to note about Xavier is that he has a very sharp and independent mind for identifying research ideas. He is only in his second year of the PhD program but has already started his own top-notch and extremely promising project. He is working to assemble a new dataset on USPTO patent inventors, with detailed information on their career and compensation. There is much to admire in his dataset construction, matching efforts and his approach of examining the impacts of early deaths of inventors on the earnings and citations of their collaborators (following Azoulay et al. 2010). He exploits this source of exogenous variation in inventor networks to provide for new and more rigorous estimates of the magnitude of knowledge spillovers at the individual level among inventors. All this is being done at a time when most graduate students have barely dipped a toe in the research waters.

Xavier also has a second line of work with the USPTO dataset which is how I first met him. In this parallel stream, he has identified from the USPTO filings how to separate inventors working in the United States of various nationalities and citizenships. This project again involves heavy data assembly, as the information is only in PDF form from the USPTO PAIR website, and Xavier has identified some interesting tax and regulation differences to analyze with the information. This work is promising enough that he has been offered a small grant from the NBER High-Skilled Immigration initiative, which I co-lead, to help Xavier expand his data development efforts. Xavier's career is developing so rapidly that he has yet to take us up on the grant given the opportunity costs of his time on other fronts!

More generally, these unique datasets and deep understanding of the patent data—as only a second year student—will allow Xavier to pursue other high-profile research projects going forward, and he would benefit from attending the NBER ERBC to gain even more exposure than he already has to the literature on productivity, entrepreneurship, management, and so on. My assessment of him right now is that the sky is the limit in terms of his research skillset, but that he needs a better grounding in the literature and exposure to research possibilities. The ERBC can provide precisely these inputs and also build a long-term connection of Xavier to the entrepreneurship and innovation literatures.

Pulling back from the "weeds" of his direct overlaps with ERBC themes, Xavier has a well-defined research agenda and is exceptionally diligent in his work. At a broad level, he is interested in using micro data to answer macro questions. His work on patents is part of this agenda, but more generally he has worked over the past few years to gain a deep understanding of macroeconomics, public finance and econometrics, three fields that are rarely combined (he will soon be taking his oral exams in these fields with my colleagues Raj Chetty, Gary

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Chamberlain and Diego Comin in the Economics department). He has been doing so well that Robert Barro invited Xavier as a guest lecturer in his 2nd-year PhD macro class at Harvard on the theme of "using micro data to answer macro questions." In addition, Xavier has already written and submitted two co-authored papers (to the *Review of Economic Studies* and the *Economic Journal*). Xavier is further working with Chetty and others on related project with the IRS tax data that I am sure will result in some top publications too.

In summary, Xavier has a talent for research and really desires to make important contributions and challenge himself. Our conversations have convinced me that he has reflected upon many topics and has read the literature closely. While he is just in his second year, I can forecast with confidence that he will have an exceptional choice of job offers ahead. I think he is exactly the kind of promising researcher that the NBER ERBC is looking for, to help advance and also establish ties to.

Thus, I give Xavier my highest recommendation and hope that the committee judges his application favorably. Please let me know if any further information can aid you in your selection.

Sincerely,



Bill Kerr