Entrepreneurship and Innovation in the Development of the American Economy

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April 14, 2016

Entrepreneurship and innovation have been crucial drivers of economic growth and development in the United States. Inventions like the electric furnace, the gas powered automobile, the airplane, wireless telegraphy, the induction motor etc. have greatly improved the efficiencies of our manufacturing process and our access to transportation and communication - to say the least. The direct consequence of efficiently commercializing inventions is a reduction in the cost of production and an increase in our overall living standards. Yet, we know very little about how invention and entrepreneurship (i.e. the commercialization of inventions - both at the product and process margins) interact. While there has been some research on breakthrough inventions (Sokoloff, 1988; Sokoloff and Khan, 1990; Khan and Sokoloff, 1993; Lamoreaux and Sokoloff, 2005) and on transformative entrepreneurship (Ahuja and Morris Lampert, 2001; Garud and Karnøe, 2003), inclusive work on the universe of enterprises and inventions, and their combined role in the economy has been severely lacking. This omission presents a gaping chasm to our understanding of the development of the American economy and the concentration of this economic proliferation in certain geographies and amongst certain populations. A key reason for the absence of such research of paramount import is the lack of data.

In order to understand the relationship between innovation, entrepreneurship and economic development, one would need a long panel of data covering inventive activity, business activity, local demographics, local economics, local institutions and migration patterns across the US. It is precisely this dataset that we propose assembling with the help of this NBER grant. In particular, we plan to merge together records of patents granted, the decennial census, and business credit ratings from Dun & Bradsteet (D&B). We have already begun the process of matching individuals who were awarded a patent to the 100% sample of the decennial Census of Population provided by the Minnesota Population Center which provides a rich set of demographic information on these individuals.

Second, we have already embarked upon collecting data from the historical D&B credit reports for businesses, located at the Library of Congress (LOC). The D&B credit rating agency was one of the earliest such institutions in the US and intended to provide "hard" information on the financial strength of local businesses to potential lenders. The D&B credit rating data has information on the location of businesses, names of the business owners, the main commerce the firm was engaged in and the creditworthiness of that business. It covered both manufacturing businesses and also a variety of other concerns, from general stores to bars and inns. This data source is potentially unparalleled in its length and breadth. Using the names of the business owners and the county they are located in, we will be able to link them to the decennial Population Census to add information on age, race, gender, educational attainment, birthplace, migration status, household characteristics and whatever other information was included in the Census questionnaire in that year (this varies across years). Our sample is currently slated to include data for each Census year from 1860 to 1940 for Alabama, Mississippi, Louisiana, Georgia, South Carolina, Wisconsin, Iowa, New Jersey, Washington DC, Maryland, Missouri and Massachusetts. We currently possess transcribed data for 5 states for 5 years (1860, 1970 , 1880, 1889, 1900) and have additionally collected data for a further 6 states over 8 additional years (from the LOC). This latter data has yet to be transcribed and the NBER grant would help defray those costs.

With this dataset in place we intend to address a number of questions. While we will briefly describe two

specific questions we can address, it should be noted that the scope for inquiry is great. Some of the further inquiry (not described below) will be associated with combining additional historical data - on transportation routes, mail routes, international immigrant settlements, local election outcomes, land grants for academic institutions etc. The research questions described below are illustrative of the big picture contributions of this dataset and are by no means reflective of the exhaustive set of possibilities.

We plan to begin by focusing on two aspects of the evolution of entrepreneurship: the number and "quality" of these small business owners. Our main measure of entrepreneur "quality" or skill is literacy in earlier periods and education later on. This is particularly interesting not only from a historical perspective, but also from a comparative perspective. Countries do not become developed over night, and, in fact, the US was a developing country for most of the 19th century and early 20th century by modern definitions of developing. As such, this comparison provides powerful insights to what the "normal" process of development looks like. The first question of interest regarding rates of self-employment is the main focus of some modern cross-country studies comparing developed to developing countries. These studies consistently find an inverse relationship between levels of development and self-employment rates (Gollin, 2008). Our first goal then is to document how self-employment (or business ownership) rates in the US have varied over time and to what extent this temporal pattern matches the pattern across countries today.

Next, we aim to document the changing skill level of entrepreneurs over American economic history. Again the historical patten in the US would offer an interesting reference point for understanding developing countries today. A number of modern studies have argued that due to economic, and in particular financial, institutions, lower skilled people tend to crowd into self-employment or entrepreneurship driving down the productivity of these sectors (Buera, 2009). To a first approximation, the US throughout its history has had a relatively *laissez faire* financial system. To what extent the temporal pattern in the US matches the pattern across countries today is simply unknown. We believe that these comparisons would shine light on the importance of institutions, financial or otherwise, on entrepreneurship.

In our second project, we ask a very simple question - who invents? This is a central question to understanding possible barriers to entry in the innovation process. Preliminary findings show that patentees over this seventy year period are more likely to be older, white, male and to be living in a state other than the one in which they were born. Surprisingly, these patterns are very persistent over space and time though the fraction of women appears to rise slightly. This persistence in the demographic patterns of inventors suggests the systematic proliferation of certain biases and barriers to the inventive process. Given the number of historical changes over this time period - from the reconstruction and the Jim Crow eras, to the second industrial revolution, the great migration and women's suffrage (among other events such as the great depression and WWI) - we are surprised to find little if any effect on the change in the demographics of inventors. We hope to understand what factors generate these limitations to participation by more carefully studying institutional changes at the local level. One area we are presently focused on is that of educational institutions. We are trying to unpack the effect of Historically Black Colleges and Universities, Women's Colleges, and land grant universities on inventive activity amongst blacks, women and the population more generally, to test if academic institutions have a differential impact on different populations.

A historical assessment of the US will not only allow us to track the trajectory of US states and counties, but it will also shed light on developing economies like India and China, given the many similarities (and differences) between developing economies today and the US in the late 19th and early 20th centuries.

References

Ahuja, G. and C. Morris Lampert (2001). Entrepreneurship in the large corporation: A longitudinal study of how established firms create breakthrough inventions. *Strategic Management Journal 22*(6-7), 521–543.

Buera, F. J. (2009). A dynamic model of entrepreneurship with borrowing constraints: Theory and evidence. *Annals of Finance 5*, 443–464.

Garud, R. and P. Karnøe (2003). Bricolage versus breakthrough: distributed and embedded agency in technology entrepreneurship. *Research policy 32*(2), 277–300.

Gollin, D. (2008). Nobody's business but my own: Self-employment and small enterprise in economic development. *Journal of Monetary Economics 55*, 219–233.

Khan, B. Z. and K. L. Sokoloff (1993). "Schemes of Practical Utility": Entrepreneurship and innovation among "great inventors" in the United States, 1790-1865. *Journal of Economic History 53*, 289–307.

Lamoreaux, N. R. and K. L. Sokoloff (2005). The decline of the independent inventor: A Schumpterian story. NBER Working Paper 11654.

Sokoloff, K. L. (1988). Inventive activity in early industrial America: Evidence from patent records, 1790-1846. *Journal of Economic History 48*, 813–850.

Sokoloff, K. L. and B. Z. Khan (1990). The democratization of invention during early industrialization: Evidence from the United States, 1790-1846. *Journal of Economic History 50*, 363–378.

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EMPLOYMENT AND AFFILIATIONS:

Aug 2014- Present:	**The University of Wisconsin Madison, School of Business** Assistant Professor of Management and Human Resources Courtesy Appointment, Department of Economics Center for Financial Security, Affiliate (2015 – present)
Nov 2012 – July 2014:	**Duke University, Fuqua School of Business** Post Doctoral Research Associate
Aug 2011 – Nov 2012:	**Cornerstone Research, San Francisco** Associate

EDUCATION:

Ph.D., Economics, University of California, San Diego, 2011
(Thesis Advisor: Professor Roger H. Gordon)

M.A. and C. Phil, Economics, University of California, San Diego, 2008/ 2009

B.S., Economics (Honors) and Statistics, University of Wisconsin-Madison, 2005
(Thesis Advisor: Professor Kenneth D. West)

RESEARCH INTERESTS:

Primary Fields: Entrepreneurship, Entrepreneurial Finance, Labor/ Public Economics, Household Finance
Secondary Fields: Development Economics, Industrial Organization, Corporate Finance

TEACHING EXPERIENCE:

Entrepreneurial Finance, Wisconsin School of Business (UG / MBA)	2014 – present
Wisconsin Entrepreneurship Bootcamp	Summer 2015
Corporate Finance, Duke University, Fuqua School of Business	Fall/Winter 2012/2013
Managerial Economics, UCSD, IRPS (Master's)	Summer 2010
Teaching Assistant, MIT, Abdul Latif Jameel, Poverty Action Lab (JPAL)	Summer 2010
Teaching Assistant, UCSD, Department of Economics and IRPS	2005 – 2011

(Undergraduate: Micro, Econometrics, IO, Development, Macro, Masters: Quantitative Methods)

WORKING PAPERS:

1. "The unobserved returns from entrepreneurship" (under review)
2. "Is it all about who you know? Prior work connections and entrepreneurial success," with Oana Tocoian (under review)
3. "Distance and the informativeness of Credit Ratings," with Nicolas Ziebarth
4. "Risky business: some empirical aspects of household risk management in entrepreneurship" with Oana Tocoian
5. "The demographics of inventors in the historical United States" with Mike Andrews and Nicolas Ziebath

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WORK IN PROGESS:

1. "Entrepreneurship from an Historical Perspective," with Nicolas Ziebarth
2. "Entrepreneurship and the American dream: How far does the upward mobility ladder reach?" with Oana Tocoian
3. "The Cyclicality of Entrepreneurship" with Siha Lee and Oana Tocoian
4. "The Formalization of Networks into Entrepreneurial Organizations," with Oana Tocoian
5. "Fertility and the Business Cycle," with Oana Tocoian
6. "A Time Series Evaluation of Consumption vs. Income in Self-Employment," with Roger Gordon

GRANTS, HONORS, SCHOLARSHIPS, AND FELLOWSHIPS:

2016:	UW-Madison, WARF Grant ($35,000)
2015:	NSF Grant #1542959 ($200,000) with Giri Venkatraman and Suman Banerjee, UW-Madison, WARF Grant ($32,000)
2010:	Kauffman Dissertation Fellowship ($20,000)
2005-2011:	Tuition Scholarship, Summer Fellowship (2007), UCSD Department of Economics

INVITED SEMINARS AND PRESENTATIONS

2016 UCSD Women in Economics Conference, ESSEC (Singapore) – First Cut Seminar Series, Kauffman Emerging Scholars Conference (March 2016), Agricultural and Applied Economics Seminar, UW-Madison (March 2016), University of Maryland, Smith Entrepreneurship Research Conference (May 2016); Northwestern University, Searle Conference on Entrepreneurship and Innovation (June 2016)

2015 Agricultural and Applied Economics Workshop, UW-Madison, Georgetown University, McDonough School of Business, MHR Brown Bag, UW-Madison

2014 US Census Bureau; University of Wisconsin Madison, School of Business; University of Pennsylvania, Wharton School of Business
5th IZA Workshop on Entrepreneurship Research ; Midwest Strategy Meeting; Duke University, Finance Brown Bag; Kauffman Emerging Scholars Conference; Bank of Finland and CEPR Entrepreneurial Finance, Innovation and Growth Conference

2013 National University of Singapore, Department of Economics; Claremont McKenna College, Department of Economics; University of Iowa, Department of Economics; Duke University, Fuqua School of Business
HEC Paris, 4th Workshop on Entrepreneurship; NBER Summer Institute (Entrepreneurship); Northwestern University, Searle Conference on Entrepreneurship and Innovation; Society of Labor Economics (Boston); Duke University, Finance Brown Bag

2011 Cheung Kong, Graduate School of Business; Oxford University, Said Business School; University of Kansas, School of Business; Cornerstone Research
Kauffman Entrepreneurship Mentoring Workshop, Denver CO

2010 UCSD, Department of Economics
New York University, Satter Conference; Kauffman Entrepreneurship Mentoring Workshop, Atlanta GA

SERVICE

2015-present	PhD recruiting committee (MHR), Syllabus committee
2015-present	Co-Editor, Kauffman State of the Field – Productivity Growth
2014-present	BBA curriculum committee

2015 MHR lecturer recruiting committee

PANELS AND FORUMS

2015 Federal Reserve Board – Chicago, Entrepreneurship Panelist

REFEREE ACTIVITY

Management Science, Journal of Economics and Management Strategy, Journal of Business Venturing, Small Business Economics

PROFESSIONAL ACTIVITIES

NBER Summer Institute; AOM; AEA; 12th International Industrial Organization Conference (Discussant); Entrepreneurship and Innovation Seminar Series, Duke Fuqua (Organizer); Queens University; Economics of Entrepreneurship and Innovation Conference (Discussant); SFS Finance Cavalcade (Discussant); NBER Spring Sessions (Productivity, Innovation and Entrepreneurship); Western Economic Association (Discussant); Duke/ Kauffman Entrepreneurship Conference (Discussant); Kauffman Entrepreneurship Mentoring Workshop; NBER Entrepreneurship Bootcamp

OTHER RELEVANT POSITIONS

2007-2008 Research Assistant, UCSD (Chris Woodruff and Gordon Hanson)

PROFESSIONAL MEMBERSHIPS
Member: American Economic Association, Econometric Society

LANGUAGES:
English (native), Tamil (native)

CITIZENSHIP:

Citizenship: Singapore, US Permanent Resident

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Affiliations

University of Iowa
Assistant Professor of Economics, 2012-

NBER
Faculty Research Fellow, DAE, 2013-

Education

University of Wisconsin, Madison
BA with Comprehensive Honors, 2005.
Majors: Economics, Mathematics, and Philosophy

Northwestern University
PhD, Economics, 2012.
Dissertation Committee: Joel Mokyr, Jonathan Parker, Joseph Ferrie.

Refereed Publications

1. Nicolas L. Ziebarth (2013),"Are China and India backwards? Evidence from the 19th century U.S. Census of Manufactures," *Review of Economic Dynamics* 16: 86-99.
2. Nicolas L. Ziebarth (2013), "Identifying the effects of bank failures from a natural experiment in Mississippi during the Great Depression," *AEJ: Macroeconomics* 5: 81-101.
3. Richard Steckel and Nicolas L. Ziebarth (2013),"A troublesome statistic: Traders and the westward movement of slaves," *Journal of Economic History* 73: 792-809.
4. Mark Chicu and Nicolas L. Ziebarth (2013), "Multi-market contact and competition: Evidence from the cement industry during the Depression," *International Journal of Industrial Organization* 31: 603-611.
5. Mark Chicu, Chris Vickers, and Nicolas L. Ziebarth (2013),"Cementing the case for collusion under the NRA," *Explorations in Economic History* 50: 487-507.
6. Chris Vickers and Nicolas L. Ziebarth (2014),"Did the NRA facilitate collusion? Evidence from the macaroni industry," *Journal of Economic History* 74: 831-862.
7. Paul L.E. Grieco and Nicolas L. Ziebarth (2015), "Unigeniture in an uncertain world," *Cliometrica* 9: 139-166.
8. Joel Mokyr, Chris Vickers, and Nicolas L. Ziebarth (2015),"The history of technological anxiety and the future of economic growth: Is this time different?," *Journal of Economic Perspectives* 29: 31-50.
9. Nicolas L. Ziebarth (2015), "The Great Depression through the eyes of the Census of Manufactures," *Historical Methods* 48: 185-194.
10. Peter Scott and Nicolas L. Ziebarth (2015), "The determinants of plant survival in the U.S. radio equipment industry during the Great Depression," *Journal of Economic History* 75: 1097-1127.
11. Richard Steckel and Nicolas L. Ziebarth (2016), "Selectivity and measured catch-up growth of American slaves" *Journal of Economic History* 76: 109-138.

12. Chris Vickers and Nicolas L. Ziebarth (2015), "Economic development and the demographics of criminals in Victorian London," *Journal of Law and Economics*, forthcoming.
13. Gabriel Mathy and Nicolas L. Ziebarth (2015),"How much does political uncertainty matter? The Case of Louisiana under Huey Long," conditionally accepted at *Journal of Economic History*.

Working Papers

1. "Banking distress and business bankruptcy: Evidence from Mississippi during the Great Depression," with Mary E. Hansen, revise and resubmit at *AEJ: Macro*.
2. "A simple estimator for merged datasets with non-unique identifiers" with Alexandre Poirier.
3. "The role of local labor supply in response to oil price shocks," with Matthias Kehrig, revise and resubmit (2nd round) at *AEJ: Macro*.
4. "Misallocation and productivity during the Great Depression."
5. "Women's (Dis)empowerment and the Pill."
6. "The radio and bank distress during the Great Depression."
7. "Internal capital markets in the Great Depression."

Other Refereed Publications

1. N. Lehmann-Ziebarth, P. Heideman, R.A. Shapiro, S.L. Stoddart, C.C.L. Hsiao, G.R. Stephenson, P.A. Milewski, and A.R. Ives (2005), "The Evolution of Periodicity in Periodical Cicadas," *Ecology* 86: 3200-3211.
2. N. Lehmann-Ziebarth and A.R. Ives (2006), "The structure and stability of model ecosystems assembled in a variable environment," *Oikos* 114: 451-464.
3. N.L. Ziebarth, K.C. Abbott, and A.R. Ives (2010),"Weak Population Regulation in Ecological Time Series," *Ecology Letters* 13: 21-31.
4. A.R. Ives, K.C. Abbot, and N.L. Ziebarth (2010), "Analysis of Ecological Time Series with $ARMA(p, q)$ models," *Ecology* 91: 858-871.
5. A.R. Ives, P. Glaum, N.L. Ziebarth and D.A. Andow (2011), "The evolution of resistance to two-toxin pyramid transgenic crops," *Ecological Applications* 21: 503-515.

Non-Refereed Publications

1. Nicolas L. Ziebarth (2013), "Dissertation Summary of 'Essays on the Great Depression from a Micro-Perspective,' " *Journal of Economic History* 73, 556-559.
2. Nicolas L. Ziebarth (2014), "Review of Taylor Jaworski's *The Warring Forties: The Economic Consequences of WWII*," *Dissertation Reviews*.
3. Joel Mokyr, Chris Vickers, and Nicolas L. Ziebarth (2016),"The history of technological anxiety and the future of economic growth: Is this time different?," *LSE Business Review*.

Refereeing

Quarterly Journal of Economics, *American Economic Review*, *Journal of Economic History*, *European Economic Review*, *Management Research Review*, *Academy of Management Review*, *Economic Inquiry*, *Empirical Economics*, *Explorations in Economic History*, *Financial History Review*, *RAND Journal of Economics*, *Economic History of Developing Regions*.

Honors and Awards

Finalist, Nevins Prize for best dissertation in American economic history, 2012.
EHA Sokoloff Graduate Fellowship, 2011.

Grants

NSF SES-1459263 with Chris Vickers, 2015-2016.
Tippie Competitive Summer Research Grant, 2015.
Economic History Association Cole Grant-In-Aid, 2013.
Economic History Society Small Grant with Peter M. Scott, 2012.
Berkeley Economic History Lab Grant with Joshua Hausman, 2011.
NSF Dissertation Improvement Research Grant, 2011.

Presentations

2011 Northwestern Economic History, Economics and Business History Conference, SED mini-conference on misallocation and productivity, NBER Summer Institute DAE (Poster session), Economic History Association Annual Meetings (poster), Yale Conference on Macroeconomics and Finance, Chicago Fed.
2012 NBER Pre-Conference on Microeconomics of New Deal, All-UC Conference on Innovation, Columbia Business School, Federal Reserve Board, FDIC, Census Bureau Center for Economic Studies, University of Iowa, University of Washington, Booth, UC-Davis, Penn State, Michigan State, Ohio State, Northwestern Economic History, NBER DAE (New Deal Conference), American University, EHA Annual Meetings Nevins Prize Panel.
2013 University of Maryland, Midwest Macro, World Cliometrics Conference, University of Notre Dame, Second Wharton Conference on Financial Crises and Liquidity.
2014 Winter meeting of the Econometric Society, University of Mississippi, Auburn University, NBER DAE Spring Program Meeting, All UC "100 Years of the Federal Reserve," Social Science History Association Annual Meetings, Economic History Association Annual Meetings, University of Michigan, BEA, University of Iowa Library, University of Wisconsin.
2015 Stanford, University of Iowa Finance, AEA (discussant), Cliometrics Conference, NBER SI, Auburn, Yale, Vanderbilt.
2016 College of William and Mary, Census, Washington Area Economic History, Wisconsin Business School, Wisconsin ARE (planned), Iowa Inequality, Northwestern (Planned), Auburn.

Professional Service

Committee on Research in Economic History, Economic History Association, 2014-.
Associate Editor, *Economic Inquiry*, 2014-.

References

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Last Updated: April 8, 2016