José Antonio Lobo
(jose.lobo@asu.edu)

Date & Place of Birth: April 18, 1962, San Juan, Puerto Rico

Citizenship: United States of America

Education

1984	**Bachelor of Science**, Physics, Cornell University
1992	**Master's in City and Regional Planning**, Cornell University
1996	**PhD**, Regional Science, Cornell University

Research Interests

- Settlement formation and urbanization across different eras and geographic areas
- Urbanization and economic development
- Invention and innovation in urban areas
- Urban sustainability
- Invention and technological change
- Origins of novelty in biological and socioeconomic-cultural systems

Employment & Appointments

2012 – present	Arizona State University, Tempe, Arizona **Associate Professor of Research,** School of Sustainability **Senior Sustainability Scientist,** Julie Ann Wrigley Global Institute of Sustainability **Core Faculty,** Center for Social Dynamics and Complexity **Affiliated Faculty,** School for the Future of Innovation in Society **Honors Faculty,** Barrett the Honors College
2007 – 2011	Arizona State University, Tempe, Arizona **Associate Professor of Research** School of Human Evolution and Social Change W.P. Carey School of Business Graduate Program in Applied Mathematics for the Life and Social Sciences
2005 – 2006	Arizona State University, Tempe, Arizona **Research Scientist**, Global Institute of Sustainability
2004	Università di Modena e Reggio Emilia, Reggio Emilia, Italy **Visiting Researcher**, Department of Social, Communication and Cognitive Sciences

2003	Santa Fe Institute, Santa Fe, New Mexico **Visiting Researcher**
2002 – 2003	Cap Gemini Ernst & Young Consumer Products/Retail/Distribution Practice **Statistics and Economics Consultant**
2001 – 2002	BiosGroup Inc., Santa Fe, New Mexico **Senior Scientist**
1997 – 2001	Cornell University, Ithaca, New York **Assistant Professor**, Graduate Field of Regional Science, Department of City and Regional Planning
1995 – 1997	Cornell University, Ithaca, New York **Instructor**, Department of City and Regional Planning
1989 – 1990	United Nations Observation Mission to the Electoral Process in Nicaragua, Esteli, Nicaragua **Field Coordinator**
1985 – 1988	United Nations High Commissioner for Refugees, Esteli, Nicaragua **Field Representative**

Research Affiliations

2016 – present	Affiliated Faculty Member, Centre for Entrepreneurship and Spatial Economics and Centre of Excellence for Science and Innovation Studies, Jönköping International Business School, Jönköping University (Jonkoping, Sweden)
2015 – present	Fellow, Arizona State University – Santa Fe Institute Center for Biosocial Complex Systems
2014 – present	Santa Fe Institute Working Group on Universals in Human Biosocial Organization
2014 – present	The Social Reactors Project: Human Settlements and Networks in History (University of Colorado-Boulder, Arizona State University and the Santa Fe Institute)
2013 – present	Santa Fe Institute Dynamics of Informal Settlements Project
2013 – present	Santa Fe Institute Working Group on Technological Change

2009 – present	Research Affiliate, Martin Prosperity Institute (MPI), Rotman School of Management, University of Toronto
2009 – present	Faculty Steering Committee, Center for Social Dynamics and Complexity, Arizona State University
2003 – 2006	Member, Information Society as a Complex System (ISCOM) Research Project, University of Modena and Reggio Emilia (Italy)
1999 – 2001	Faculty Steering Committee, Interdisciplinary Graduate Fellowships in Nonlinear Systems, Cornell University

Teaching Experience

- Undergraduate courses in applied mathematics, calculus, urban economics, statistics, econometrics, systems theory and complexity science.
- Graduate level courses in urban economics, economic growth theory, probability theory, statistics, and complexity science.

Papers

1. Frank, M.R., David Autor, James E. Bessen, Erik Brynjolfsson, Manuel Cebrian, David J. Deming, Maryann Feldman, Matthew Groh, José Lobo, Esteban Moro, Dashun Wang, Hyejin Youn, H., Iyad Rahwan (2019) Towards understanding the impact of AI on labor. P*roceedings of the National Academy of Sciences of the United States of America.* (https://doi.org/10.1073/pnas.1900949116)
2. Smith, Michael E., José Lobo (2019) Cities through the ages: one thing or many? (Forthcoming in *Frontiers of Digital Humanities.*)
3. Bettencourt, Luis M/A., José Lobo (2019) Quantitative Methods for the Comparative Analysis of Cities in History. (Forthcoming in *Frontiers of Digital Humanities.*)
4. Mellander, Charlotta, José Lobo (2019) Let's Stick Together: Labor Market Effects from Immigrant Neighborhood Clustering. (Forthcoming in *Environment and Planning A.*)
5. José Lobo, Luis M.A. Bettencourt, Michael E. Smith, Scott Ortman, S.G. (2018) Settlement Scaling Theory: Bridging the Study of Ancient and Contemporary Urban Systems. (Forthcoming in *Urban Studies*.)
6. Lobo, José, Deborah Strumsky, Charlotta Mellander (2018) As Different as Night and Day: Scaling Analysis of Swedish Urban Areas and Regional Labor Markets. (Forthcoming in in *Environment and Planning B.*)
7. Lobo, José, Todd Whitelaw, Luis M.A. Bettencourt Polly Wiessner, Scott Ortman, Michael Smith (2018) Scaling of Hunter Gatherer Camp Size Indicates a Major Transition in Human Sociality. (Under review in *Current Anthropology*.)
8. Cesaretti, Rudolf, José Lobo, Michael E. Smith, Luis M. A. Bettencourt (2018) Increasing Returns to Scale in the Provincial Towns of Tudor England. (Under review in *Explorations in Economic History*.)

9. Gómez-Liévano, Andrés, Vladislav Vysotsky, José Lobo (2018) Increasing returns to scale without sorting or agglomeration economies. (Under review in *Journal of Urban Economics*.)
10. Strumsky, Deborah, José Lobo (2018) Sources of Inventive Novelty: Two Patent Classification Schemas, Same Story. (Forthcoming in *Scientometrics*.)
11. Shutters, Shade, José Lobo, Deborah Strumsky, Charlotta Mellander, Luis Bettencourt, Matthias Brachert, Teresa Farinha, Rachata Muneepeerakul (2018) Urban Occupational Structures as Information Networks: Scaling of Network Density with Number of Occupations. *Plos One* 13(5): e0196915. https://doi.org/10.1371/journal.pone.0196915
12. Ossa, Alana, Michael Smith, José Lobo (2017) The Size of Plazas in Mesoamerican Cities: A Quantitative Analysis and Social Interpretation. *Latin American Antiquity*, 28: 457-475.
13. Brelsford, Christa, Luis Bettencourt, José Lobo, Joe Hand (2017) The Heterogeneity and Scale of Sustainable Development in Cities. *Proceedings of the National Academy of Sciences of the United States of America*, 114: 8963-8968.
14. Hanson, John W., Scott G. Ortman, José Lobo (2017) Urbanisation and the Division of Labour in the Roman Empire. *Journal of the Royal Society Interface*, 14: 1-12. DOI: 10.1098/rsif.2017.0367.
15. Smith, Michael E., José Lobo (2016) Comments on Urbanization, State Formation and Cooperation: a Reappraisal. *Current Anthropology*, 57: 485-486.
16. Mellander, Charlotta, Kevin Stolarick, José Lobo (2016) Distinguishing neighbourhood and workplace network effects on individual income: evidence from Sweden. *Regional Studies* doi:10.1080/00343404.2016.1236187.
17. Cesaretti, Rudolf, José Lobo, Luís M. A. Bettencourt, Scott Ortman, Michael Smith (2016) Population-Area Relationship in Medieval European Cities. *PLoS ONE* 11(10): e0162678. doi:10.1371/journal.pone.0162678.
18. Fragkias, Michail, José Lobo, Karen Seto (2016) A comparison of nighttime lights data for urban energy research: Insights from scaling analysis in the US system of cities. *Environment and Planning B*, doi: 10.1177/0265813516658477.
19. Ortman, Scott, Kaitlyn Davis, José Lobo, Michael Smith, Luis Bettencourt, Aaron Trumbo (2016) Settlement Scaling and Economic Change in the Central Andes. *Journal of Archaeological Science*. 73: 94-106.
20. Bettencourt, Luis M.A., José Lobo (2016) Urban Scaling in Europe. *Journal of the Royal Society Interface*, 13 20160005. DOI: 10.1098/rsif.2016.0005.
21. Youn, Hyejin, Luis Bettencourt, José Lobo, Deborah Strumsky, Horacio Samaniego, Geoffrey West (2016) Scaling and universality in urban economic diversification. *Journal of the Royal Society Interface*, 13: 20150937. DOI: 10.1098/rsif.2015.0937.
22. Shutters, Shade, Rachata Muneepeerakul, José Lobo (2016) How hard is it for urban economies to become "green"? *Environment and Planning B*, 43: 198-209.
23. Hamilton, Marcus J., José Lobo, Eric Rupley, Hyejin Youn, Geoffrey B. West (2016) The Ecology and energetics of hunter-gatherer residential mobility. *Evolutionary Anthropology*, 25: 124-132.
24. Mellander, Charlotta, José Lobo, Kevin Stolarick, Zara Matheson (2015) Night-Time Light Data: A Good Proxy Measure for Economic Activity? *Plos ONE* 10(10):e0139779. doi:10.1371/journal.pone.0139779
25. Shutters, Shade, Rachata Muneepeerakul, José Lobo (2015) Constrained pathways to a creative urban economy. *Urban Studies*, 53: 3439-3454.

26. Bettencourt, Luis M.A., Joe Hand, José Lobo (2015) Spatial Selection and the Statistics of Neighborhoods. Santa Fe Institute Working Paper #15-06-020. Santa Fe Institute. (Forthcoming in *Nature Human Behaviour*.)
27. Strumsky, Deborah, José Lobo (2015) Identifying the sources of technological novelty in the process of invention. *Research Policy*, 44: 1445-1461.
28. Youn, Hyejin, Deborah Strumsky, Luis Bettencourt, José Lobo (2015) Invention as a combinatorial process: evidence from U.S. Patents. *Journal of the Royal Society Interface*, 12: 20150272; DOI: 10.1098/rsif.2015.0272.
29. Shutters, Shade, Rachata Muneepeerakul, José Lobo (2015) Quantifying urban economic resilience through labor force interdependence. *Palgrave Communications*, 1: doi:10.1057/palcomms.2015.10.
30. Mellander, Charlotta, Kevin Stolarick, José Lobo, Deborah Strumsky (2014) The Inventive, the Educated and the Creative: How Do They Affect Metropolitan Productivity? *Industry and Innovation*, 21, 155-177.
31. Muneepeerakul, Rachatta, José Lobo, Shade Shutters, Andres Goméz-Liévano, Murad Qubbaj (2013) Urban Economies and Occupation Space: Can They Get "There' from 'Here"?, PLoS ONE 8(9): e73676. doi:10.1371/journal.pone.0073676.
32. Fragkias, Michail, José Lobo, Deborah Strumsky, Karen Seto (2013) Does Size Matter? Scaling of CO2 Emissions and U.S. Urban Area. *PLoS ONE* 8(6): e64727. doi:10.1371/journal.pone.0064727.
33. Lobo José, Bettencourt, Luis M.A, Strumsky, Deborah, West, Geoffrey (2013) Urban Scaling and the Production Function for Cities. *PLoS ONE* 8(3): e58407. doi:10.1371/journal.pone.0058407
34. Lobo, José, Jonathan Rothwell, Deborah Strumsky and José Lobo (2013) Scaling of patenting with urban population size: evidence from global metropolitan areas. *Scientometrics* doi: 10.1007/s11192-013-0970-3
35. Strumsky, Deborah, José Lobo, Sander van der Leeuw (2012) Using Patent Technology Codes to Study Technological Change. *Economics of Innovation and New Technology*, 21: 267-286.
36. Lobo, José, Joseph Tainter and Deborah Strumsky (2011) Productivity of Invention, in William Bainbridge, ed., *Leadership in Science and Technology: A Reference Handbook*, Sage Publishers.
37. Stolarick, Kevin, José Lobo and Deborah Strumsky (2011) Are Creative Metropolitan Areas Also Entrepreneurial? *Regional Science Policy & Practice*, 3: 271-286.
38. Bettencourt, Luis, José Lobo, Deborah Strumsky and Geoffrey West (2010) Urban Scaling and Its Deviations: Revealing the Structure of Wealth, Innovation and Crime across Cities. PLoS ONE 5(11): e13541. doi:10.1371/journal.pone.0013541.
39. Strumsky, Deborah, José Lobo and Joseph Tainter (2010) Complexity and the Productivity of Science. *Systems Research and Behavioral Science*, 27: 496-509.
40. Lobo, José and Michail Fragkias (2010) CO_2 emissions in U.S. counties: the importance and interplay of population size, income levels and industry composition. *UGEC Viewpoints*, March, 13-17.
41. Bettencourt, Luis, José Lobo and Geoffrey West (2008) Why are large cities faster? Universal scaling and self-similarity in urban organization and dynamics. *European Physical Journal B*, 63: 285-293.

42. Lobo, José and Deborah Strumsky (2008) Metropolitan patenting, inventor agglomeration and social networks: A tale of two effects. *Journal of Urban Economics*, 63: 871-884.
43. Bettencourt, Luis, José Lobo, Dirk Helbing, Christian Kühnert and Geoffrey West (2007) Growth, innovation, scaling and the pace of life in cities. *Proceedings of the National Academy of Sciences*, 104, 7301-7306.
44. Bettencourt, Luis, José Lobo and Deborah Strumsky (2007) Invention in the city: increasing returns to patenting as a scaling function of metropolitan size. *Research Policy*, 36: 107-120.
45. Pumain, Denise, Fabien Paulus, Céline Vacchiani-Marcuzzo and José Lobo (2006) An Evolutionary Theory for Interpreting Urban Scaling Laws. CyberGeo: Revue Européenne de Géographie (http://www.cybergeo.eu/index2519.html).
46. Lobo, José, Matthew Drennan and Deborah Strumsky (2004) An Application of the Unit Root Test to the Question of Income Convergence Across U.S. Metropolitan Areas. *Journal of Economic Geography*, 4: 583-595.
47. Deisboeck, Thomas, Mark Kimura, José Lobo and Yuri Mansury (2002) Emerging Patterns in Tumor Systems: Simulating the Dynamics of Multicellular Clusters with an Agent-Based Spatial Agglomeration Model. *Journal of Theoretical Biology*, 219, 343-370.
48. Drennan, Matthew, Shannon Larsen, José Lobo, Deborah Strumsky and Wahyu Utomo (2002) Sectoral Shares, Specialization and Metropolitan Wages in the United States, 1969-1996. *Urban Studies*, 39, 1129-1142.
49. Levitan, Bennett, José Lobo, Stuart Kauffman and Richard Schuler (2002) Evolution of Organizational Performance and Stability in a Stochastic Environment. *Computational and Mathematical Organization Theory*, 8, 281-313.
50. Lobo, José and David Smole (2002) Stratification and Spatial Segregation of Human Capital as Determinants of Metropolitan Productivity in the United States. *Urban Studies*, 39, 529-547.
51. Auerswald, Phillip, Stuart Kauffman, José Lobo and Karl Shell (2000) The Production Recipes Approach to Modeling Technological Innovation: An Application to Learning By Doing. *Journal of Economic Dynamics and Control*, 24, 389-450.
52. Bhatta, Saurav and José Lobo (2000) Human Capital and Per Capita Output: A Comparison of U.S. States. *Papers in Regional Science*, 79, 393 – 411.
53. Kauffman, Stuart José Lobo and William Macready (2000) Optimal Search on a Technology Landscape. *Journal of Economic Behavior and Organization*, 43, 141 – 166.
54. Drennan, Matthew and José Lobo (1999) A Simple Test for Convergence of Metropolitan Income in the United States. *Journal of Urban Economics*, 46, 350-359.
55. Lobo, José and Norma Rantisi (1999) Investment in Infrastructure as Determinant of Metropolitan Productivity. *Growth and Change: A Journal of Urban and Regional Policy*, 30, 106-127.
56. Isard, Walter and José Lobo (1998) Regional Transitions and Noise. *CyberGeo: Revue Européenne de Géographie* (http://www.cybergeo.eu/index346.html).

Working Papers, Reports and Book Chapters

1. Lobo, José (2019) Economic Growth in the Past: Empirics, not Ontology. In *Re-Framing the Northern Rio Grande Pueblo Economy*, Scott Ortman, ed. Tucson: University of Arizona Press (in press).
2. Bettencourt, Luis, Ann Beukes, José Lobo (2018) Producing and aggregating local knowledge in Joel Bolnick, Skye Dobson, Sheela Patel, Achilles Kallergis and Nancy MacPherson eds., *Know Your City: Slum Dwellers Count*. Cape Town: Slum Dwellers International and Rockefeller Foundation.
3. Tainter, Joseph, Deborah Strumsky, Temis Taylor, Michelle Arnold, José Lobo (2018) Depletion vs. Innovation: the Fundamental Question of Sustainability, in Angelo Tartaglia and Roberto Burlando, eds., Physical Limits to Economic Growth, New York: Routledge.
4. Lobo, José (2015) Urban Planning and Community Data Collection Efforts in the Developing World: Data as a Facilitator. *The Cities Papers*. (//citiespapers.ssrc.org/urban-planning-and-community-data-collection-efforts-in-the-developing-world-data-as-a-facilitator/)
5. Tainter, Joseph, Temis Taylor, Roslynn Brain, José Lobo (2015) Sustainability. in Emerging Trends in the Social and Behavioral Sciences (eds.) Robert Scott and Stephen Kosslyn, Hoboken, NJ: John Wiley and Sons.
6. Bettencourt, Luis M.A., José Lobo, Hyejin Youn (2013) The Hypothesis of Urban Scaling: Formalization, Implications and Challenges. Santa Fe Institute Working Paper 13-01-004.
7. Rothwell, Jonathan, José Lobo, Deborah Strumsky, Mark Muro (2013) Patenting Prosperity: Invention and Economic Performance in the United States and its Metropolitan Areas. Washington, D.C.: The Brookings Institution.
8. Lobo, José, Kevin Stolarick and Richard Florida (2010) Growth without Growth: Population and Productivity Change in U.S. Metropolitan Areas, 1980-2006. Martin Prosperity Institute Working Paper 2011-02-17. Martin Prosperity Institute, Rotman School of Management, University of Toronto.
9. Lobo, José, Deborah Strumsky and Luis Bettencourt (2009) Metropolitan Areas and CO2 Emissions: Large is Beautiful. Martin Prosperity Institute Working Paper 2009-MPIWP-006. Rotman School of Management, University of Toronto.
10. Bettencourt, Luis, José Lobo and Geoffrey West (2009) The self similarity of human social organization in cities. in David Lane, Denise Pumain, Sander van der Leeuw and Geoffrey West, editors, Complexity Perspectives in Innovation and Social Change. Berlin: Springer-Verlag.
11. Lobo, José, John Miller and Walter Fontana (2004) Neutrality in Technological Landscapes. (http://zia.hss.cmu.edu/miller/papers/neut.pdf)
12. Lobo, José and Deborah Strumsky (2003). If it isn't broken, don't fix it: extremal search on a technology landscape. Santa Fe Institute Working Paper 03-02-003.
13. Lobo, José and William Macready (1999) Landscapes: A Natural Extension of Search Theory. Santa Fe Institute Working Paper 99-05-037E.
14. Lobo, José and Richard Schuler (1997) Efficient Organization: Urban Hierarchies and Landscape Criteria. in Schweitzer, F. editor, *Self-Organization of Complex Structures: From Individual to Collective Dynamics*. London: Gordon and Breach.
15. Lobo, José (1995) Stochastic Fluctuations, Noise-Induced Transitions, and the Blowtorch Theorem: Does Noise Matter in Economics? in L. Nadel and D. L. Stein, editors, *1993*

Lectures in Complex Systems, SFI Studies in the Science of Complexity, Vol. VI, Reading, MA: Addison-Wesley.
16. Auerswald, Phil, Stuart Kauffman and José Lobo (1994) Diversity, Economic Webs and Growth. (http://ssrn.com/abstract=1460991).