

Raffaele Vardavas

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RAND Corporation
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Languages: English, Italian & Basic Greek

Education

Ph.D. Physics, Imperial College, London, 2002

M.Sci. Physics, Imperial College, London, 1998

Research Experience

Mathematician (Full)	2013-to date
Mathematician (Associate)	2008-2012
RAND	Santa Monica, CA

Selected projects include: Vaccination behavior models for influenza and smallpox outbreaks; Evolutionary Economic model of Climate Change and Lobbying; COMPARE: modeling and evaluating proposed changes to US health care system; Economics of Treating Viral STIs - constructing a transmission model of HIV; Modeling yearly health and cost burden of illicit drugs in the US; Healthcare workforce forecast for the Ministry of Health of Singapore; Modeling Income Tax Evasion in the U.S.; Multi-Agent AI for Agent-Based Models; Deep Generative Models of Social Networks.

Postdoctorate Researcher	2004-2008
UCLA	Disease Modeling Group

Modeling transmission dynamics of influenza and HIV using deterministic and stochastic methods.

Postdoctorate Researcher	2002-2004
UCLA	Department of Applied Mathematics

Modeling kinetic growth of atomic diffusion, nucleation and aggregation over stained surfaces.

Computer Skills

Programming languages: R, C/C++, FORTRAN, some Matlab and Java/MASON.
Symbolic-Mathematics Software: Mathematica.
Other Software: LaTeX, MS Office, etc.

Teaching Experience

Tutorial classes, Evolutionary Complex Socio-economic Systems, RAND Corporation 2013
Teaching Assistant, Mathematical Finance, University of California, Los Angeles, 2003
Teaching Assistant, Statistical Mechanics, Imperial College, 2000

Enterprises

Advisory Board	2016-to date
Create Cures Foundation	Los Angeles, USA

The Create Cures Foundation is engaged in fundraising to support research aimed at rapidly developing inexpensive, creative, integrative therapies for the treatment of serious diseases and the identification of strategies to prevent illness and promote longer, healthier lives. <https://createcures.org/>

Board of Directors 2009-2015
L-Nutra Los Angeles, USA
A spin-off of the University of Southern California, formed in 2009 to develop, manufacture and market medical food for the protection against aging and age-related diseases, with initial focus on cancer and chemotherapy treatment. <http://www.l-nutra.com/>

Co-founder 2001-2009
Quantnotes.com London, UK
An educational website on mathematical finance that aims to support the understanding of financial derivatives for researchers, practitioners and those interested in quantitative finance.
Traffic during operational period: 10,000 weekly sessions.

Publications in Peer-Reviewed Journals

Wändi Bruine de Bruin, Andrew M Parker, Mirta Galesics, **Raffaele Vardavas**
The role of social circle perceptions in 'false consensus' about population statistics: Evidence from a national flu survey *Medical Decision Making* November 2019

Michael Johansson, Karyn M Apfeldorf, Scott Dobson, ... **Raffaele Vardavas** (81 authors)
An open challenge to advance probabilistic forecasting for dengue epidemics *Proceedings of the National Academy of Sciences* November 2019 DOI: 10.1073/pnas.1909865116

Wändi Bruine de Bruin, Andrew M Parker, Mirta Galesics, **Raffaele Vardavas**
Reports of social circles' and own vaccination behavior: A national longitudinal survey *Health Psychology* April 2019 DOI: 10.1037/hea0000771

Drabo, Emmanuel.; Hay, Joel W.; **Vardavas, Raffaele.**; Wagner, Zachary.; Sood, Neeraj. A cost-effectiveness analysis of preexposure prophylaxis for the prevention of HIV among Los Angeles county men who have sex with men *Clinical Infectious Diseases* v. 63, no. 11, Dec. 2016, p. 1495-1504

Steven Isley, Robert Lempert, Steven Popper, **Raffaele Vardavas** The Effect of Near-Term Policy Choices on Long-Term Greenhouse Gas Transformation Pathways *Global Environmental Change*, Volume 34, September 2015, Pages 147-158

Risa M. Hoffman, Amber Jaycocks, **Raffaele Vardavas**, Glenn Wagner, Jordan Lake, Deborah Mindry, Judith Currier, Raphael J. Landovitz. Benefits of PrEP as an adjunctive method of HIV prevention during attempted conception between HIV-uninfected women and HIV-infected male partners *Journal of Infectious Diseases*, 2015 June 19. pii: jiv305. [Epub ahead of print]

EF Drabo, JW Hay, **R Vardavas**, Z Wagner, N Sood PIN54-Rolling Out Oral Pre-Exposure Prophylaxis (Prep) Is a Cost-Effective HIV Prevention Strategy Among the Los Angeles County (LAC) Men Who Have Sex With Men (MSM) *Value in Health* 18 (3), A237, 2015

Amado Cordova, **Raffaele Vardavas**, James Broyles, Christine Eibner, Federico Girosi. Modeling Employer Self-Insurance Decisions After the Affordable Care Act *Health Services Research*, - Manuscript HSR-11-0568.R1 2013 Apr;48(2 Pt 2):850-65.

Sood N, Wagner Z, Jaycocks A, Drabo E, **Vardavas R.** Test-and-Treat in Los Angeles: A Mathematical Model of the Effects of Test-and-Treat for the Population of Men Who Have Sex With Men in Los Angeles County. *Clin Infect Dis.*, 2013 Jun;56(12):1789-96.

Parker AM, **Vardavas R**, Marcum CS, Gidengil CA. Conscious consideration of herd immunity in influenza vaccination decisions. *Am J Prev Med.* 2013 Jul;45(1):118-21.

Christine Eibner, Carter Price, **Raffaele Vardavas**, Amado Cordova, Federico Giroi. Small firms' actions in two areas, and exchange premium and enrollment impact. *Health Affairs*, v. 31, no. 2, Feb. 2012, p. 324-331

Raffaele Vardavas, Romulus Breban, and Sally Blower. A universal long-term flu vaccine may not prevent severe epidemics. *BMC Res Notes*, 3:92, 2010.

Romulus Breban, Virginie Supervie, Justin T Okano, **Raffaele Vardavas**, and Sally Blower. Is there any evidence that syphilis epidemics cycle? *The Lancet Infectious Diseases*, 8(9):577 – 581, 2008.

Kevin A Fenton, Romulus Breban, **Raffaele Vardavas**, Justin T Okano, Tara Martin, Sevgi Aral, and Sally Blower. Infectious syphilis in high-income settings in the 21st century. *The Lancet Infectious Diseases*, 8(4):244 – 253, 2008.

Sally Blower and **Raffaele Vardavas**. Treatment equity & the HIV epidemic in Africa. *Nuntium*, 34, 2008.

Romulus Breban, **Raffaele Vardavas**, and Sally Blower. Theory versus data: How to calculate R_0 ? *PLoS ONE*, 2(3):e282, Mar 2007.

Raffaele Vardavas and Sally Blower. The emergence of HIV transmitted resistance in Botswana: When will the WHO detection threshold be exceeded? *PLoS ONE*, 2(1):e152, Jan 2007.

Romulus Breban, **Raffaele Vardavas**, and Sally Blower. Mean-field analysis of an inductive reasoning game: Application to influenza vaccination. *Physical Review E (Statistical, Nonlinear, and Soft Matter Physics)*, 76(3):031127, 2007.

Raffaele Vardavas, Romulus Breban, and Sally Blower. Can influenza epidemics be prevented by voluntary vaccination? *PLoS Comput Biol*, 3(5):e85, May 2007.

X. Niu, **R. Vardavas**, R. E. Caflisch, and C. Ratsch. Level set simulation of directed self-assembly during epitaxial growth. *Physical Review B (Condensed Matter and Materials Physics)*, 74(19):193403, 2006.

C. Ratsch, Y. Landa, and **R. Vardavas**. The asymptotic scaling limit of point island models for epitaxial growth. *Surface Science*, 578(1-3):196 – 202, 2005.

Romulus Breban, **Raffaele Vardavas**, and Sally Blower. Linking population-level models with growing networks: A class of epidemic models. *Physical Review E (Statistical, Nonlinear, and Soft Matter Physics)*, 72(4):046110, 2005.

R. Vardavas, C. Ratsch, and R.E. Caflisch. Submonolayer growth in the presence of defect sites. *Surface Science*, 569(1-3):185 – 192, 2004.

Paola Fabrizio, Luisa Battistella, **Raffaello Vardavas**, Cristina Gattazzo, Lee-Loung Liou, Alberto Diaspro, Janis W. Dossen, Edith Butler Gralla, and Valter D. Longo. Superoxide is a mediator of an altruistic aging program in *saccharomyces cerevisiae*. *J. Cell Biol.*, 166(7):1055–1067, 2004.

Chiara Baggio, **Raffaele Vardavas**, and Dimitri D. Vvedensky. Fokker-Planck equation for lattice deposition models. *Phys. Rev. E*, 64(4):045103, Sep 2001.

RAND Reports

Taxpayers' misperceptions and two novel behavioral interventions to counter tax evasion Aliyev, Gursel.; Parker, Andrew M.; **Vardavas, Raffaele**; Linnemayr, Sebastian; Bloomquist, Kim
Report Number: RAND/RGSD-435 2019

Medicare for 50-to-64-year-olds: assessing the effects of allowing older adults to buy into the Medicare program. Eibner, Christine.; **Vardavas, Raffaele**.; Nowak, Sarah; Liu, Jodi L.; Rao, Preethi.
Report Number: RAND/RR-4246-AARP 2019

RAND's interdisciplinary behavioral and social science agent-based model of income tax evasion: technical report. **Vardavas, Raffaele**.; Katkar, Pavan; Parker, Andrew M.; Aliyev, Gursel.; Graf, Marlon.; Kumar, Krishna B.
Report Number: RAND/WR-1322 2019

Increasing cost-effective readiness for the U.S. Air Force by reducing supply chain variance: technical analysis of flying hour program variance. Mills, Patrick H.; Nowak, Sarah.; Buryk, Peter.; Drew, John G.; Guo, Christopher.; **Vardavas, Raffaele**.
Report Number: RAND/RR-2118-AF 2018

Improving decision support for infectious disease prevention and control: aligning models and other tools with policymakers' needs. Manheim, David.; Chamberlin, Margaret.; Osoba, Osonde A.; **Vardavas, Raffaele**.; Moore, Melinda.
Report Number: RAND/RR-1576-OSD 2016

Assessing the Department of Defense's approach to reducing mental health stigma. Acosta, Joie D.; Becker, Amariah.; Cerully, Jennifer L.; Fisher, Michael P.; Martin, Laurie T.; **Vardavas, Raffaele**.; Slaughter, Mary Ellen.; Schell, Terry L.
Report Number: RAND/RB-9881-OSD 2016

Estimating the economic costs of antimicrobial resistance. Taylor, Jirka; Hafner, Marco.; Yerushalmi, Erez.; Smith, Richard.; Bellasio, Jacopo.; **Vardavas, Raffaele**.; Bienkowska-Gibbs, Teresa.; Rubin, Jennifer.
Report Number: RAND/RR-911-WT 2014

An Evolutionary Model of Industry Transformation and the Political Sustainability of Emission Control Policies. Isley, Steven C., Robert J. Lempert, Steven W. Popper and **Raffaele Vardavas**.
Report Number: RAND/TR-1308 2013

Mental health stigma in the military. Becker, Amariah.; Cerully, Jennifer L.; Fisher, Michael P.; Martin, Laurie T.; **Vardavas, Raffaele**.; Slaughter, Mary Ellen.;
Report Number: RAND/RR-426 2013

Employer self-insurance decisions and the implications of the Patient Protection and Affordable Care Act as modified by the Health Care and Education Reconciliation Act of 2010 (ACA) Eibner, Christine; Girosi, Federico; Miller, Amalia R; Cordova, Amado; McGlynn, Elizabeth A; Pace, Nicholas M ; Price, Carter C; **Vardavas, Raffaele**; Gresenz, Carole R.
Report Number: RAND/TR-971-DOL 2011

Overview of the COMPARE microsimulation model
Bertko, John; Buntin, Melinda Beeuwkes; Cordova, Amado; Eibner, Christine; Girosi, Federico; Gresenz, Carole R.; Keeler, Emmett B; Ringel, Jeanne S; Sullivan, Jeffery; **Vardavas, Raffaele**
Report Number: RAND/WR-650 2009

Peer-Reviewed Publications in Books

O'Mahony, Angela.; Davis, Paul K.; Appling, Scott; Brashears, Matthew E.; Briscoe, Erica; Carley, Kathleen M.; Epstein, Joshua M.; Matthews, Luke Joseph.; Pavlic, Theodore P.; Rand, William.; Reilly, Scott Neal; Rouse, William B.; Swarup, Samarth; Tolk, Andreas; **Vardavas, Raffaele.**; Yilmaz, Levent

Chapter Title: *Social-Behavioral Modeling for Complex Systems, Chapter 33*

Doc # EP-67899

John Wiley & Sons Inc. 2019

ISBN 13: 9781119484967 ISBN 10: 1119484960 doi: 10.1002/9781119485001.ch33

R. Vardavas and C.S. Marcum

Chapter Title: *Modeling influenza vaccination behaviour via inductive reasoning games*, Book Title: *Modeling the Interplay between Human Behavior and the Spread of Infectious Diseases*.

Book Editors: Piero Manfredi, Alberto d'Onofrio

Springer Series on Behavioral Epidemiology.

Springer New York, 2013. ISBN 978-1-4614-5474-8

D.D. Vvedensky, C. Baggio, A. Chua, C. Haselwandterand, and **R. Vardavas**.

Recent Advances in Scientific Computing and Partial Differential Equations: Stochastic differential equations for driven lattice systems,

Volume 330 of *Contemporary Mathematics Series*. American Mathematical Society, Providence, Rhode Island, 2003. ISBN 0-8218-3155-0.

Letters and Comments in Peer-Reviewed Journals

Sood N, Wagner Z, Jaycocks A, Drabo E, **Vardavas R**. Reply to Gonzalez-Serna et al. *Clin Infect Dis.*, 2013 May 21

Romulus Breban, **Raffaele Vardavas**, and Sally Blower. Reply to “comment on ‘linking population-level models with growing networks: A class of epidemic models’ ”. *Physical Review E (Statistical, Nonlinear, and Soft Matter Physics)*, 74(1):018102, 2006.

D. D. Vvedensky, C. Ratsch, F. Gibou, and **R. Vardavas**. Singularities and spatial fluctuations in submonolayer epitaxy. *Phys. Rev. Lett.*, 90(18):189601, May 2003.

Ph.D. Thesis

Fluctuations and scaling in 1D irreversible film growth models,

Imperial College of Science, Technology and Medicine, London, Spring 2002;

Ph.D. Advisor: Prof. Dimitri Vvedensky.

Conference Presentations

INFORMS Annual Meeting, Houston , Texas October 22-25. Contributed talk on “Perceptions of Income Tax Evasion and Tax Moral: A survey to inform an agent-based model”.

Agent-Based Modeling (ABM) 17: A Symposium That Advances the Science of ABM, San Diego, CA, April 20-22, 2017 , poster on “Perceptions of Income Tax Evasion and Tax Moral: A survey to inform an agent-based model”.

INSNA Sunbelt 2016, Newport Beach , CA, April 4 -April 9 2016, poster on “RAND-Net: A new versatile tool for network analysis and visualization”.

The Computational Social Science Society of the Americas, Santa Fe, NM, October 29 -November 1 2015, poster on “The Interplay between Influenza Epidemiology and Vaccination Behavior: An inductive reasoning game approach with Social Networks”.

NAKFI Conference on Collective Behavior: From Cells to Societies, Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering, Irvine, CA, November 13-15 2014, poster on “The Interplay between Influenza Epidemiology and Vaccination Behavior: An inductive reasoning game approach with Social Networks”.

The Jacob Marschak Interdisciplinary Colloquium on Mathematics in the Behavioral Sciences, University of California in Los Angeles (UCLA), January 11 2013, Invited talk on “Modeling influenza vaccination behavior via inductive reasoning games”.

European Conference on Mathematical and Theoretical Biology, Krakow, Poland, June/July 2011, Invited talk on “Modeling Adaptive Behavior in Influenza Vaccination Decisions”.

SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2009, Contributed talk on “Modeling Control Measures of Smallpox Attack Outbreaks”.

INFORMS Regional Conference, Phoenix, AZ, April 2009, Contributed talk on “Controlling Smallpox Outbreaks using Therapeutics and Vaccination”.

LANL Risk Symposium, Santa Fe, NM, April 2009, Contributed talk on “Controlling Smallpox Outbreaks using Therapeutics and Vaccination”.

SIAM/SMB Conference on Life Sciences, Raleigh, NC, July/August 2006, Invited talk on “Controlling Influenza Epidemics via Public Health Vaccination Incentives”.

European HIV Drug resistance conference, Monte Carlo, Monaco, March 2006, poster on “The WHO surveillance threshold and the emergence of drug-resistant HIV strains in Botswana”.

Conference on Retroviruses and Opportunistic Infections, Denver, CO, February 2006, “Stochastic Evolution of Drug-resistant Strains of HIV in Botswana”.

American Physical Society, Annual APS Meeting, Austin, TX, March 2003, Contributed talk on “Scaling and Growth in the presence of point defects”.

NanoTech, San Francisco, CA, February 2003, poster on “Scaling and Growth in the presence of point defects”.

Material Research Society, Fall Meeting, Boston, MA, December 2002, Contributed talk on “Scaling and Growth in the presence of point defects”.

Workshops/Courses attended

An Industrial Short Course on Deep Learning and the Latest AI Algorithms, Institute of Pure and Applied Mathematics, University of California in Los Angeles (UCLA), May 16 -17 2019.

Introduction to Python, DataCamp May 15 2019.

Unsupervised Learning in R, DataCamp May 2 2019.

Structural Equation Modeling with lavaan in R, DataCAMP April 24 2019.

Introduction to Egocentric Network Data Analysis with ERGMs and TERGMs Using statnet, INSNA Sunbelt, Newport Beach, CA, April 5 2016.

Exponential Family Random Graph Modeling (ERGMs) Using statnet, INSNA Sunbelt, Newport

Beach, CA, April 5 2016.

Grants Awarded as PI or co-PI

Modeling the Coupled Dynamics of Influenza Transmission and Vaccination Behavior R01: NIAID/NIH (R01 AI118705-01A1) Raffaele Vardavas & Andy Parker (PIs) <i>Amount awarded: \$2,200,000</i>	2016-2021
Agent-Based Model of the Role of Perceptions in Income Tax Evasion NSF/ Interdisciplinary Behavioral and Social Sciences Research competition (1519116) R.Vardavas (PI) <i>Amount awarded: \$605,844</i>	2015-2017
A Focus Group and a Survey Study on the adoption of Nanovaccines for Seasonal Influenza Vaccination. Nanovaccine Consortium R.Vardavas (PI) <i>Amount awarded: \$40,000</i>	2015-2016
Health Outcomes, Risk Perceptions and Preventive Behavior on Social Networks R21: NIH (5R21CA157571-02.) R.Vardavas (PI) and S. Nowak (co-PI) <i>Amount awarded: \$415,295</i>	2011-2013
Control and Prevention of Infectious Diseases. National Academies Keck Futures Initiatives. S. Blower (co-PI), R. Breban (co-PI) and R. Vardavas (co-PI). <i>Amount awarded: \$75,000</i>	2006

Major contributions to other Grants Awarded

Microsimulation of Obesity Policies R01: NIH (1R01HD087257-01) Roland Sturm & Franco Sassi (PIs) <i>Amount awarded: \$2,791,647</i>	2016-2021
International Alcohol Policy Model R01: NIAAA/NIH (1R01AA022132-01A1) Rosalie Pacula & Franco Sassi (PIs) <i>Amount awarded: \$2,679,116</i>	2014-2019
Economics of treating Viral STIs R01: NIAID/NIH (R01HD054877) Goldman & Sood (PIs) <i>Amount awarded: \$1,848,238</i>	2009-2013

Advisor on RAND Ph.D. Theses

Aliyev, Gursel
Taxpayers' misperceptions and two novel behavioral interventions to counter tax evasion

RAND/RGSD-435
2019

Azhar, Gulrez
Indian summer: three essays on heatwave vulnerability, estimation and adaption,
RAND/RGSD-431
2019

Go, Myong-Hyun
Structures and Dynamics of Social Networks: Selection, Influence, and Self-Organization.
RAND/RGSD263
2010