January 15, 2022

Ms. Elisa Pepe
Grant Administrator
National Bureau of Economic Research
1050 Massachusetts Ave.
Cambridge, MA 02138

Dear Ms. Pepe:

I respectfully write to you today to be considered for the *Mentoring Program to Support NSF Grant Proposals by MSI Faculty*.

My contact information is the following:

Eduardo Zambrano
Professor of Economics, Orfalea College of Business, Cal Poly
1 Grand Ave.
San Luis Obispo, CA 93407.
Email: ezambran@calpoly.edu
Website: https://eduardo-zambrano.github.io/

I do research on game theory, decision theory, general equilibrium theory, welfare economics and political economy. As of late, my focus has been the measurement of multidimensional inequality and well-being, using tools from welfare economics.

I have no history of applying to grants outside of my home institution.

The senior administration from my university who can attest to the presence of institutional support for grant applications to the NSF and other entities is the Associate Vice President for Research Administration: Amy Velasco. She can be reached by email at: aevelasc@calpoly.edu.

Please do not hesitate to contact me if you have any questions about my application.

Sincerely,



Eduardo Zambrano
Professor of Economics
Cal Poly – San Luis Obispo

Eduardo Zambrano

Curriculum Vitae - January 2022

Department of Economics
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ACADEMIC POSITIONS

Sept. 2015 – *California Polytechnic State University*, San Luis Obispo
Professor of Economics. Orfalea College of Business.

Sept. 2007 – Aug. 2015 *California Polytechnic State University*, San Luis Obispo
Associate Professor of Economics. Orfalea College of Business.

Aug. 1999 – Aug. 2007 *University of Notre Dame*
Assistant Professor of Economics, Mendoza College of Business (On leave during the academic years 2002-2004).

EDUCATION

1994-1999 *Cornell University*
Ph.D., Department of Economics.

1993-1994 *Harvard University*
Special Student. Graduate School of Arts and Sciences.

1986-1993 *Universidad Católica Andrés Bello,* Venezuela.
BA in Economics.

PUBLICATIONS

"Monotone Comparative Statics in the Calvert-Wittman Model," *Economic Theory Bulletin*, forthcoming.

"Tracking progress towards accessible, green and efficient energy: The Inclusive Green Energy Index," with Carmen Herrero, José Pineda and Antonio Villar, *Applied Energy*, 279, December, 2020.

"Risk Attitudes over Small and Large Stakes Recalibrated," *Economics Letters,* 187, February, 2020.

"The Green Economy Progress Measurement Framework: A Didactic Introduction (with C. Herrero, J. Pineda and A. Villar), in Eaton, D. and Sheng, F. (eds.), *Inclusive Green Economy: Policies and Practice*. Dubai, Shanghai:

Zayed International Foundation for the Environment and Tongji University, 2019.

"Rationality, Strategic Uncertainty and Belief Diversity in Non-Cooperative Games," *International Journal of Economic Theory*, 14(4), December, 2018.

"Public Economies and the Endogenous Choice of Institutions," with Patrick Holder. *Homo Oeconomicus*, 35(3), September, 2018.

"Should a Central Bank Transfer its Profits to the Treasury?," with Fernando Álvarez-Parra and Adriana Arreaza, *Economía*, 18(2), Spring, 2018.

"A 'Rights-Based' Approach to Optimal Tax Policy," in A. Mishra and T. Ray (eds.) *Markets, Governance and Institutions in the Process of Economic Development*, Ch. 19, Oxford University Press, 2018.

"The 'Troubling Tradeoffs' Paradox and a Resolution," *Review of Income and Wealth*, 63 (3), September, 2017.

"Solving the Kidney Shortage via the Creation of Kidney Donation Cooperatives," with KC Eames and Patrick Holder, *Journal of Health Economics*, 54, July, 2017.

"`Vintage' Nash Bargaining Without Convexity," *Economics Letters*, 141, 2016.

"Subtle Price Discrimination and Surplus Extraction Under Uncertainty," *Journal of Mathematical Economics*, 52, 2014.

"An Axiomatization of the Human Development Index," *Social Choice and Welfare*, 42(4), 2014.

"A Structuralist Theory of Central Bank Independence," *Economics Bulletin*, 34(4), 2014.

Measuring Key Disparities in Human Development: The Gender Inequality Index (with A. Gaye, J. Klugman, M. Kovacevic and S. Twigg), in D. Figart and T. Warnecke (eds.), *Handbook of Research on Gender and Economic Life*, Edward Elgar Publishers, 2013.

"Expected Utility Inequalities: Theory and Applications," *Economic Theory*, 36(1), 2008.

"Epistemic Conditions for Rationalizability," *Games and Economic Behavior*, 63(1), 2008.

"Testable Implications of Subjective Expected Utility Theory," *Games and Economic Behavior*, 53(2), 2005.

"Counterfactual Reasoning and Common Knowledge of Rationality in Normal Form Games," *Topics in Theoretical Economics*, 4(1), 2004.

"The Interplay Between Analytics and Computation in the Study of Congestion Externalities: The Case of the El Farol Problem," *Journal of Public Economic Theory*, 6(2), 2004.

"Authority, social theories of." Prepared, by invitation, for the *International Encyclopedia of the Social and Behavioral Sciences*, 2001.

"A Simple Test of the Law of Demand for the United States," with Timothy Vogelsang, *Econometrica 68 (4)*, 2000.

"Formal Models of Authority: Introduction and Political Economy Applications," *Rationality and Society 11(2)*, 1999.

"On the Emergence of the Market Pattern," *Journal of Institutional and Theoretical Economics 154(3)*, 1998.

BOOKS

Probability Models for Economic Decisions, 2nd edition, with Roger B. Myerson, MIT Press, 2019.

WORKING PAPERS

"Protected Income and Inequality Aversion," with Marc Fleurbaey.

"Fair and Efficient Overhead Allocation in Multi-Division Organizations."

"Risk Aversion on Growth Rates."

"Risk-Reward Representations of Expected Utility Theory," with Hayley Stevens.

"`Polity' Human Development Indices."

WORKS IN PROGRESS

"Treatment Effects in the Presence of Skewed and Fat Tailed Data," with Jack Keefer.

"Tenure Density Calibrated and Recalibrated," with Amory Yagar.

"Equilibrium Existence in the Calvert-Wittman Model: A Toolkit," with Christopher Almacen.

RESEARCH INTERESTS

Microeconomic Theory, Decision Theory, Game Theory, Welfare Economics, Political Economy.

PRESENTATIONS IN PROFESSIONAL MEETINGS

2019 European Meeting of the *Econometric Society*, August. Manchester, UK.

2017 *Association for Public Economic Theory Annual Conference,* July, Paris.

2016 *Expert Group Meeting on Gender Inequality in Social Institutions,* OECD, September, Paris.

2015 *Expert Group Meeting on Gender Inequality in Human Development,* UN Development, June. Reykjavik.
Second Green Economy Progress Index Workshop, UN Environment, June. Geneva.
First Green Economy Progress Index Workshop, UN Environment, April. Geneva.
South West Economic Theory Conference, University of Arizona, March.

2013 *Association for Public Economic Theory Annual Conference,* July, Lisbon.
International Economic Development and the Promotion of Human Rights: Finding Harmony and Measuring Progress to Achieve Human Development, DePaul University College of Law, April, Chicago.
Second Conference on Measuring Human Development Progress, UN Development, March. New York.
Seminar on Measurement of Sustainable Human Development, French Agency for Development/UN Development, January. Paris.

2012 *Seminar on Sustainability and Measurement of Human Progress*, UN Development, May, New York.
Conference on Measuring Human Development Progress, UN Development, January. New York.

2009 European Meeting of the *Econometric Society*, August. Barcelona, Spain.
South West Economic Theory Conference, Caltech, March.

2008 European Meeting of the *Econometric Society*, July. Milan, Italy.
Third World Meeting of the *Game Theory Society*, July. Evanston, Illinois.

2006 Latin American Meeting of the *Econometric Society,* November. Mexico City, Mexico.
Latin American and Caribbean Economics Association Annual Meeting, November. Mexico City, Mexico.
Australasian Meeting of the *Econometric Society,* July. Alice Springs, Australia.
North American Meeting of the *Econometric Society,* Minnesota, June.
Midwest Economic Theory Conference, Michigan State, May.

2005 *Midwest Economic Theory Conference*, Vanderbilt, May.

2002 First Brazilian Workshop of the *Game Theory Society*.

2001 Latin American Meeting of the *Econometric Society,* July. Buenos Aires, Argentina.
Midwest Economic Theory Conference, May. Wisconsin, Madison.
Winter meeting of the *Econometric Society*, January. New Orleans, Louisiana.

2000 First World Meeting of the *Game Theory Society*, July. Bilbao, Spain.
Midwest Economic Theory Conference, May. Lexington, Kentucky.

1997 Conference organized by the *Central Bank of Venezuela*, December. Caracas, Venezuela.
European Meeting of the *Econometric Society,* August. Toulouse, France.
Latin American Meeting of the *Econometric Society*, August. Santiago, Chile.
Meeting of the *Latin American Law and Economics Association*, June. Caracas, Venezuela.

1996 Annual Conference of the *Association of Economic Theory of Southern Europe* (ASSET), November. Alicante, Spain.
Santa Fe Institute Graduate Workshop in Computational Economics, June-July. Santa Fe, New Mexico.

1995 Annual Conference of the *Society for the Advancement of Behavioral Economics,* August. Toronto, Canada.

PRESENTATIONS IN SEMINARS

Princeton University, UC-Santa Barbara, George Washington University, Cornell University, UN Development, ASU, AQR Capital, UC-Santa Barbara, UC-Davis, University of Notre Dame, Claremont McKenna, Cal Poly, Wesleyan University, Purdue, Cornell University, UC-Irvine, Tor Vergata University, Central Bank of Venezuela, Purdue, IESA, UC-Irvine, University of Notre Dame, University of Rochester, Erasmus University, CIDE, ITAM, El Colegio de México, Universidad de Alicante, Cornell University.

INVITED LECTURES

2003 "Industrial Organization and Game Theory," Tor Vergata University, Italy, December.

2001 "The Tension Between Prediction and Optimization in Games," Cornell University, April.

NON-ACADEMIC WORK EXPERIENCE

2021- WORLD BANK
Consultant for the development of a multidimensional mobility indicator on gender.

2017 *UN Women*
Consultant for the development of a monitoring methodology for *Sustainable Development Goal 5.1:* End all forms of discrimination against all women and girls everywhere.

2016-2017 *Organization for Economic Cooperation and Development (OECD)*
Consultant for the redesign of the *Social Institutions and Gender Index*.

2014-2016 *UN Environment*
Consultant for the development of the *Green Economy Progress Index*.

2010-2013 *UN Development*
Consultant for the development of the *Gender Inequality Index* and the redesign of the *Human Development Index*.

2003-2004 *Central Bank of Venezuela*
Senior Economist. Economic Research Department.

2002-2003 *Congressional Budget Office, Venezuela*
Junior Economist.

1989-1991 *Banco de Venezuela*
Strategic Planning Manager at the Vice Presidency for Financial Planning.

VISITING POSITIONS

2019 *Princeton University*
Visiting Scholar. Spring, 2019.

2012 *George Washington University*
Visiting Scholar. Winter, 2012.

2011 *Cornell University*
Visiting Scholar. Department of Economics. Fall, 2011.

2009 *New York University*
Visiting Scholar. Stern School of Business. Summer, 2009.

AWARDS AND FELLOWSHIPS

2015 –2018 *California Polytechnic State University*, San Luis Obispo
Jacobsen Faculty Fellow. Orfalea College of Business.

1993 Scholarship for pursuing Ph.D. studies in Economics. Awarded by *Fundación Gran Mariscal de Ayacucho* (a Venezuelan-based institution), and administered by the *Latin American Scholarship Program for American Universities (LASPAU)*.

1986 XI National Mathematical Olympics. Third prize. Organized by the *National Center for the Natural Sciences*, Venezuela.

1984 IX National Mathematical Olympics. Second prize.

PROFESSIONAL ACTIVITY

Member of the External Review Committee for CIDE, México, 2011-2014.

Member of the Editorial Board of the *Latin American Economic Review,* since 2013.

Member of the Econometric Society.

Refereeing services for the *American Economic Review, Econometrica*, the *Journal of Economic Theory*, *Games and Economic Behavior*, *Journal of Mathematical Economics, Journal of Health Economics*, *Social Choice and Welfare, International Journal of Game Theory, Mathematical Social Sciences*, *Theory and Decision*, *Journal of Public Economic Theory*, *Synthese*, *Economics Letters*, *Economics and Philosophy*, *One Earth*, the *BE Journals in Theoretical Economics*, the *International Journal of Economic Theory*, *Games*, *Economic History Review*, *Journal of Development Studies*, *Homo Oeconomicus*, the *Review of International Economics*, the *Review of Income and Wealth*, the *Journal of Institutional and Theoretical Economics,* the *Eastern Economic Journal*, the *Cambridge Journal of Economics*, the *Journal of Human Development and Capabilities*, the *Southern Economic Journal*, *Economics Bulletin*, *Finance Review Letters*, *Group Decisions and Negotiations, Feminist Economics, Estudios Económicos* and *Temas de Coyuntura*.

Research proposal evaluation services for the *National Science Foundation* (US) and the *Social Science and Humanities Research Council* (Canada).

REFERENCES

Kaushik Basu
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PROJECT: Bayesian estimation of egalitarian-equivalent treatment effects

In a Randomized Control Trial (*RCT*), the data from the trial allows the identification of the two distributions, $F_1(Y_1)$ and $F_0(Y_0)$ of outcomes Y_1 and Y_0 in the treated and untreated cases within the given sample $y_1 = (y_{11}, \dots, y_{1N_1})$ and $y_0 = (y_{01}, \dots, y_{0N_0})$. Let $y = (y_1, y_0)$. When evaluating the causal effect of the treatment, the effect is typically evaluated by computing $\bar{y}_1 - \bar{y}_0$ to estimate $E(Y_1) - E(Y_0)$. In many situations, however, researchers are interested in features of the distribution of outcomes beyond the average. For example, a researcher may want to track how a policy affects the 90/10 ratio, the median, or some other quantile of the outcome distribution. Furthermore, the researcher may want to summarize the effect of the intervention on the entire distribution by computing and comparing the *quasi-arithmetic mean,* $M(Y_i)$, of the distribution of outcomes before and after the treatment.[1] The specific quasi-arithmetic mean to be computed can be chosen so that it is more sensitive than the arithmetic mean to what occurs in certain parts of the distribution of outcomes, and in Welfare Economics is known as the 'egalitarian-equivalent' of the distribution of outcomes (a concept similar to the notion 'certainty-equivalent' from expected utility theory). The calculation can, for example, penalize a treatment that has a favorable (arithmetic) mean effect that is solely due to what happens at the top of the distribution of outcomes. For an *inequality averse* quasi-arithmetic mean, we have that $M(Y_i) \leq E(Y_i)$. Let μ_i^{ee} denote $M(Y_i)$.

While one can use the empirical distribution of outcomes to arrive at a point estimate of the egalitarian-equivalent measure, μ_i^{ee}, this methodology would leave the researcher with no way of quantifying the uncertainty inherent in such point estimate. To address this shortcoming, I plan to extend Kruschke 2013's[2] Bayesian approach to the estimation of treatment effects in several directions:

1. Select the egalitarian equivalent outcome measure, μ_i^{ee}, to be computed by identifying the normative principles (e.g., inequality aversion and others) the researcher wishes the measure to satisfy, as in Fleurbaey and Zambrano 2022.[3]

2. Develop a Bayesian model of the treatment effect that allows for the distribution of the outcome variable before and after the treatment to be skewed and have fat tails, as in Keefer and Zambrano 2022.[4] I then specify priors on the parameters of this distribution, adapting ideas from Kruschke and Meredith 2021.[5] This structure induces a prior probability distribution P on μ_1^{ee} and μ_0^{ee}, the egalitarian equivalent outcome measures in the treatment and control group, respectively.

3. Estimate the posterior distributions of μ_1^{ee} and μ_0^{ee} by conditioning P on the results of the *RCT*, that is, by computing $P(\mu_1^{ee}|y)$ and $P(\mu_0^{ee}|y)$ using Markov Chain Monte Carlo Methods. **The comparison between these two posterior distributions forms the basis of the analysis of the treatment effect and constitutes the main intellectual contribution of the proposal.**

4. Prepare an `R` package that would allow applied researchers have ready access to the tools outlined above, together with a carefully detailed reference manual and vignette to aid correct application and interpretation. **Being able to carefully estimate and evaluate treatment effects in a way that is sensitive to distributional considerations in the population is the main societal benefit of the proposal** since, as citizens in a polity, we not only care about what happens "on average" but to everyone, and especially to those of us who may exhibit the greatest need.

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[1] Examples of quasi-arithmetic means include: the arithmetic, geometric, harmonic, quadratic, and exponential. Of those, only the arithmetic mean puts equal weight on all observations, and independent of the value of the other observations.

[2] https://doi.org/10.1037/a0029146

[3] "Protected Income and Inequality Aversion," in preparation.

[4] "Treatment Effects in the Presence of Skewed and Fat Tailed Data," in preparation.

[5] https://cran.r-project.org/web/packages/BEST/index.html