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a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU			19b. TELEPHONE NUMBER 949-824-7417

**RPPR Final Report**  
as of 11-Jan-2023

Agency Code: 21XD

Proposal Number: 68493NSRIP

**Agreement Number: W911NF-16-1-0210**

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EIN: 952226406

**Report Date:** 31-Aug-2017

Date Received: 19-Apr-2022

**Final Report** for Period Beginning 01-Jun-2016 and Ending 31-May-2017

**Title:** Instrumentation for the UC Irvine Experimental Social Science Laboratory

**Begin Performance Period:** 01-Jun-2016

**End Performance Period:** 31-May-2017

**Report Term:** 0-Other

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**Distribution Statement:** 1-Approved for public release; distribution is unlimited.

**STEM Degrees:** 8

**STEM Participants:**

**Major Goals:** Our ultimate goal is to conduct experimental research on human behavior in the Experimental Social Science Laboratory (ESSL) on the campus of the University of California, Irvine. The proximate goal of this proposal was to obtain funds to upgrade the hardware and software (the computer system) of ESSL. This dedicated experimental research laboratory serves a critical function in the Southern California region, as it is used by not only by researchers at UC Irvine but also by researchers at several local universities and colleges, including the California Institute of Technology and Claremont Graduate University and several others that do not have experimental research laboratories of their own or do not have a sufficiently large body of undergraduate student subjects. The ESSL has been under continuous operation since 2011, and the heavy use of the lab during that time prompted our request for funds to purchase new computers and related peripherals.

**Accomplishments:** Our proximate and ultimate goals have been clearly met. We purchased the equipment in 2016 and since then there have been able to support a large number of experimental projects

To put our goal in context, we note that an experimental social science laboratory consists of four components. The first is human capital to design the research program, manage the experiments, and maintain the infrastructure. UC Irvine has the human capital in place. The second component is a subject pool. The lab's subject pool is the largest and most diverse in the region, which is why researchers from outside UC Irvine want to conduct research at our lab. The third component is physical facilities, including the room. The fourth component is a computer

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system that enables experimenters to run experiments. The requested funds were used to update and upgrade our computer system.

The computer system consists of a computer network and software. These components combine to form a single system because all are necessary to operate a functioning experimental laboratory. The computer network consists of three servers, 42 desktop client computers, backup devices, laptop computers, printers, and the necessary peripherals. The computers are linked in a network and locked down for security.

The computer servers run the experimenter's side of the software, synchronize the client computers, record data from choices made by subjects, and maintain our web-based platforms. These computers are also used to track subjects' participation, maintain accounting records, and analyze data. Laptops will be used to program experimental software. A desktop computer is needed for each experimental subject for recording and collecting data. Other laptop computers are needed when conducting experiments in small groups, for individuals participating in the experiment in the small conference room, and for running small experiments with young subjects in a quiet environment. Other peripherals are used to print instructions and images for the experiment. Still other equipment (such as cables and routers) link the system together.

The computer network also requires standard software packages. This software includes programs that link servers and clients, install the experiment program throughout the network (Ghost), backup data, protect against viruses, and allow experimental subjects to open and edit documents (e.g. Adobe Acrobat and Microsoft Office). Operating systems, such as Windows 2007, are also necessary. Finally, experiment management software (Sona) is needed to track subjects recruitment, participation, and earnings.

We accomplished our primary goal of purchasing this computer system, including related peripherals and software. The system has been in place and running since 2016. It has been used in scores of experimental studies.

**Training Opportunities:** Two types of training occur in our ESSL facility, using the computer system, peripherals, and software purchased with the grant.

The first is educational. Our lab is used to teach undergraduate and graduate courses in experimental economics. Since the equipment was purchased, we have trained 82 undergraduate students and 25 graduate students in experimental economics courses that were taught in the ESSL facility. These courses provided hands-on experience and training in conducting lab-based social science experiments.

The second is graduate dissertation research under the direct advisement of ESSL faculty researchers. Since the equipment was purchased, we have had eight students graduate who had experimental projects that formed parts of their dissertations. We currently have another nine currently engaged in experimental research as part of their dissertations.

There is also one post-doc currently working in the lab.

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**Results Dissemination:** Results are primarily distributed through academic publications. Those articles that cite federal funding support are included in the formal list with pdfs attached to the report. However, there are several other publications in which faculty who use the lab with their own funding to pay for human subjects will not have identified federal support. We here provide an additional list of studies completed in the lab by PIs on the grant since 2016 that did not cite federal funding but which did use the ESSL facility after the instrumentation purchase. Note that publications from other users of ESSL from other institutions are not listed here, but they also benefitted from the lab and this instrumentation grant.

Mikhail Anufriev, John Duffy and Valentyn Panchenko, "Learning in Two-Dimensional Beauty Contest Games: Theory and Experimental Evidence," *Journal of Economic Theory* 201, 2022, 105417

Michael Caldara, Michael McBride, Matthew McCarter, Roman Sheremeta, "A Study of the Triggers of Conflict and Emotional Reactions," *Games* 8, 2017

Michael McBride, Ryan Kendall, Martin Short, Maria D'Orsogna, "Crime, Punishment, and Evolution in an Adversarial Game," *European Journal of Applied Mathematics* 27, 2016, 317-337

Michael McBride and Garret Ridinger, "Beliefs also Make Social-norm Preferences Social," *Journal of Economic Behavior and Organization* 191, 2021, 765-784

Michael McBride, Stergios Skaperdas, and Pii-Han Tsai "Why Go to Court? Bargaining Failure under the Shadow of Trial with Complete Information," *European Journal of Political Economy* 55, 2018, 151-168

John Duffy, Jean Paul Rabanal and Olga A. Rud, "The Impact of ETFs in Secondary Asset Markets: Experimental Evidence," *Journal of Economic Behavior and Organization* 188, 2021, 674-696.

John Duffy and Jonathan Lafky, "Social Conformity Under Evolving Private Preferences," *Games and Economic Behavior* 128, 2021, 104-124.

John Duffy and Frank Heinemann, "Central Bank Reputation, Cheap Talk and Transparency as Substitutes for Commitment: Experimental Evidence," *Journal of Monetary Economics* 117, 2021, 887-903.

John Duffy and Ted Loch-Temzelides, "A Double Slit Experiment with Human Subjects," *PLOS ONE* 16(2), 2021, e0246526.

John Duffy and Jason Ralston, "Innovate versus Imitate: Theory and Experimental Evidence," *Journal of Economic Behavior and Organization* 177, 2020, 727-751.

John Duffy and Yue Li, "Lifecycle Consumption Under Different Income Profiles: Evidence and Theory," *Journal of Economic Dynamics and Control* 104, 2019, 74-94.

John Duffy and Brian C. Jenkins, "A Classroom Experiment in Monetary Policy," *Journal of Economic Education* 50, 2019, 89-107.

John Duffy and Huan Xie, "Group Size and Cooperation Among Strangers," *Journal of Economic Behavior and Organization* 126, Part A, 2016, 55-74.

**Honors and Awards:** Nothing to Report

**Protocol Activity Status:**

**Technology Transfer:** Nothing to Report

### **PARTICIPANTS:**

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**Person Months Worked:** 15.00

**Funding Support:**

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Project Contribution:  
National Academy Member: N

**Participant Type:** PD/PI  
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**Person Months Worked:** 15.00  
Project Contribution:  
National Academy Member: N

**Funding Support:**

**Participant Type:** Co-Investigator  
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**Person Months Worked:** 15.00  
Project Contribution:  
National Academy Member: N

**Funding Support:**

**Participant Type:** Co-Investigator  
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Project Contribution:  
National Academy Member: N

**Funding Support:**

**Participant Type:** Faculty  
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Project Contribution:  
National Academy Member: N

**Funding Support:**

**Participant Type:** Faculty  
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Project Contribution:  
National Academy Member: N

**Funding Support:**

**Participant Type:** Faculty  
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Project Contribution:  
National Academy Member: N

**Funding Support:**

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Project Contribution:  
National Academy Member: N

**Funding Support:**

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Project Contribution:  
National Academy Member: N  
**Funding Support:**

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Project Contribution:  
National Academy Member: N  
**Funding Support:**

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Project Contribution:  
National Academy Member: N  
**Funding Support:**

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Project Contribution:  
National Academy Member: N  
**Funding Support:**

**Participant Type:** Graduate Student (research assistant)  
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Project Contribution:  
National Academy Member: N  
**Funding Support:**

**Participant Type:** Graduate Student (research assistant)  
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Project Contribution:  
National Academy Member: N  
**Funding Support:**

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Project Contribution:  
National Academy Member: N  
**Funding Support:**

**RPPR Final Report**  
as of 11-Jan-2023

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Project Contribution:  
National Academy Member: N

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Project Contribution:  
National Academy Member: N

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Project Contribution:  
National Academy Member: N

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Project Contribution:  
National Academy Member: N

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Project Contribution:  
National Academy Member: N

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Project Contribution:  
National Academy Member: N

**Participant Type:** Graduate Student (research assistant)  
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**Person Months Worked:** 15.00 **Funding Support:**  
Project Contribution:  
National Academy Member: N

**Participant Type:** Graduate Student (research assistant)

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**Person Months Worked:** 15.00

Project Contribution:

National Academy Member: N

**Funding Support:**

**Participant Type:** Graduate Student (research assistant)

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**Person Months Worked:** 15.00

Project Contribution:

National Academy Member: N

**Funding Support:**

**Participant Type:** Graduate Student (research assistant)

**Participant:** Whenhao Zhao

**Person Months Worked:** 15.00

Project Contribution:

National Academy Member: N

**Funding Support:**

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**Person Months Worked:** 15.00

Project Contribution:

National Academy Member: N

**Funding Support:**

**Participant Type:** Faculty

**Participant:** Rhadika Lunawat

**Person Months Worked:** 15.00

Project Contribution:

National Academy Member: N

**Funding Support:**

**ARTICLES:**



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as of 11-Jan-2023

**Publication Type:** Journal Article      Peer Reviewed: Y      **Publication Status:** 1-Published

**Journal:** Journal of Quantitative Criminology

Publication Identifier Type: DOI

Publication Identifier: 10.1007/s10940-016-9331-8

Volume: 34

Issue: 1

First Page #: 189

Date Submitted: 3/28/22 12:00AM

Date Published: 11/1/16 7:00AM

Publication Location:

**Article Title:** Birds of a Feather Fight Together: Status-Enhancing Violence, Social Distance and the Emergence of Homogenous Gangs

**Authors:** Jason Gravel, Blake Allison, Jenny West-Fagan, Michael McBride, George E. Tita

**Keywords:** gangs, violence, group formation, status, game theory

**Abstract:** This study proposes a theoretical framework for understanding two empirical findings from gang research: (1) gangs are generally racially homogenous, even in heterogeneous environments, and (2) gang violence tends to be intra-racial. We draw from the extensive literature on street gangs as well as from research on group formation and status-enhancing behavior to develop a theoretical model of gang formation. Using game theory, we model the simultaneous decisions of individuals to commit status-enhancing acts of violence and to seek protection by joining a gang. We then conduct computer simulations to examine the resulting patterns of violence and gang composition. We demonstrate that as long as some social distance exists between racial groups in a community, gang violence will be intra-racial and gangs will be homogenous. We find that our results are robust to a number of simple variations of the model and allow us to generate several hypotheses about the nature of gang formation.

**Distribution Statement:** 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support: Y

**Publication Type:** Journal Article      Peer Reviewed: Y      **Publication Status:** 1-Published

**Journal:** European Journal of Political Economy

Publication Identifier Type: DOI

Publication Identifier: 10.1016/j.ejpoleco.2017.12.001

Volume: 55

Issue:

First Page #: 151

Date Submitted: 3/28/22 12:00AM

Date Published: 12/1/18 8:00AM

Publication Location:

**Article Title:** Why go to court? Bargaining failure under the shadow of trial with complete information

**Authors:** Michael McBride, Stergios Skaperdas, Pi-Han Tsai

**Keywords:** Litigation Court Conflict Contests

**Abstract:** Why do legal disputes ever go to trial? Prior research emphasizes the role of mistakes, irrationalities, or asymmetric information because rational litigants with complete or symmetric information should choose pre-trial settlements over the costs and risks of trial. Using a dynamic incomplete-contracting framework, we provide an overlooked rationale for going to court. Even though risky and costly, going to court can be both rational and socially efficient when a court decision enhances property rights and deters future costly litigation. Experimental evidence supports these predictions. Our findings provide new insights into the incidence of litigation and trial.

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**Publication Type:** Journal Article

Peer Reviewed: Y

**Publication Status:** 1-Published

**Journal:** Games

Publication Identifier Type: DOI

Publication Identifier: 10.3390/g8020021

Volume: 8

Issue: 2

First Page #: 21

Date Submitted: 3/28/22 12:00AM

Date Published: 4/1/17 7:00AM

Publication Location:

**Article Title:** A Study of the Triggers of Conflict and Emotional Reactions

**Authors:** Michael Caldara, Michael McBride, Matthew McCarter, Roman Sheremeta

**Keywords:** conflict; incentives; fear; uncertainty; laboratory experiment; reverse dictator game; joy of destruction game

**Abstract:** Why do legal disputes ever go to trial? Prior research emphasizes the role of mistakes, irrationalities, or asymmetric information because rational litigants with complete or symmetric information should choose pre-trial settlements over the costs and risks of trial. Using a dynamic incomplete-contracting framework, we provide an overlooked rationale for going to court. Even though risky and costly, going to court can be both rational and socially efficient when a court decision enhances property rights and deters future costly litigation. Experimental evidence supports these predictions. Our findings provide new insights into the incidence of litigation and trial.

**Distribution Statement:** 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support: Y

**Publication Type:** Journal Article

Peer Reviewed: Y

**Publication Status:** 1-Published

**Journal:** Journal for the Scientific Study of Religion

Publication Identifier Type: DOI

Publication Identifier: 10.1111/jssr.12569

Volume: 58

Issue: 1

First Page #: 67

Date Submitted: 3/28/22 12:00AM

Date Published: 12/1/18 8:00AM

Publication Location:

**Article Title:** Dynamics of Religious Group Growth and Survival

**Authors:** Tongzhou Chen, Michael McBride, Martin B. Short

**Keywords:** religious affiliation, population dynamics, religious growth, competition, pluralism.

**Abstract:** We model and analyze the dynamics of religious group membership and size. A group is distinguished by its strictness, which determines how much time group members are expected to spend contributing to the group. Individuals differ in their rate of return for time spent outside of their religious group. We construct a utility function that individuals attempt to maximize, then find a Nash equilibrium for religious group participation with a heterogeneous population. We then model dynamics of group size by including birth, death, and switching of individuals between groups. Group switching depends on the strictness preferences of individuals and their probability of encountering members of other groups. We show that in the case of only two groups—one with finite strictness and the other with zero—there is a parameter combination that determines whether the nonzero strictness group can survive over time, which is more difficult at higher strictness levels. We also show that a high

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**Publication Type:** Journal Article      Peer Reviewed: Y      **Publication Status:** 1-Published

**Journal:** International Economic Review

Publication Identifier Type: DOI

Publication Identifier: 10.1111/iere.12549

Volume:

Issue:

First Page #:

Date Submitted: 3/29/22 12:00AM

Date Published: 10/1/21 7:00AM

Publication Location:

**Article Title:** THE FRIEDMAN RULE: EXPERIMENTAL EVIDENCE

**Authors:** John Duffy, Daniela Puzzello

**Keywords:** Friedman Rule, deflation, money supply

**Abstract:** We evaluate the Friedman rule for optimal monetary policy in a laboratory economy based on Lagos–Wright (Journal of Economic Theory 145 (2010), 1508–24). We explore two implementations of Friedman's rule: one involving deflationary monetary policy and another where interest is paid on money. We compare the welfare consequences of the Friedman rule with two other policies: a constant money supply regime and a regime where the money supply grows at a constant  $k\%$ . Counter to theory, we find that the Friedman rule is not welfare-improving, performing no better than the constant money regime. By one welfare measure, the  $k\%$  money growth rate regime performs best.

**Distribution Statement:** 1-Approved for public release; distribution is unlimited.

Acknowledged Federal Support: Y

### Partners

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I certify that the information in the report is complete and accurate:

Signature: Michael McBride

Signature Date: 4/19/22 12:34PM

DURIP Instrumentation Grant W911NF1610210  
Report Attachment

Once received, the instrumentation grant was put into immediate use in equipping the Experimental Social Science Laboratory. The computer system (both hardware and software) was purchased and has been in use ever since.

As seen in the report above, the ESSL has been heavily used since the instrumentation grant by a large number of faculty, graduate students, and post-docs in their experimental research projects (named in the report). It has also been used to teach dozens of graduate students and undergraduate students (not named in the report).

ESSL serves as a vital resource in experimental research in the southern California region. We are very pleased with the success of the ESSL during that time and appreciate the support from this instrumentation grant.