October 20, 2016

Dear Recruiting Chair:

We are pleased to provide the curriculum vitae and dissertation abstracts of the Penn Economics Ph.D. students who seek employment in this year's job market. Also find in the attached table, a summary indicating fields of interest and advisors' names.

Full dissertation abstracts and research papers will be supplied directly from the candidates as they apply for positions. Each candidate is also responsible for having confidential letters of recommendation sent upon request.

We encourage you to contact the faculty members who are most familiar with the students’ work (each vita contains a list of faculty references). Also, please feel free to contact either of the placement officers.

If you or a member of your institution will be in the Philadelphia area and would like to meet with some of our students, Kelly Quinn, our Graduate Group Coordinator, would be pleased to arrange such interviews. She can be reached by phone 215-898-5691 or email at kquinn@econ.upenn.edu.

If we can help in any way regarding the placement of this year's University of Pennsylvania students, please call or e-mail us.

Sincerely,

Iourii Manovskii
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manovski@econ.upenn.edu
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Andrew Postlewaite
Graduate Placement Officer
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- Kelly A. Quinn  
  Main Department: 215-898-7701  
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---

### SUMMARY LISTING OF DOCTORAL STUDENTS SEEKING EMPLOYMENT, 2016/2017

<table>
<thead>
<tr>
<th>Candidate Name</th>
<th>Research Interest</th>
<th>Job Market Paper</th>
<th>Faculty Advisor, Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rodrigo Azuero</td>
<td>Applied Microeconomics, Development Economics, Labor Economics</td>
<td>Evaluating Early Childhood Policies in Chile: An Estimable Model of Family Child Investments</td>
<td>Petra Todd <a href="mailto:ptodd@econ.upenn.edu">ptodd@econ.upenn.edu</a></td>
</tr>
<tr>
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<td>() 701-8419</td>
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<td></td>
</tr>
</tbody>
</table>
| Alberto Ciancio       | Political Economy, Public Economics, Economics of Crime, Program Evaluation, Applied Econometrics | The Impact of Immigration Policies on Local Enforcement, Crime and Policing Efficiency | Camilo Garcia-Jimeno gcamilo@econ.upenn.edu  
                        | ciancio@sas.upenn.edu (215) 779-5673                                             |                                                                                  | Petra Todd Pttodd@econ.upenn.edu            |
| Mustafa Dogan         | Microeconomic Theory, Contract Theory, Mechanism Design                            | Dynamic Incentives for Self-Monitoring                                           | George J. Mailath gmailto@econ.upenn.edu     |
| mudogan@sas.upenn.edu | (215) 715-2113                                                                   |                                                                                  |                                             |
| Daniel Hauser         | Game Theory, Dynamic Games, Industrial Organization                               | Promoting a Reputation for Quality                                                | Ailinn Bohren abohren@econ.upenn.edu        
                        | dahauser@sas.upenn.edu (301) 325-4464                                             |                                                                                  | George J. Mailath gmailto@econ.upenn.edu     |
| Juan M. Hernandez     | Macroeconomics, International Macroeconomics, Finance                             | How International Reserves Reduce the Probability of Debt Crises                  | Enrique Mendoza egme@econ.upenn.edu         |
| juan hern@sas.upenn.edu (203) 451-7098 |                                                                                  |                                                                                  |                                             |
| Nicholas Janetos      | Applied Microeconomic Theory, Social Norms, Political Economy                     | Fads and Imperfect Information                                                     | Steven Matthews stevenma@econ.upenn.edu     |
| njjanetos@sas.upenn.edu (503) 883-3076 |                                                                                  |                                                                                  |                                             |
| Ami Ko                | Public Economics, Health Economics, Labor Economics, Industrial Organization      | An Equilibrium Analysis of the Long-Term Care Insurance Market                    | Hanming Fang hanming.fang@econ.upenn.edu   |
| koam@sas.upenn.edu    | (609) 367-2781                                                                   |                                                                                  |                                             |
| Yunan Li              | Microeconomic Theory, Mechanism Design                                           | Mechanism Design with Financially Constrained Agents and Costly Verification       | Rakesh Vohra rvohra@econ.upenn.edu          |
| yunanli@sas.upenn.edu | (215) 285-7282                                                                  |                                                                                  |                                             |
| Laura Liu             | Econometrics, Macroeconomics, Financial Economics                                 | Density Forecasts in Panel Data Models: A Semiparametric Bayesian Perspective       | Francis X. Diebold fdiebold@econ.upenn.edu  
<pre><code>                    | yuuliu4@sas.upenn.edu (585) 748-2986                                              |                                                                                  | Frank Schorfheide schorf@econ.upenn.edu     |
</code></pre>
<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Research Interests</th>
<th>Project/Research Focus</th>
<th>Email/Contact</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Government Debt and Risk Premia</td>
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<td>Water, Spillovers and Free Riding: Provision of Local Public Goods in a Spatial Network</td>
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<td>Labor Economics, Development Economics, Program Evaluation</td>
<td>Valuing School Choice: Using a Randomized Experiment to Validate Welfare Evaluation of Private School Vouchers</td>
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<td>Employment and Welfare Effects of Short-Time Work</td>
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<tr>
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<td>Taxing Firms Facing Financial Frictions</td>
<td>Dirk Krueger <a href="mailto:dkrueger@sas.upenn.edu">dkrueger@sas.upenn.edu</a></td>
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<td></td>
<td>Harold Cole <a href="mailto:colehl@sas.upenn.edu">colehl@sas.upenn.edu</a></td>
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</table>
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Personal Information:

Date of birth: September 10, 1986
Citizenship: Colombia. US Permanent resident.

Undergraduate Studies:
B.SC. Economics, Universidad de los Andes, Cum Laude, 2009

Masters Level Work:
M.A., Economics, Universidad de los Andes, 2011

Graduate Studies:
University of Pennsylvania, 2012 to present.
Thesis Title: “Essays on the Economics of Human Capital”
Expected Completion Date: May 2017

Thesis Committee and References:
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Teaching and Research Fields:
Research fields: Development Economics, Labor Economics, Applied Microeconomics

Teaching Experience:

Spring, 2007  Differential Calculus, Universidad de los Andes, teaching assistant to Professor Luis Jorge Ferro

Fall, 2007  Integral Calculus, Universidad de los Andes, teaching assistant to Professor Luis Jorge Ferro
Research from the United States shows that gaps in early cognitive and non-cognitive ability appear early in the life cycle. Little is known about this important question for developing countries. This paper provides new evidence of sharp differences in cognitive development by socioeconomic status in early childhood for five Latin American countries. To help with comparability, we use the same measure of receptive language ability for all five countries. We find important differences in development in early childhood across countries, and steep socioeconomic gradients within every country. For the three countries where we can follow children over time, there are few substantive changes in scores once children enter school. Our results are robust to different ways of defining socioeconomic status, to different ways of standardizing outcomes, and to selective non-response on our measure of cognitive

Abstract


Research Experience and Other Employment:

<table>
<thead>
<tr>
<th>Year</th>
<th>Position and Institution</th>
</tr>
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<tbody>
<tr>
<td>2009-2010</td>
<td>Universidad de los Andes, Research Assistant</td>
</tr>
<tr>
<td>2010-2012</td>
<td>Inter-American Development Bank, Research Fellow</td>
</tr>
<tr>
<td>2013-2016</td>
<td>Inter-American Development Bank, Consultant</td>
</tr>
<tr>
<td>Fall, 2015</td>
<td>University of Pennsylvania, Research Assistant</td>
</tr>
</tbody>
</table>

Professional Activities:


Referee: ECONOMIA: Journal of LACEA.

Honors, Scholarships, and Fellowships:

<table>
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<th>Year</th>
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<tbody>
<tr>
<td>2012</td>
<td>University of Pennsylvania, Fellowship for PhD studies</td>
</tr>
<tr>
<td>2015</td>
<td>Penn Institute for Economic Research, Research Assistant Matching Grant</td>
</tr>
<tr>
<td>2016</td>
<td>Judith Rodin Fellow, Fellowship to students committed to nation building, University of Pennsylvania</td>
</tr>
</tbody>
</table>

Publications:

development.

**Research Papers:**

"Evaluating Early Childhood Policies in Chile: an Estimable Model of Family Child Investment Decisions" (Job Market Paper)

**Abstract**

There is extensive evidence suggesting that skills developed early in life have consequences on adult life outcomes. Such findings have motivated a large body of literature analyzing the production of skills in young children. Nonetheless, very little is known about how families make decisions about investments in their children. In this article, I estimate a production function of skills in young children, nested within a collective model of household behavior in a developing country context. The parameters estimated are used to simulate the effects of various policies aimed at increasing skills of children in disadvantaged households that are popular in developing countries. This is the first paper in the literature evaluating cash transfers, childcare subsidies and in-kind transfers, as policy tools to decrease gaps in skills. The results show that there are substantial disparities in the skills of poor and rich children when they are five years old. I find that, in order to close this gap in skills, it is more effective to design policies that subsidize skill-enhancing goods for children than it is to design policies providing unconditional cash transfers or childcare subsidies.

"The Effects of Student Loans on the Provision and Demand for Higher Education", With David Zarruk

We characterize the outcomes of the tertiary education market in a context where borrowing constraints bind, there is a two-tier college system operating under monopolistic competition in which colleges differ by the quality offered and returns to education depend on the quality of the school attended. College quality, tuition prices, acceptance cutoffs and education demand are all determined in a general equilibrium model and depend on the borrowing constraints that agents face. Our main finding shows that subsidized student loan policies lead to a widening gap in the quality of services provided by higher education institutions. This happens because the demand for elite institutions unambiguously increases when individuals can borrow. This does not happen in non-elite institutions, since relaxing borrowing constraints makes some individuals move from non-elite to elite institutions. The higher increase in demand for elite institutions allows them to increase prices and investment per student. If investment and average student ability are complementary inputs in the quality production function, elite universities also increase their acceptance cutoffs. In this new equilibrium, the differentiation of the product offered by colleges increases, where elite universities provide higher quality education to high-ability students and non-elite universities offer lower quality to less-able students. We calibrate the model to Colombia, which implemented massive student loan policies during the last decade and experienced an increase in the gap of quality of education provided by elite and non-elite universities. We show that the increase in the quality gap can be a by-product of the subsidized loan policies. Such results show that, when analyzed in a general equilibrium setting, subsidized loan policies can have negative effects in equilibrium.

**Research Paper(s) in Progress**

"The role of Executive Function in the Process of Skills formation in Children” With Norbert Schady and Yyannu Cruz-Arguayo

The process of skill formation in children has been extensively analyzed in Economics. A widely accepted distinction in skills is made between cognitive ones, related to learning and problem solving, and non-cognitive ones, related to behavior, motivation and regulation of emotions. Partly because of data limitations, the literature has ignored the potential role of executive functions in the skills formation process. Executive functions are processes related to cognitive flexibility, attentional control and inhibitory control, among others, that cannot be categorized as cognitive or non-cognitive skills. We use a sample of approximately 24,000 children in Ecuador in order to identify the role of Executive Functions in the skills formation process.

**Languages:** English (fluent), Spanish (native), French (advanced)
**Computational Skills:** C++ (OpenMP, CUDA), R, Python, Stata, Julia, Matlab

**Software:**

- **gmapsdistance.** R package to compute distance and travel time between two points using the Google Maps API
- **Rtauchen.** R package to discretize an AR(1) process following Tauchen (1986).
Dissertation Abstract

Rodrigo Azuero

Evaluating Early Childhood Policies in Chile: an Estimable Model of Family Child Investment Decisions

Research in medicine, psychology and economics shows that skills shaped during early childhood significantly determine adult outcomes. There is evidence that lower levels of early skill accumulation explain in a large part why children from lower socioeconomic backgrounds experience worse educational and labor market outcomes. These facts have motivated a new line of research in economics aimed at better understanding the skill formation process. This research emphasizes that there are critical ages when skill investments are most fruitful and the importance of modeling the joint evolution of multiple skills. However, having a precise characterization of the skill production technology is not sufficient for assessing the effects that social policies have on skill accumulation. To do that, we also need to better understand how families make child investment decisions, both in terms of time and resources. The goal of this paper is to understand how families make child investment decisions and the scope for different kinds of policy interventions.

To this end, I use a rich dataset of early childhood development from Chile to estimate a skill production function nested within a dynamic-collective model of household behavior. I incorporate into my estimation strategy key findings from the literature related to the skill formation process. Specifically, I allow parental skills to affect their children’s skill accumulation and I consider a multiplicity of skills. I use information on parental skill assessments and on child test scores to model the skill formation process by a latent factor structure that allows for general forms of measurement error.

The estimated model consists of households populated by two agents, fathers and mothers, with different preferences, and a child who is not a decision maker. Parents make decisions about private consumption, time, and monetary investments in their child, as well as childcare services. Although parents have different preferences, they reach an agreement that is Pareto efficient. The skills of the child are a public good that can be increased by time and monetary investments as well as childcare attendance.

This paper extends existing frameworks for modeling the skill formation process in several ways. First, by comparing simultaneously the effectiveness of in-kind transfers, childcare subsidies and cash transfers in the acquisition of skills. Second, by implementing a simulation-based estimator using particle filtering techniques from the machine learning literature, I show a feasible approach to dealing with the high dimensionality problem arising in such models. Third, by using highly detailed geocoded information about households and childcare providers, I am able to use provision of childcare services in a neighborhood as an exogenous source of variation improving the identification strategy. Fourth, I bring the skill formation literature to a developing country context, which has not yet received much attention. Fifth, I estimate a collective model of household behavior in a novel way. In particular, I
use information about questionnaires related to female empowerment as an empirical measure of the bargaining power of each household member. This new estimation strategy imposes fewer restrictions in the data compared with approaches currently used in the literature.

Among the main results, I find that there are large gaps in skills between children in the lowest quintile of the income distribution and those in the highest quintile, equivalent to 40% of a standard deviation. These inequalities are mostly explained by differences in parental skills and monetary investments. Additionally, I find that fathers’ time is 50% less productive than mothers’ time and that mothers have stronger preferences for children. However, the higher productivity and the stronger preferences for children do not fully explain the observed disparities in time investments between mothers and fathers. The relative disempowerment of women explains around 15% of such difference: given that women are relatively less empowered than men, women tend to contribute a higher share in the production of public goods within the household.

The estimated model is used to simulate the effects that various social programs can potentially have on children’s skill levels. I simulate the effect of cash transfers programs, free childcare subsidies and in-kind transfers (where families receive goods that can only be used to increase skills of children such as toys, puzzles, costumes and child development guides). I find that in-kind transfers are much more effective than the other alternatives when it comes to closing the gaps in skills between rich and poor children.

**The Effects of Student Loans on the Provision and Demand for Higher Education**

In joint work with David Zarruk, I analyze the consequences that subsidized loans for higher education have on the quality of education offered by colleges in the context of a developing country (Colombia). We find that subsidized student loan policies lead to a widening gap in the quality of services provided by higher education institutions. This happens because the demand for elite institutions unambiguously increases when individuals can borrow. Relaxing borrowing constraints makes some individuals move from non-elite to elite institutions. The higher increase in demand for elite institutions allows them to increase prices and investment per student. If investment and average student ability are complementary inputs in the quality production function, elite universities also increase their acceptance cut-offs. In this new equilibrium, the differentiation of the product offered by colleges increases, where elite universities provide higher quality education to high-ability students and non-elite universities offer lower quality to less-able students. We calibrate the model to Colombia, which implemented massive student loan policies during the last decade and experienced an increase in the college quality gap provided by elite and non-elite universities. We show that the increase in the quality gap can be a by-product of the subsidized loan policies. Such results show that, when analyzed in a general equilibrium setting, subsidized loan policies can have negative effects in equilibrium.
ALBERTO CIANCIO

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M.A. Economics (Allievi Honors Program), Collegio Carlo Alberto, 2011

Graduate Studies:
University of Pennsylvania, 2011 to present
Thesis Title: “The Impact of Immigration Policies on Local Enforcement, Crime and Policing Efficiency”
Expected Completion Date: May 2017

Thesis Committee and References:
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Teaching and Research Fields:

Teaching Experience:
Spring, 2016 Econ 001, Microeconomics, T.A. for professor Rebecca Stein
Fall 2015 Econ 001, Microeconomics, T.A. for professor Anne Duchene
Fall 2014 Econ 101, Intermediate Microeconomics, T.A., for professor Rakesh Vohra
Spring 2013 Econ 001, Microeconomics, T.A. for professor Rebecca Stein
Fall 2013  |  Econ 101, Intermediate Microeconomics, T.A. for professor Aislinn Bohren
Spring 2013 | Econ 001, Microeconomics, T.A. for professor Rebecca Stein
Fall 2012  |  Econ 001, Microeconomics, T.A. for professor Rebecca Stein

**Research Experience and Other Employment:**

2013  

**Honors, Scholarships, and Fellowships:**

2011-2016  |  Graduate School Fellowship, University of Pennsylvania
2009-2011  |  Allievi Program Scholarship (Honors Program)

**Research Papers:**

*“The Impact of Immigration Policies on Local Enforcement, Crime and Policing Efficiency”*  
(Job Market Paper)

A policy change under the Obama Administration led to a dramatic fall in non-border deportations from the US. Using data obtained through a Freedom of Information Act request on several steps of the deportation process, I estimate how the drop in federal immigration enforcement affected county level enforcement, local crime rates and policing efficiency. First, I find that counties with a higher share of Democratic Party voters complemented the federal policy change by reducing local enforcement efforts. Then, employing a triple-difference framework, I find that counties with higher non-citizen population shares in more democratic counties saw greater increases in clearance rates, my measure of policing efficiency, but not in crime rates. I supplement the analysis by examining the effects of the 2014 California Trust Act that forced counties to limit collaboration with the federal immigration agency and find again positive effects on clearance rates but no significant effect on crime. The results indicate that reducing immigration enforcement did not increase crime and rather led to an increase in policing efficiency, either because it allowed police to focus efforts on solving crimes or because it elicited greater cooperation of noncitizens with police.

*“Monitoring Employers Hiring Undocumented Immigrants: Evidence from E-Verify”*  
(In Progress)

I collected data with multiple FOIA requests on the E-Verify program, which allows firms to electronically check the legal status of new employees. The program is voluntary for most firms, but mandatory in some states and for federal contractors. The data is a monthly panel of enrolled firms, from 2004 to early 2016 with information on firms’ characteristics (size, industry, precise location), number of times the firms use the program and find someone unauthorized, and monitoring actions of the Department of Homeland Security with regard to a particular firm. Two facts emerge: monitoring actions focus on big firms and the share of unauthorized persons found is higher in small firms, suggesting that undocumented immigrants cluster in small firms. I interpret E-verify as an increase in the hiring costs, which are increasing in firm size. Increasing marginal costs of recruitment is a potential cause of monopsony power (Manning 2003). Complementing these data with CPS data, I analyze whether monitoring actions reduce the number of unauthorized workers found and whether this has a negative effect on labor market outcomes of likely undocumented workers.

**Computer Skills:**

Matlab, Stata

**Languages:**

English (fluent), Italian (native), Spanish (intermediate), German (intermediate), French (basic)
Immigration policy is at the center of the political debate in the United States and in many European countries. One of the reasons for the policy debate’s focus on immigration policy is the presumed relationship between immigration and crime. Those in favor of high immigration enforcement argue that immigrants commit a lot of crimes and believe that removing criminal aliens should be a top priority. Those favoring a more lenient approach believe that immigration enforcement is actually counterproductive, because it distracts law enforcement resources from fighting more serious crimes and makes immigrants less likely to collaborate with the police. The debate highlights the importance of assessing the impact of immigration policy on crime, which is the goal of my paper.

After years of increasing enforcement through the introduction of several partnerships with local enforcement agencies, in 2011, the Obama administration issued guidelines to relax enforcement. These guidelines prioritized deportations only of individuals representing a threat to the country, which lead to a fall in deportations that is still ongoing in 2016. The number of non-border removals from the US reached a peak in 2010-2011 and then decreased around 70% in the period 2011-2015. Some states enacted policies to further reduce immigration enforcement. The California Trust Act, implemented in January 2014, forced California counties to restrict their collaboration with the federal immigration agency only to serious crimes.

In this paper, I evaluate the effects of the dramatic change in immigration policy that occurred under the Obama administration in 2011 and also the effects of the 2014 California Trust Act on crime and policing. Through a Freedom of Information Act request, I obtained unique data including deportations at the county level along with information on several steps of the deportation process, from the arrest by the local enforcement agency to the final removal. These data are particularly interesting, because they enable construction of a continuous and uniform measure of enforcement, the share of non-citizens arrested that end up in custody of the federal immigration agency, for multiple jurisdictions over time. I can also decompose this enforcement measure into components due to local and federal enforcement. I supplement these data with information on crime and clearance rates (the number of crimes cleared by an arrest), which is a measure of policing efficiency.
I first document changes over time in county-level enforcement and explore how enforcement relates to county characteristics. After Obama issued the guidelines to relax immigration enforcement, many counties stopped handing in detainees to the federal authorities for deportation, except for those accused of serious crimes. To explore how counties react to federal policies, I develop a simple model that describes how local and federal immigration enforcement activities are jointly determined in a Stackelberg game, where counties differ in preferences for deportations. Depending on county characteristics, local and federal enforcement can be strategic complement or substitute. My empirical analysis finds that Democratic counties “complemented” federal policies, by reducing their immigration enforcement, whereas Republican counties tended to maintain higher levels of enforcement.

To analyze effects on crime and policing, I first use a difference in difference approach comparing counties with different percentage of non-citizens before and after the change in policy. I use the non-citizens share of population as a measure of the intensity of the policy with the idea that the policy should have no effect on outcomes in places with very few immigrants (e.g. Montana), but strong effects in places with a strong immigrant community like Nevada. I find that the relaxation in immigration enforcement in 2011 had no effect on crime rates but had a weak positive effect on clearance rates. This analysis, though, does not take into account how county-level characteristics influenced the level of enforcement, such as the share of Democrat voters. Employing a triple-difference framework, I find that counties with higher non-citizen population shares in more democratic counties saw greater increases in clearance rates, my measure of policing efficiency, but experienced no significant change in crime rates.

I examine robustness of the results to a number of factors, including changes in economic conditions, changes in the size of the police department and other changes in immigration enforcement at the state or local level. I also replicate the results using an estimate of the share of undocumented immigrants instead of the share of non-citizens. Finally, I complement the analysis of the federal policy change by also examining effects of the 2014 California Trust Act. With a difference in difference analysis, I find that Trust Act increased clearances and had no effect on crime rates.

This paper makes two important empirical contributions. First, it shows that tougher immigration enforcement does not reduce crime and appears instead to make the job of the police harder as reflected in lower clearance rates. Second, this paper explores how political considerations affect immigration policy and that policy effects are heterogeneous depending on county characteristics. The results underscore the importance of taking into account how local authorities react to federal policies in determining overall enforcement levels.
UNIVERSITY OF PENNSYLVANIA

Placement Director: Iourii Manovskii
Placement Director: Andrew Postlewaite
Graduate Student Coordinator: Kelly Quinn

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Philadelphia, PA, 19104
+1 215 715 2113

Undergraduate Studies:
B.Sc., Mathematics, Koc University, Istanbul, Turkey, Summa Cum Laude, 2009
B.A., Economics, Koc University, Istanbul, Turkey, Magna Cum Laude, 2009

Masters Level Work:
M.Sc., Mathematical Economics and Econometrics, Toulouse School of Economics, Toulouse, France, 2010

Graduate Studies:
University of Pennsylvania
Thesis Title: “Essays on Applied Microeconomic Theory”
Expected Completion Date: June 2017

Thesis Committee and References:
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432 McNeil Building
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+1 215 898 7908

Professor Steven Matthews
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3718 Locust Walk
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Professor Mallesh M. Pai
Rice University
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Teaching and Research Fields:
Research: Microeconomic Theory, Contract Theory, Mechanism Design, Information Economics

Teaching: Microeconomics, Game Theory, Political Economics, Industrial Organization, Public Economics,
**Teaching Experience:**

- **Summer 2014**, Introduction to Microeconomics, Instructor, University of Pennsylvania.
- **Spring 2014**, Microeconomic Theory (Graduate Level), University of Pennsylvania, Teaching Assistant for Professor Mallesh Pai
- **Fall 2012-2014**, Business Economics and Public Policy, Wharton Business School, Teaching Assistant for Professor Joseph Harrington
- **Spring 2016**, Intermediate Microeconomics, University of Pennsylvania, Teaching Assistant for Professor Kenneth Burdett
- **Spring 2015**, Game Theory, University of Pennsylvania, Teaching Assistant for Professor Yuichi Yamamoto
- **Spring 2012**, Intermediate Macroeconomics, University of Pennsylvania, Teaching Assistant for Professor Ufuk Akcigit

**Professional Activities:**

**Presentations:**
- 2016, Micro Theory Seminar, University of Pennsylvania
- 2012-2016, Penn Micro Theory Lunch Club, University of Pennsylvania

**Referee Activities:**
- Symposium on Algorithmic Game Theory (SAGT)

**Other:**
- 2013-2014, Co-organizer, University of Pennsylvania Micro Theory Lunch Club

**Honors, Scholarships, and Fellowships:**
- 2010-2015, University fellowship, University of Pennsylvania
- 2009-2010, Eiffel Scholarship, France Ministry of Foreign Affairs

**Research Papers:**

“**Dynamic Incentives For Self-Monitoring**” (*Job Market Paper*)

This paper studies a regulatory system featuring self-monitoring. Each period the agent (he) would like to undertake a new project, which may produce harm. He can acquire costly information by self-monitoring, yet the effort spent on it is not observed. The regulator (she), in each period, decides whether or not to request him to self-monitor, and then chooses whether to approve the project. There are no monetary transfers; instead she uses future regulatory behavior as an incentive device. When the regulator has full commitment power, self-monitoring can only be induced in an initial phase of the policy. During this phase, in order to provide incentives, the agent is promised a higher continuation utility each time he discloses “bad news”. otherwise he is punished with a lower continuation utility. If the regulator internalizes self-monitoring costs, the agent will be either blacklisted or whitelisted in the
long run. When she does not internalize the cost, whitelisting is the only long run outcome. Blacklisting is replaced by a probation state, which consists of temporary rejection, since the agent can always get out of it by disclosing bad news. When the regulator has limited commitment power in that she cannot commit to a policy with a negative continuation value, the results change remarkably. If the expected cost of projects is higher than its economic benefits, whitelisting disappears. In this case, if the regulator does not internalize the self-monitoring costs, the policy never reaches to a stable outcome.

“Product Upgrades and Posted Prices”
This paper considers the dynamic pricing problem of a durable good monopolist with commitment power, when a new version of the good is expected at some point in the future. The new version of the good is superior to the existing one, bringing a higher flow utility. When the arrival is a stationary stochastic process, the corresponding optimal price path is shown to be constant for both versions of the good, hence there is no delay on purchases and time is not used to discriminate over buyers, which is in line with the literature. However, if the arrival of the new version occurs at a commonly known deterministic date, then the price path may decrease over time, resulting in delayed purchases. For both arrival processes, posted prices is a sub-optimal selling mechanism. The optimal mechanism involves bundling of both versions of the good and selling them only together, which can easily be implemented by selling the initial version of the good with a replacement guarantee.

“Divide and Rule” (Work In Progress)
I consider a strategic information transmission framework where an informed third party expert provides reports to two decision makers who want to coordinate their decisions, and also would like to adapt to the underlying state variable. The expert is perfectly informed about the current state, but has different preferences from the decision makers over the composition of the decisions. The expert can exploit the lack of communication between the decision makers and send them private messages about the state variable. This creates a situation in which the decision makers need to incorporate their higher order beliefs in making their decisions. Effectively, the expert designs a global game between the decision makers by constructing their private messages appropriately, and tilts their decisions towards her preferred composition. I show that when the expert is biased towards the status-quo, she can induce her preferred composition for infinitely many different bias levels.

“Strategic Ignorance” (Work In Progress)
This paper provides an explanation for strategic ignorance. I consider a Bayesian persuasion framework involving a decision maker, and an expert. There is an underlying uncertainty about a two-dimensional state space effecting the optimal decision of the decision maker. First, the decision maker chooses a signal structure about the first state variable, and then upon observing this choice, the expert chooses a signal structure regarding the second state variable. Finally, the decision maker observes the signal realizations and makes her decision. I show that the decision maker leaves herself ignorant by choosing a signal structure that reveals imperfect information about the first state variable despite being able to learn it perfectly. By doing so, she incentivizes the expert to choose a more informative signal which compensates for her strategic ignorance. In other words, she persuades the persuader for revealing better information.
Dynamic Incentives for Self-Monitoring. (Job Market Paper)

The Environmental Protection Agency’s auditing policy encourages firms to self-monitor their activities and voluntarily report any violations. In general, many enforcement authorities adopt self-monitoring practices for various regulatory purposes. A mining company, for example, in applying for a mining license, may be asked to submit an Environmental Impact Statement and sometimes other supplementary information that requires serious scale costly self-monitoring. In this paper, I study how regulators can induce economic agents to acquire and disclose costly information about the negative consequences of their activities through the use of future regulatory behavior without resorting to monetary transfers. I show that, when the regulator has full commitment power, self-monitoring can only be induced in an initial phase of the policy which endures over a stochastic number of periods. Eventually, the policy reaches a terminal phase and the agent is either whitelisted or blacklisted. If the regulator does not internalize the self-monitoring costs, blacklisting is replaced by a probationary state.

I construct a dynamic principal-agent model in which a stream of projects arrive over time. The agent (he) needs the approval of principal (she) to undertake each project. A project may cause some social harms that outweigh its economic benefits, but, the agent does not internalize the social harms. He can acquire costly information about the potential social harms by self-monitoring, yet the effort spent on this is not observed. Information acquisition can generate a unique verifiable signal perfectly revealing “bad news”. There is no verifiable “good news”, instead the agent may report “no news”, for which there are two possible explanations from the principal’s perspective. First, the agent might have shirked and avoided self-monitoring. Second, the agent might have acquired information yet the project is more likely to be good and did not generate bad news. Each period, the principal first decides whether or not to ask for self-monitoring, and then chooses whether to approve the project. There are no monetary transfers, which is meant to reflect the fact that many regulatory agencies are limited in their ability to use monetary transfers. For example, in some industries there is a legal limit on the amount of fines the regulators can levy.

During the initial phase of the optimal policy where self-monitoring takes place, the agent is promised a higher continuation utility each time he discloses a bad news. His current project is less likely to get approved but the regulator promises more frequent approval for the future. If he does not disclose any signal, he is downgraded to a lower continuation utility. His current project has higher chances of approval, yet he will be given less frequent approvals in the future. The duration of this phase is stochastic; when it ends, the policy reaches a second phase in which there is no more self-monitoring. The transitional dynamics between the phases and the long run outcome of the optimal policy depends on whether the principal internalizes the cost of self-monitoring.

If the principal internalizes the costs of self-monitoring, the acquired information is always used in the approval decision. The agent’s continuation utility eventually reaches either its minimum or maximum and remains constant. In this stage, the principal permanently rejects or permanently approves projects, that is the agent is either blacklisted or whitelisted in the long run. When the principal does not internalize the costs, the content of the information is not always used in the current approval decision in contrast to the previous case. There is a probation state, which replaces blacklisting, wherein the agent acquires information, but the project is rejected regardless of the outcome. After being initiated, this probationary state repeats until the agent discloses some bad news. The agent’s continuation utility eventually reaches its maximum which still puts permanent approval into action, and in the long-run, the agent is always whitelisted.

One could interpret the whitelisting outcome as a form of regulatory capture, which is a type of government failure. However, whitelisting arises as a possible outcome of optimal behavior on the part of
the regulator. My paper, therefore suggests that what has been described as regulatory capture may indeed be an outcome of optimal regulatory behavior.

When the principal has limited commitment power, in that she cannot commit to a policy with a negative continuation value, the results change remarkably. If the expected cost of projects is higher than its economic benefits, the policy does not feature whitelisting. In this case, if the principal does not internalize about self-monitoring costs, the policy never reaches a stable outcome and fluctuates over time. The paper analyses the case in which the principal also can monitor projects at a higher cost compared to the agent. Each period, prior to making an approval decision, she chooses either to monitor on her own; or delegate it to the agent; or completely avoid monitoring. For some set of parameters, a randomized decision between non-delegated monitoring and direct approval replaces whitelisting.

Product Upgrades and Posted Prices.
This paper studies the dynamic pricing problem of a durable good monopolist with commitment power, when a new version of the good is expected at some point in the future. The new version of the good is superior to the existing one, bringing a higher flow utility. When the arrival is a stationary stochastic process, the corresponding optimal price path is shown to be constant for both versions of the good, hence there is no delay on purchases and time is not used to discriminate over buyers, which is in line with the literature. However, if the arrival of the new version occurs at a commonly known deterministic date, then the price path may decrease over time, resulting in delayed purchases. For both arrival processes, posted prices is a sub-optimal selling mechanism. The optimal mechanism involves bundling of both versions of the good and selling them only together, which can easily be implemented by selling the initial version of the good with a replacement guarantee.

Divide and Rule. (Work In Progress)
I consider a strategic information transmission framework where an informed third party expert provides reports to two decision makers who want to coordinate their decisions, and also would like to adapt to the underlying state variable. The expert is perfectly informed about the current state, but has different preferences from the decision makers over the composition of the decisions. The expert can exploit the lack of communication between the decision makers and send them private messages about the state variable. This creates a situation in which the decision makers need to incorporate their higher order beliefs in making their decisions. Effectively, the expert designs a global game between the decision makers by constructing their private messages appropriately, and tilts their decisions towards her preferred composition. I show that when the expert is biased towards the status quo, she can induce her preferred composition for infinitely many different bias levels.

Strategic Ignorance. (Work In Progress)
This paper provides an explanation for strategic ignorance. I consider a Bayesian persuasion framework involving a decision maker, and an expert. There is an underlying uncertainty about a two-dimensional state space effecting the optimal decision of the decision maker. First, the decision maker chooses a signal structure about the first state variable, and then upon observing this choice, the expert chooses a signal structure regarding the second state variable. Finally, the decision maker observes the signal realizations and makes her decision. I show that the decision maker leaves herself ignorant by choosing a signal structure that reveals imperfect information about the first state variable despite being able to learn it perfectly. By doing so, she incentivizes the expert to choose a more informative signal which compensates for her strategic ignorance. In other words, she persuades the persuader for revealing better information.
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Undergraduate Studies:
B.S. in Mathematics and Economics; University of Maryland, College Park, 2012

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University of Pennsylvania, 2012 to present
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Expected Completion Date: June 2017

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Research Fields:
Microeconomic Theory, Game Theory, Dynamic Games, Industrial Organization

Teaching Fields:
Microeconomics, Game Theory, Industrial Organization, Political Economy

Teaching Experience:
Fall 2013, 2014  Econ 701 Microeconomic Theory I (graduate level), University of Pennsylvania,
T.A. for Andrew Postlewaite and Steven Matthews
Spring 2014  Econ 001 Intro Microeconomics, University of Pennsylvania,
T.A. for Uriel Spiegel
Spring 2015  Econ 235 Industrial Organization, University of Pennsylvania,
T.A. for Aislinn Bohren
Summer 2015  Econ 897 Summer Math Camp (graduate level), University of Pennsylvania,
Instructor
**Research Experience and Other Employment:**

- 2012-2015 Power Auctions LLC
- 2016 Research Assistant for George Mailath and Andrew Postlewaite

**Presentations:**

- 2016 5th World Congress of the Game Theory Society
- 2016 Stony Brook Game Theory Conference
- 2016 North American Summer Meetings of the Econometric Society
- 2016 Pennsylvania Theory Conference (poster)
- 2016 Midwest Economic Theory Conference
- 2015 EconCon (http://sites.sas.upenn.edu/econcon2015/announcements)

**Refereeing:**

SAGT 2014, AEJ Micro, WINE 2016

**Honors, Scholarships, and Fellowships:**

- 2015-16 Sidney Weintraub Memorial Fellowship

**Other Academic Responsibilities**

- 2015-16 Shadow Workshop Organizer
- 2015-16 Penn Theory Lunch Organizer
- 2014-16 Micro Theory Reading Group Organizer

**Research Papers:**

"Promoting a Reputation for Quality" (Job Market Paper)

A firm builds its reputation by investing in the quality of their products and by controlling the information consumer’s see. I model a firm that not only invests in its product, but also influences the rate at which consumers’ receive information about that product: the firm can either promote, which increases the arrival rate of signals when quality is high, or censor, which decreases the arrival rate of signals when quality is low. I study how the firm's incentives to build quality and signal depend on its reputation and current quality. The firm's ability to promote or censor plays a key role in the structure of equilibria. Promotion and investment in quality are complements: the firm has stronger incentives to build quality when the promotion level is high. Costly promotion can, however, reduce the firm's incentive to build quality; this effect persists even as the cost of building quality approaches zero. Censorship and investment in quality are substitutes. The ability to censor can destroy a firm's incentives to invest in quality, because it can reduce information about poor quality products, which in turn causes the firm’s reputation to decay and never be restored.

"Social Learning with Model Misspecification" (joint with Aislinn Bohren)

In many economic situations, an individual learns from the actions of others, even if she doesn't know how these individuals interpret information. This paper explores model misspecification in an observational learning framework. An agent's type specifies how she interprets signals and the actions of other agents. Misspecified types have incorrect beliefs about the signal distribution and how other agents draw inference. This framework captures behavioral biases such as confirmation bias, underweighting or overweighting information, partisan bias and correlation neglect, as well as models of inference such as level-k and cognitive hierarchy. We develop a simple criterion to identify how misspecification impacts asymptotic learning. Depending on the nature of the misspecification, beliefs may converge to the incorrect state, the correct state, or not converge at all. Agents with different models may asymptotically disagree, despite observing the same information. Finally, we establish that the correctly specified model is robust in that agents with approximately correct models have identical asymptotic learning outcomes.

**Technical Papers**

Review of Environmental Auctions (with Larry Ausubel, Peter Cramton and Christina Aperjis)
Review of Relevant Auction Theory (with Larry Ausubel, Peter Cramton and Christina Aperjis)
Best Practices for PAF Auction Implementation (with Larry Ausubel, Peter Cramton and Christina Aperjis)

These were written for the World Bank as part of work I did at Power Auctions. They are available at: http://www.pilotauctionfacility.org/content/background-research-notes-auctioning
**Daniel Hauser: Research Statement**

In my job market paper, “Promoting a Reputation for Quality,” I model a firm that manages its reputation for selling high quality products by investing in the quality of the product and by controlling the information consumers observe. As in Board and Meyer-ter-Vehn (2013), quality is persistent, and evolves stochastically over time. Consumers do not observe product quality or the firm’s actions directly, instead they form beliefs about the quality of the firm’s product based on the information they observe. I focus on two cases, the good news case, where the firm can promote its product by releasing positive information, and the bad news case, where the firm can choose to censor negative information about its product, and characterize Markov perfect equilibria.

In the good news case, future promotion is a complement for current investment, which provides incentives for the firm to build a reputation. All Markov perfect equilibria have the same structure. At high reputations, the firm chooses to forgo any investment in maintaining quality or promotion, while at low reputations, the firm invests in quality and promotes its product. At intermediate reputations, the firm doesn’t invest in maintaining the quality of its product, but it promotes high quality products. In the long run this leads to reputation cycles: the firm’s reputation drifts down until the firm successfully mounts a promotional campaign, at which point the reputation jumps up. Even as the cost of investing in becomes small, the firm still does not invest in maintaining quality at a high reputation, and these reputation cycles persist. Relative to the optimal information structure, the firm is over-promoting, and under-investing. But, even though the firm is only investing in quality when its reputation is very low, its reputation never completely vanishes. The firm will always have an incentive to rebuild a high reputation, which it then exploits.

In the bad news case, censorship is a substitute for investment, which dampens the firm’s ability to build a reputation. A firm can either invest in maintaining a high quality product to keep consumers from learning negative things about the product, or it can hide bad news directly. When censorship is inexpensive relative to investment, this leads to a breakdown of incentives. The firm always chooses to censor instead of investing in quality. In contrast with the good news case, the firm’s reputation vanishes in the long run, since consumers anticipate that that the firm will never invest in quality. This is reminiscent of firms like tobacco companies or oil producers who have invested heavily in suppressing research about the harmful effects of their products, but have done little to improve products. Similar results hold in a richer model which incorporates both bad news and good news, as long as the firm’s ability to promote is sufficiently low.

In “Social Learning With Model Misspecification,” (joint with Aislinn Bohren) we investigate how consumers learn from the actions of others. We consider what happens in a social learning environment when agents have potentially misspecified models of the world. Agents may misinterpret information they see about the world, and may also misinterpret how others view the world. We develop a set of tools that allow us to analyze asymptotic learning outcomes in the presence of model misspecification. This framework allows us to consider agents with a variety of biases, including the level-k models, confirmation bias, partisan bias, and models where agents over or under-weight
the information contained in their private signals.

With model misspecification, even in situations where agents with correctly specified models of the world would eventually learn the truth, social learners can become certain of something false, or fail to have their beliefs converge at all. For instance, in an environment with level-2 and level-3 agents, the level-2 agents can asymptotically learn the truth, while the level-3 agents can become convinced of something that is false. But, for small amounts of model misspecification asymptotic learning is robust: if agents with correctly specified models would asymptotically learn the true state so will agents with misspecified models as long as the misspecification is sufficiently small.

This framework can be used to study a variety of problems, including how to optimally release information when faced with a sequence of biased social learners. The optimal way to correct for agent biases depends on the type of bias. For example, an information campaign run by a government who believes that mild levels of partisan bias is leading parents to not vaccinate their children should be run very differently from a campaign intended to target parents with severe partisan bias. When facing agents who learn the true state with positive probability, but can also come to learn something that is incorrect, the government needs to intervene infrequently, if at all, while if agents would never learn the correct state on their own, the government needs to constantly release information to make sure agents make the right choices.

References

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University of Pennsylvania, 2011 to present
Thesis Title: “Essays in Macroeconomics with Financial Frictions”
Expected Completion Date: June 2017

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Masters Level Work:
MA, Economics, Universidad de los Andes (Colombia), 2011

Undergraduate Studies:
BA, Economics, Universidad de los Andes (Colombia), Cum Laude, 2007
BA, Mathematics, Universidad de los Andes (Colombia), 2007

Teaching and Research Fields:
Primary fields: International Macroeconomics and Finance.
Secondary Fields: Macroeconomics.
Teaching Experience:

- Spring, 2016: Monetary and Fiscal Policy, University of Pennsylvania, T.A. for Prof. Harold Cole.
- Fall, 2015: Money and Banking, University of Pennsylvania, T.A. for Professor Harold Cole.
- Fall, 2014: International Finance, University of Pennsylvania, T.A for Prof. Enrique Mendoza
- Fall, 2013: Microeconomic Theroy I (PhD level), University of Pennsylvania, T.A. for Professors Steven Matthews and Andy Postlewaite.
- Spring, 2013: Intermediate Microeconomics, University of Pennsylvania, T.A. for Professor Tymofiy Mylovanov
- Fall, 2012: Microeconomic Theroy I (PhD level), University of Pennsylvania, T.A. for Professors Andy Postlewaite and Mallesh Pai.

Research Experience and Other Employment:

- 2015: University of Pennsylvania, Research Assistant for Professor Enrique Mendoza.
- 2007-2011: Colombian Central Bank, Monetary and Reserves Affairs Division, Senior Economist.
- 2006: Universidad de los Andes Colombia, Research Assistant for Prof. Hernán Vallejo.

Professional Activities:

- 2014: Latin American and Caribbean Economic Association (LACEA) Meetings. Sao Paulo, Brazil.

Honors, Scholarships, and Fellowships:

- 2012: Prize for Best Performance in Microeconomics Preliminary Examination, University of Pennsylvania.

Research Working Papers:

"How International Reserves reduce the Probability of Debt Crises" (Job Market Paper)
This paper provides a model to explain the role of international reserves in reducing the likelihood of sovereign debt crises. The setup features a government making optimal choices of debt and reserves in an environment in which self-fulfilling rollover crises à-la Cole-Kehoe and external default à-la Eaton-Gersovitz coexist. This allows for both fundamental and market-sentiment driven debt crises. Self-fulfilling crises arise because of a lender's coordination problem when multiple equilibria are feasible. Conditional on the country's Net Foreign Asset position, additional reserves make the sovereign more willing to service its debt even when no new borrowing is possible, which enlarges the set of states in which repayment is the government's dominant strategy and this in turn reduces the set of states that admit a self-fulfilling crisis. From an ex-ante perspective, reserves reduce the probability of crises in the future and which lowers current
sovereign spreads. The result depends on the existence of roll-over risk and debt not being limited to one period debt. This paper advances existing models by accounting not only for the self-insurance role of reserves against self-fulfilling crises but also for their part in reducing the probability of such events. These findings are in line with the empirical literature on vulnerability measures to sovereign debt crisis that shows the connection between international reserves, the probability of debt crises and sovereign spreads. Quantitatively the model can explain 60% of Mexico's international reserves holdings, while accounting for key cyclical facts, showing the relevance of the proposed mechanism.


We evaluate the effectiveness of optimal versus simple financial policy rules in a model of a small open economy with production, liability dollarization and “unconventional shocks” in the form of global liquidity shifts and news about future fundamentals. In our model, both tradable and nontradable goods are produced using intermediate goods traded in world markets. Debt is denominated in units of tradables, and a collateral constraint limits debt to a fraction of the market value of total income. The optimal policy has a macroprudential or ex-ante component: a debt tax levied at date $t$ only when the collateral constraint is not currently binding but may do so at $t+1$, as well as an ex-post component: sectoral production taxes/subsidies used when the collateral constraint binds. The optimal policy, although complex, is very effective at reducing the magnitude and severity of financial crises. Simple policies can be effective but need to be constructed carefully otherwise they can be welfare reducing.

“Fighting for the Best, Losing with the Rest: On the Desirability of Competition in Financial Markets” with Daniel Wills

The Jumpstart Our Business Startups (JOBS) act of 2012 aims at increasing funding access for young firms by easing securities regulation. Motivated by this, we ask if there is a role for the regulation of the market of funds for firms that lack collateral and have a large uncertainty about their ability to generate profits. To answer that we characterize optimal financial contracts in a competitive environment with risk, adverse selection and limited liability. We find that competition among financial intermediaries always forces them to fund projects with negative expected returns both from a private and from a social perspective. Intermediaries use steep payoff schedules to screen entrepreneurs, but limited liability implies this can only be done by giving more to all entrepreneurs. In equilibrium, competition for the best entrepreneurs force intermediaries to offer better terms to all customers, there is cross subsidization among entrepreneurs and intermediation profits are nil. The three main features of our framework (competition, adverse selection and limited liability) are necessary in order to get the inefficient laissez-faire outcome and a role for financial regulation. Our result remains robust when firms can collateralize some portion of the credit as long as there is still an unsecured fraction.

Work in Progress

“Optimal Capital Taxes and Entrepreneurial Choice: New vs Old Money” with Ali Shourideh and Daniel Wills

We characterize optimal business and labor income tax schedules in an environment in which agents can choose to be entrepreneurs or workers. Agents privately observe their skill for each occupation and also privately decide the corresponding investment and effort intensities. The different nature of the incentive structure in each sector results in a distortion of the occupational choice margin, and the resulting sector specific tax schedules are different from what they would be in a world without sector mobility. In the case where workers supply hours inelastically, a Rawlsian planner sets the marginal tax on labor income always higher than the marginal tax on operating profits. In this setting consumption is not equalized among workers.
In my job market paper, “How International Reserves reduce the Probability of Debt Crises” I provide a model to explain the role of international reserves in reducing the likelihood of sovereign debt crises. The setup features a government making optimal choices of debt and reserves in an environment in which self-fulfilling rollover crises a-la Cole-Kehoe and external default a-la Eaton-Gersovitz coexist. This allows for both fundamental and market-sentiment driven debt crises. Self-fulfilling crises arise because of a lender’s coordination problem when multiple equilibria are feasible. Conditional on the country’s Net Foreign Asset position, additional reserves make the sovereign more willing to service its debt even when no new borrowing is possible, which enlarges the set of states in which repayment is the government’s dominant strategy and this in turn reduces the set of states that admit a self-fulfilling crisis. From an ex-ante perspective, reserves reduce the probability of crises in the future and which lowers current sovereign spreads. The result depends on the existence of roll-over risk and debt not being limited to one period debt. This paper advances existing models by accounting not only for the self-insurance role of reserves against self-fulfilling crises but also for their part in reducing the probability of such events. My findings are in line with the empirical literature on vulnerability measures to sovereign debt crisis that shows the connection between international reserves, the probability of debt crises and sovereign spreads. Quantitatively the model can explain 60% of Mexico’s international reserves holdings, while accounting for key cyclical facts, showing the relevance of the proposed mechanism.

Further research will leverage on this framework’s ability to evaluate policy prescriptions aimed at preventing debt crises. There is a wide range of crises vulnerability indicators based on reserves ratios and corresponding policy rules for emerging economies. My research will contribute to our understanding of this polices and propose potential improvements. Also, this framework can assess the effectiveness of contingent credit or swap lines recently put in place by the IMF and developed countries central banks.

In joint work with Enrique Mendoza (University of Pennsylvania), titled “Optimal v. Simple Financial Policy Rules in an Equilibrium Model of Credit Booms and Crashes” we evaluate the effectiveness of optimal versus simple financial policy rules in a model of a small open economy with production, liability dollarization and “unconventional shocks” in the form of global liquidity shifts and news about future fundamentals. In our model, both tradable and nontradable goods are produced using intermediate goods traded in world markets. Debt is denominated in units of tradables, and a collateral constraint limits debt to a fraction of the market value of total income. The optimal
policy has a macroprudential or ex-ante component: a debt tax levied at date t only when the collateral constraint is not currently binding but may do so at t + 1, as well as an ex-post component: sectoral production taxes/subsidies used when the collateral constraint binds. The optimal policy, although complex, is very effective at reducing the magnitude and severity of financial crises. Simple policies can be effective but need to be constructed carefully otherwise they can be welfare reducing.

The paper “Fighting for the Best, Losing with the Rest: On the Desirability of Competition in Financial Markets” developed with Daniel Wills, is motivated by the Jumpstart Our Business Startups (JOBS) act of 2012, which aimed at increasing funding access for young firms by easing securities regulation. We ask if there is a role for the regulation of the market of funds for firms that lack collateral and have a large uncertainty about their ability to generate profits. To answer that we characterize optimal financial contracts in a competitive environment with risk, adverse selection and limited liability. We find that competition among financial intermediaries always forces them to fund projects with negative expected returns both from a private and from a social perspective. Intermediaries use steep payoff schedules to screen entrepreneurs, but limited liability implies this can only be done by giving more to all entrepreneurs. In equilibrium competition for the profitable entrepreneurs force intermediaries to offer better terms to all customers, there is cross subsidization among entrepreneurs and intermediation profits are nil. The three main features of our framework (competition, adverse selection and limited liability) are necessary in order to get the inefficient laissez-faire outcome and a role for financial regulation. Our result remains robust when firms can collateralize some portion of the credit as long as there is still an unsecured fraction.

Finally in “Optimal Capital Taxes and Entrepreneurial Choice: New vs Old Money”, joint work with Ali Shourideh from Carnegie Mellon University and Daniel Wills from the University of Pennsylvania, we characterize optimal business and labor income tax schedules in an environment in which agents can choose to be entrepreneurs or workers. Agents privately observe their skill for each occupation and also privately decide the corresponding investment and effort intensities. The different nature of the incentive structure in each sector results in a distortion of the occupational choice margin, and the resulting sector specific tax schedules are different than they would be in a world without sector mobility. In the case where workers supply hours inelastically, a Rawlsian planner sets the marginal tax on labor income always higher than the marginal tax on operating profits; in particular consumption is not equalized among workers.
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Undergraduate Studies:
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Thesis Title: “Essays in social norms”
Expected Completion Date: June 2017

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Teaching and Research Fields:
Research fields: Applied microeconomic theory, social norms, political economy
Teaching fields: Microeconomics, game theory, social choice, political economy

Teaching Experience:
Fall 2012, Spring 2013, Fall 2014  
TA, Introductory microeconomics
Spring 2014  
TA, Social choice
Spring 2015  
Lecturer, Introductory microeconomics
Summer 2015, Summer 2016  
Lecturer, Game theory
Fall 2015  
TA, Game theory
**Professional activities**

- Fall 2013: Organizer, Micro theory reading group
- Fall-Spring 2015: Organizer, Micro theory seminar

**Seminars and conferences:**

- Spring 2016: Pennsylvania Theory Conference
- Summer 2016: North American Summer Meeting of the Econometric Society, Stony Brook Game Theory Conference, Game Theory Society World Congress

**Research Papers:**

- "Fads and imperfect information" *(Job Market Paper)*
  A fad is something that is popular for a short time, then unpopular. For example, in the 1960s tailfins on cars were popular, in the 1970s they were not. I study a model in which fads are driven through the channel of imperfect information. Some players have better information about past actions of other players, and all players have preferences for choosing the same actions as well-informed players. I show that in equilibrium, better informed (high type) players initially pool on a single action choice. Over time, the low type players learn which action the high type players are pooling on, and start to mimic them. Once a tipping point is reached, the high type players switch to a different action, and the process repeats. I explicitly compute equilibria for a specific parameterization of the model. Low type players display instrumental preferences for conformity, choosing actions which appear more popular, while high type players sometimes coordinate on actions which appear unpopular. Improving the quality of information to low type players does not improve their payoffs, but increases the rate at which high type players switch between actions.

- "Voting as a signal of education"
  Since the chance of swaying the outcome of an election by voting is usually very small, it cannot be that voters vote solely for that purpose. So why do we vote? One explanation is that smarter or more educated voters have access to better information about the candidates and that people have a concern for appearing to be well-informed through their choice of whether to vote. If voting behavior is publicly observed, then more educated voters may vote to signal their education, even if the election itself is inconsequential and the cost of voting is the same across voters. I explore this explanation with a voting game in which players are unsure about the importance of swaying the election, high type players receive more precise signals, and all players have a reputational concern for appearing to be the high type through their decision whether to vote. I find that in very large games, voter turnout and the signaling return to voting remains high even though the chance of swaying the election disappears and the cost of voting is the same for all types. I explore generalizations of this model, and close by comparing the stylized features of voter turnout to the features of the model.

- "Honor among thieves: Reputation dynamics in a black market" *(joint with Jan Tilly)*
  We analyze reputation dynamics in an online market for illicit drugs using a novel dataset of prices and ratings. The market is a black market, and so contracts cannot be enforced. We document the role reputation plays in alleviating adverse selection in this market. Consistent with prior literature, there is a positive correlation between the price and the rating of a seller. We show that this effect is increasing in the number of reviews left for a seller. A mature highly-rated seller charges a 20% higher price than a mature low-rated seller, while for young sellers, the rating has no correlation with the price. Sellers with more reviews charge a higher price than sellers with low reviews regardless of rating, and low-rated sellers are more likely to exit the market and make fewer sales. We show that these stylized facts are explained by a dynamic model of adverse selection, ratings, and exit, in which buyers form rational inferences about the quality of a seller jointly from his rating and number of sales. Sellers who receive low ratings initially charge the same price as high rated sellers since early reviews are less informative about quality. Bad sellers exit rather than face lower prices in the future.

**Scientific software:**

- matchingR: Library of matching algorithms implemented in R [https://cran.r-project.org/web/packages/matchingR/](https://cran.r-project.org/web/packages/matchingR/)
- tikz3d: Library for drawing 3D images in LaTeX [https://github.com/njanetos/tikz3d](https://github.com/njanetos/tikz3d)
- taoR: R bindings for TAO optimization [https://github.com/jtilly/taoR](https://github.com/jtilly/taoR)
Fads are a pervasive economic phenomenon, and large industries (advertising, branding, etc.) exist with the goal of influencing which products are ‘in vogue’ by influencing who is perceived to be choosing which actions. In my job market paper, ‘Fads and imperfect information’, I provide a framework to analyze such behavior, grounded in rational agents, and based on asymmetric information. I model fads as an equilibrium outcome of a dynamic game with imperfect information. The game has high- and low-type players who differ from each other in two ways. First, all players want to match the actions of high-types and want not to match the actions of low-types. Second, the high-type players have access to better information about the actions chosen by players in the past—although no player has any special ability to identify which types chose which actions. The high-type players are interpreted as a well-connected ‘in-group’, and the low-type players as an ‘out-group’. For example, the high-type players may be interpreted as people who live in Manhattan, the low-types as people who live in a rural area, and the actions as some choice between styles of clothing to wear. Equilibria of this game display cyclical behavior. Initially, the high-type players coordinate on an action. Over time, the low-type players learn which action this is, and start playing it too. Eventually, a tipping point is reached, and the high-type players switch to coordinate on a different action. They can do so because they are the first to perceive that an action has become too popular. These dynamics then repeat, with players periodically switching between actions.

I argue that the model formalizes an intuition about the dynamics of social identity. We draw credible, positive inferences about well-dressed people—not because they signal their wealth by buying expensive clothing, but because they signal that they are the sort of people who understand what one wears in order to appear ‘well-dressed’. When the out-group can learn what members of the in-group are wearing, the meaning of ‘well-dressed’ must shift over time to remain credible, and the rate at which it shifts is driven by the speed at which the out-group learns.

Equilibria of the game have surprising properties. Low-type players fail to coordinate on the high-type’s actions because they have access to information which is more ‘out-of-date’ about the actions of others. Giving low-type players more up-to-date information causes them to learn faster, and high-type players to switch more rapidly. The net effect on welfare is zero. The model, therefore, suggests an explanation for why we cycle through fads more rapidly today than a century ago: the increasing democratization of information (through radio, television, social media, etc.) has made it easier for the out-group to learn, speeding up fads, even if it has not improved their welfare.

I show also that low-type players behave as if they had preferences for conformity. They simply imitate the actions they see were taken in the past. On the other hand, high-type players sometimes behave as if conformist, and sometimes behave as if anti-conformist. Finally, I consider several extensions to the model. In one, the in-group has access to older information about
the actions of other players; in this case, they coordinate on actions which appear relatively less popular recently. In another, players have preferences for appearing to be part of the out-group; in this case, no cyclical dynamics can be supported, and players simply randomize independently over actions.

A second project, ‘Voting as a signal of education’, is motivated by the two facts that voters in the US are, on average, better educated than the population as a whole, and that self-reported voter turnout is significantly higher than actual voter turnout. This suggests that there is a reputational aspect to voting driven by a concern for appearing to be well-informed. I study voting game in which some players are better informed about the candidates standing for election. All players have the same cost to voting and preferences for swaying the election, and, most importantly, all players have a reputational concern for appearing to be well-informed through their voting choice.

In the game, as the number of players grows large, the chance of any individual voter swaying the election (the pivot probability) disappears. Voters endogenously tend to be better-informed than non-voters, and so a large percentage of players vote—even in large elections—in order to signal their education. The signaling is driven not by heterogeneity in the cost of voting, but by heterogeneity in voter’s beliefs about the value of swaying the election. In contrast to other literature on voting as signaling, the pivot probability plays an important role in driving voter turnout. The paper thus provides a resolution to the ‘paradox of voting’, demonstrating that large levels of voter turnout can be supported even when the chance of swaying the election is very small. Improving the quality of all player’s information has an ambiguous effect on voter turnout. This result sheds light on the puzzle that that over the past century, educational attainment in the US has significantly increased, while voter participation has not, even as voting participation and education are correlated.

In joint work with Jan Tilly, I empirically study cooperation in an online market for illicit drugs. In such markets contracts cannot be enforced, and so cooperation must be sustained through reputation. A key contribution of the project is the creation of a large, novel dataset of price and reputation in a black market over two years. The dataset contains seller- and good-level histories of prices, sales, and reviews. Using this dataset, we study the dynamics of reputation in the market. We find that young, poorly-rated sellers charge the same price as young, highly-rating sellers, but that mature poorly-rated sellers face significantly lower prices and are more likely to exit. The average rating of a seller is ‘U’-shaped as a function of time. We argue that these features are consistent with Bayesian consumers drawing rational inferences from ratings consistent with the entry and exit behavior of sellers, and we formulate and estimate a dynamic model of adverse selection and reputation.
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Expected Completion Date: May 2017

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Research/Teaching Fields:
Primary: Public Economics, Health Economics
Secondary: Labor Economics, Industrial Organization

Research Experience and Other Employment:
2010-2011 Korea Fair Trade Commission, Research Assistant
Teaching Experience:
Fall, 2015  Microeconomics for Managers, Wharton MBA, Head Teaching Assistant
Fall, 2014  Microeconomics for Managers, Wharton MBA, Teaching Assistant for Professor Kate Ho and Professor Matthew Weinberg
Fall, 2013  Microeconomics for Managers, Wharton MBA, Teaching Assistant for Professor Judd Kessler

Seminar and Conference Presentations:
2016  Center for Retirement Research, Boston College
      ASHEcon Biennial Meetings, University of Pennsylvania
      Econometric Society North American Summer Meetings, Philadelphia
      Social Security Administration RRC Annual Meetings, Washington, D.C.
2015  Canadian Health Economics Study Group Meetings, University of Toronto

Honors, Scholarships, and Fellowships:
2016-2017  Maloof Family Dissertation Fellowship in Economics, University of Pennsylvania
2015-2016  Center for Retirement Research Dissertation Fellowship, Boston College
2011-2016  Doctoral Study Scholarship, Korean Foundation for Advanced Studies

Job Market Paper:
"An Equilibrium Analysis of the Long-Term Care Insurance Market"
This paper provides new empirical explanations for why the long-term care insurance market has not been growing. Coverage rates are low and premiums have risen sharply. I develop and estimate a dynamic non-cooperative model of the family in which parents and children interact over long-term care decisions. Counterfactual competitive equilibrium analyses of the long-term care insurance market show two main mechanisms by which informal care accounts for the small size of the market. First, private information about the availability of informal care limits the size of the market by creating substantial adverse selection. Counterfactual pricing on child demographics that are predictive of the informal care availability reduces private information, and increases the equilibrium coverage rate by 58 percent. Second, children provide informal care in part to protect bequests from formal care expenses. Insurance protects bequests from formal care expenses and therefore undermines this strategic informal care incentive. I find that some parents forgo insurance to use bequests as effective instruments to elicit informal care. This effect reduces the equilibrium coverage rate by 43 percent. I also use the estimated model to understand the reasons for the recent soaring premiums in the long-term care insurance market. The average empirical premium before the recent hikes is below the equilibrium premium by 80 percent, suggesting that products were initially underpriced. Decreasing informal care availability for more recent birth cohorts increases the overall risk and puts upward pressure on the equilibrium premium.

Research Papers in Progress:
"Hospital Price Transparency and Insurer Competition"
With cost sharing, a consumer's willingness-to-pay for a health plan is expected to decrease in the plan's negotiated hospital prices. At first glance, an insurance company who succeeded in negotiating very low hospital prices should have an incentive to disclose its negotiated hospital prices to consumers. However, in practice, insurers do not disclose their negotiated hospital prices to consumers. This paper studies theoretically why negotiated hospital prices are not disclosed and investigates empirically the effects of hospital price transparency regulations on insurer competition. I develop a model of insurer competition where insurers face a trade-off in disclosing their negotiated hospital prices. This paper studies theoretically why negotiated hospital prices are not disclosed and investigates empirically the effects of hospital price transparency regulations on insurer competition. I develop a model of insurer competition where insurers face a trade-off in disclosing their negotiated hospital prices. On one hand, informing consumers of low hospital prices is beneficial as it generates higher demand. On the other hand, informing competing insurers of low hospital prices is costly as informed competitors will lower premiums to make their health plans more appealing. When the loss from increased competition outweighs the gain from informing consumers, there is an equilibrium where even the insurer with the lowest hospital prices forgoes disclosure. I empirically test implications of the model using variation in
negotiated hospital price transparency regulations across states and insurer-state-year level financial data. I find evidence that transparency regulations reduce premiums and insurer profits, consistent with the model's prediction.

“Partial Rating Area Offering in the ACA Marketplace” (joint with Hanming Fang)
The Affordable Care Act (ACA) requires that insurers selling plans in the Health Insurance Marketplace vary premiums only by age, smoking status and “rating area” which usually consists of multiple counties. In a given rating area, the ACA mandates uniform pricing for all counties, but, it does not mandate universal offering. We document the prevalence of a phenomenon that we label as partial rating area offering where plans are not sold to all counties within a rating area. Using individual health plans sold in 34 states with federally-facilitated marketplaces, we find that 57 percent of plans are not sold to all counties in a rating area and 63 percent of rating areas have some plans that are not universally offered to all counties. We hypothesize three explanations for this phenomenon: 1) insurers may selectively offer plans to risk screen consumers, 2) insurers may restrict offerings to avoid competition, and 3) insurers may not offer plans in counties where they have relatively narrower provider networks. We develop a simple model of insurer competition that captures these three possibilities and empirically test the model's implications.
Research Summary

My research examines the demand for and the provision of long-term care and health insurance plans to explore welfare-improving policies.

“An Equilibrium Analysis of the Long-Term Care Insurance Market” [Job Market Paper]

Over 60 percent of 65 year-olds will incur on average $100,000 in long-term care expenses in their remaining life. Yet, only 13 percent of the elderly own private long-term care insurance. Along with relatively low coverage rates, the long-term care insurance market has undergone dramatic changes in premiums and in market structure over the last couple of years. The average premium more than doubled and the number of insurance companies selling policies plunged from over one hundred to a dozen. The primary goal of the paper is to understand how informal care provided by the family can explain the small size of the long-term care insurance market and explore welfare-improving policies. A second goal of the paper is to understand the reasons for the recent unraveling of the market.

To achieve these goals, I develop and estimate a dynamic non-cooperative model of an elderly parent and an adult child. The parent has preferences over informal and formal care and values leaving a bequest to the child. The parent makes savings decisions and can have formal care paid by Medicaid if eligible. The child may provide informal care out of altruism or to protect her bequest from formal care expenses. The child’s cost of providing informal care includes foregone labor income and a psychological burden, which may vary by the child’s demographics. Among other things, the parent’s long-term care insurance decision is affected by the likelihood of receiving informal care and the chance of becoming Medicaid eligible. The model is estimated using data from the Health and Retirement Study 1998-2010 using the conditional choice probability (CCP) method. Estimation is based on actual premium data over the sample period. Then, I use the estimated model to analyze the counterfactual competitive equilibrium of the long-term care insurance market.

In the first set of counterfactuals, I examine mechanisms by which informal care accounts for the small size of the long-term care insurance market and explore welfare-increasing policies. There are two main results. First, private information about the availability of informal care creates substantial adverse selection. In equilibrium, the market only serves risky individuals who have limited informal care availability. Counterfactual pricing on child demographics that are predictive of the informal care availability reduces private information, increases the equilibrium ownership rate by 58 percent, and creates welfare gains. Second, there is a family moral hazard effect of insurance and children reduce the informal care rate by almost 20 percent in response to their parents’ insurance coverage. This is because insurance protects bequests from formal care expenses and therefore undermines children’s informal care incentives. Family moral hazard results in strategic non-purchase of insurance where parents forgo insurance to elicit more informal care from children. I find that family moral hazard reduces the equilibrium ownership rate by 43 percent.
In the second set of counterfactuals, I provide explanations for the recent unraveling of the market. First, I find that the average empirical premium before the recent hikes is below the equilibrium premium by 80 percent. I provide potential explanations for underpricing such as the relatively short history of the long-term care insurance market and the underestimated magnitude of adverse selection and family moral hazard. Second, I find demographic changes also account for the recent premium hikes. As baby boomers replace their former generation and become the major consumers of the long-term care insurance market, the equilibrium premium increases by 10 percent. This is because baby boomers are at higher risk for using formal care as they have fewer children and are therefore more costly to insurance companies.

“Hospital Price Transparency and Insurer Competition”

With cost sharing, a consumer’s willingness-to-pay for a health plan is expected to decrease in the plan’s negotiated hospital prices. At first glance, an insurance company who succeeded in negotiating very low hospital prices should have an incentive to disclose its negotiated hospital prices to consumers. However, in practice, insurers do not disclose their negotiated hospital prices to consumers. This paper studies theoretically why negotiated hospital prices are not disclosed and investigates empirically the effects of hospital price transparency regulations on insurer competition. I develop a model of insurer competition where insurers face a trade-off in disclosing their negotiated hospital prices. On one hand, informing consumers of low hospital prices is beneficial as it generates higher demand. On the other hand, informing competing insurers of low hospital prices is costly as informed competitors will lower premiums to make their health plans more appealing. When the loss from increased competition outweighs the gain from informing consumers, there is an equilibrium where even the insurer with the lowest hospital prices forgoes disclosure. I empirically test implications of the model using variation in negotiated hospital price transparency regulations across states and insurer-state-year level financial data. I find evidence that transparency regulations reduce premiums and insurer profits, consistent with the model’s prediction.

“Partial Rating Area Offering in the ACA Marketplace (joint with Hanming Fang)”

The Affordable Care Act (ACA) requires that insurers selling plans in the Health Insurance Marketplace vary premiums only by age, smoking status and “rating area” which usually consists of multiple counties. In a given rating area, the ACA mandates uniform pricing for all counties, but, it does not mandate universal offering. We document the prevalence of a phenomenon that we label as partial rating area offering where plans are not sold to all counties within a rating area. Using individual health plans sold in 34 states with federally-facilitated marketplaces, we find that 57 percent of plans are not sold to all counties in a rating area and 63 percent of rating areas have some plans that are not universally offered to all counties. We hypothesize three explanations for this phenomenon: (1) insurers may selectively offer plans to risk screen consumers, (2) insurers may restrict offerings to avoid competition, and (3) insurers may not offer plans in counties where they have relatively narrower provider networks. We develop a simple model of insurer competition that captures these three possibilities and empirically test the model’s implications.
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Undergraduate Studies:
B.A., Economics, Fudan University, 2009

Master Level Works:
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Teaching and Research Fields:
Microeconomic Theory, Mechanism Design

Teaching Experience:
Spring, 2013  Development Economics, University of Pennsylvania, teaching assistant for Professor Flavio Cunha
Summer, 2013/2014  Summer Math Camp (Graduate Level), University of Pennsylvania, instructor
Fall, 2012/2013  Microeconomic Theory II (Graduate Level), University of Pennsylvania,
teaching assistant for Professor George Mailath and Professor Mallesh Pai

Spring, 2012
Intermediate Macroeconomics, University of Pennsylvania, teaching assistant
for Professor Ufuk Akcigit

Research Experience and Other Employment:
2013 University of Pennsylvania, Research Assistant for Professor Mallesh Pai

Professional Activities:
Presentations:
2016 EconCon, Princeton
2016 The 27th International Conference on Game Theory, Stony Brook
2016 North American Summer Meeting of the Econometric Society, Philadelphia
2016 Pennsylvania Economic Theory Conference (Poster), State College
2016 Micro Student Lunch Seminar, New York University
2015 INFORMS Annual Meeting, Philadelphia
2015 11th World Congress of the Econometric Society, Montreal
2015 3rd Summer School of the Econometric Society, Tokyo
2014 Asian Meeting of the Econometric Society, Taipei
2014 Fudan Workshop on Economic Dynamics, Shanghai
2013 14th ACM Conference on Electronic Commerce, Philadelphia

Referee Activities:
Theoretical Economics, Operations Research, Optimization Methods and Software, China Economic
Review, SAGT 2014, WINE 2016

Honors, Scholarships, and Fellowships:
2015-2016 SAS Dissertation Completion Fellowship, University of Pennsylvania
2014-2015 Sydney Weintraub Memorial Fellowship, University of Pennsylvania
2013-2014 Xinmei Zhang Fellowship, University of Pennsylvania
2011-2013 Benjamin Franklin Fellowship, University of Pennsylvania

Publications in Journals
“Approximation in Mechanism Design with Interdependent Values”, Games and Economic Behavior,
Available online 25 January 2016. (A one-page abstract of an earlier version of this paper appeared in

This paper studies the revenue maximization problem in environments wherein buyers have
interdependent values and correlated types. We show that (1) when the system of feasible sets is a
matroid and buyer valuations satisfy a single-crossing condition, the generalized Vickrey-Clarke-Groves
mechanisms with lazy reserves (VCG-L) are ex-post incentive compatible and ex-post individually
rational; (2) if, in addition, the valuation distribution satisfies a generalized monotone hazard rate
condition, the VCG-L mechanism with conditional monopoly reserves is approximately optimal. Then
we construct an ascending auction that implements the truth-telling equilibrium of a VCG-L mechanism
in ex-post equilibrium. Finally, we discuss the connection between the VCG-L mechanisms and greedy
algorithms studied in Lehmann et al. (2002) and deferred-acceptance auctions studied in Milgrom and
Segal (2014), and the impact of competition by proving a Bulow and Klemperer (1996) type result.
Research Papers:

“Mechanism Design with Financially Constrained Agents and Costly Verification” (Job Market Paper)

A principal wishes to distribute an indivisible good to a population of budget constrained agents. Both valuation and budget are an agent's private information. The principal can inspect an agent's budget through a costly verification process and punish an agent who makes a false statement. I characterize the direct efficiency-maximizing mechanism. This direct mechanism can be implemented by a two-stage mechanism. Specifically, all agents report their budgets in the first stage. The principal then provides budget-dependent cash subsidies to agents and assigns the goods randomly (with uniform probability) at budget-dependent prices. In the second stage, a resale market opens, but is regulated with budget-dependent sales taxes. Agents who report low budget receive more subsidies in their initial purchases (the first stage), face higher taxes in the resale market (the second stage) and are inspected randomly. This implementation shares some features of welfare programs in practice.

“Mechanism Design with Costly Verification and Limited Punishments” (2016)

A principal has to allocate a good among a number of agents, each of whom values the good. Each agent has private information about the principal's payoff if he receives the good. There are no monetary transfers. The principal can inspect agents' reports at a cost and penalize them, but the punishments are limited. I characterize an optimal mechanism featuring two thresholds. Agents whose values are below the lower threshold and above the upper threshold are pooled, respectively. If the number of agents is small, then the pooling area at the top of value distribution disappears. If the number of agents is large, then the two pooling areas meet and the optimal mechanism can be implemented via a shortlisting procedure.

“Efficient Mechanisms with Information Acquisition” (2016)

This paper studies the design of ex ante efficient mechanisms in situations where a single item is for sale, and agents have positively interdependent values and can covertly acquire information at a cost before participating in a mechanism. I find that when interdependency is low and/or the number of agents is large, the ex post efficient mechanism is also ex ante efficient. In cases of high interdependency and/or a small number of agents, ex ante efficient mechanisms discourage agents from acquiring excessive information by introducing randomization to the ex post efficient allocation rule in areas where the information's precision increases most rapidly.

“An Efficient Ascending Auction” (2016)

This paper proposes an ascending auction that yields an efficient outcome when the seller is restricted to sell bundles whose elements form a basis of a matroid and agents have interdependent values. This ascending auction generalizes Bikhchandani et al. (2010) who assume agents have independent private values; and Perry and Reny (2005) who study multi-unit good auctions. The key feature of the auction is that agents are permitted to express different demands against different elements.

“Endogenous Labor Market Cycles” (2016), with Cheng Wang

We show that in a perfectly stationary physical environment of the labor market, moral hazard and optimal termination in long-term contracts can generate two-period and much longer cycles in employment and unemployment, and in other aggregate activities, including the creation and destruction of jobs, and the flows of workers entering and exiting employment. We argue that such a theory sheds light on the unemployment volatility puzzle, which has inspired many discussions in the literature.
“Contingent Mechanisms with Endogenous Information”

This paper studies contingent mechanisms, i.e., mechanisms in which the payment by an agent is contingent on his ex post payoff, when agents can covertly acquire information at a cost before participating in the mechanism. We first consider security-bid auctions in which the seller restricts the security design to an ordered set and uses a standard auction format (e.g., first- or second-price auction). We find that auctions using steeper securities provide lower incentives for agents to acquire information. Furthermore, this difference in incentives to acquire information may overturn the revenue ranking among security designs in Demarzo et al. (2005). We also study the design of optimal linear contingent mechanism when information in endogenous.
Dissertation Abstract
Yunan Li
Department of Economics, University of Pennsylvania

I am a microeconomic theorist focused on mechanism design, which studies what an institution can achieve when the information necessary to make decisions is dispersed and privately held. In many important applications, this information is endogenously influenced by the actions of the principal and/or agents. A useful example to illustrate this point is a start-up company that wants to bring a new product to the market and needs to attract funding. The start-up company can learn the worth of the product by developing a prototype and gathering information about target customers. A venture capital firm can also investigate the technical and the economic feasibility of the product, which is initially privately known by the start-up company. These issues do not fit into the standard mechanism design literature which largely focuses on environments in which exogenous information is privately held by agents. A common thread in my research agenda is the study of mechanism design problems in a richer information environment. Specifically, my research explores the following two environments: one where the principal can verify agents’ information; and one where agents can covertly acquire information.

Mechanism Design with Costly Verification

The standard mechanism design literature on allocation problems has largely focused on mechanisms with only monetary transfers and has ignored the possibility of the principal verifying agents’ information. In many applications, the principal can obtain information about agents at a cost. For example, the head of personnel for an organization can verify a job applicant’s claim or monitor his performance once he is hired. Hence, I think it is important to consider this option.

In the paper “Mechanism Design with Costly Verification and Limited Punishments”, I consider a situation in which verification is costly for the principal and punishment can be limited because verification is imperfect or information arrives only after the agent has been hired for a while. I characterize an optimal mechanism which has two thresholds. Agents whose values are below the lower threshold and above the upper threshold respectively are pooled. If the number of agents is small, then the pooling area at the top of the value distribution disappears. In the case of intermediate and large numbers of agents, the optimal allocation rule also involves pooling at the top. If the number of agents is sufficiently large, then the two pooling areas meet and the optimal mechanism can be implemented via a shortlisting procedure.

In my job market paper “Mechanism Design with Financially Constrained Agents and Costly Verification”, I study the problem of a principal who wishes to distribute an indivisible good to a population of budget-constrained agents, such as public housing and social health care programs. Both valuation and budget are the private information of an agent, but the principal can inspect an agent’s budget through a costly verification process. Indeed, in many public programs, applicants are subject to a set of eligibility conditions such as monthly income and family nucleus. Based on the literature which studies allocation problems among financially-constrained agents, I consider mechanisms with monetary transfers and add the option of costly verification on budgets.

I characterize the (direct) efficiency-maximizing mechanism and also provide an implementation via a two-stage mechanism. For tractability, I assume there are only two budget types: low and high. In the first stage, agents report their budgets and the principal allocates the goods randomly. Agents who report low budgets receive more cash and in-kind subsidies, and their reports are verified randomly. In the second stage, a resale market opens but is regulated. Agents who report low budgets face higher resale tax, and their reports are verified randomly if they do not sell. This resembles the public housing
program in Singapore, which imposes more restrictions on the resale of agents whose initial purchases are subsidized by the government.

A technical challenge of this paper is that the binding incentive compatibility (IC) constraints are endogenous. This problem is also ubiquitous in multidimensional screening problems with only monetary transfers and mechanism design problems with costly verification. To overcome this difficulty, I develop a novel method which can potentially be used to solve other problems.

**Mechanism Design with Information Acquisition**

In many practical settings, agents can acquire more information. An example is the sale of financial or business assets, in which buyers perform due diligence to investigate the quality and compatibility of the assets before submitting offers. Moreover, it is costly to acquire information. In the sale of a business asset, the legal and accounting costs of performing due diligence often amount to millions of dollars.

In the paper “Efficient Mechanism with Information Acquisition”, I study the design of the (ex-ante) efficient mechanism in the sale of a single object when agents’ values are positively interdependent. I focus on symmetric mechanisms that treat all agents identically, and on symmetric equilibria in which agents acquire the same amount of information before participating in the mechanism. I find that, when interdependency is low and/or the number of agents is large, the ex-post efficient mechanism is also ex-ante efficient. In cases of high interdependency and/or a small number of agents, ex-ante efficient mechanisms discourage agents from acquiring excessive information by introducing randomization to the ex-post efficient allocation rule in areas where the information’s precision increases most rapidly.

Surprisingly, few studies have considered contingent mechanisms (mechanisms in which the payment by an agent is contingent on his ex post payoff) in the context of endogenous information. In the paper “Contingent Mechanisms with Endogenous Information”, I study a general class of contingent mechanisms: security-bid auctions. In these security-bid auctions, the seller restricts the security design to an ordered set and uses a standard auction format such as first-price or second-price auction. I find that auctions using steeper securities provide lower incentives for agents to acquire information and that security-bid auctions provide agents with lower incentives to acquire information than cash auctions. Furthermore, this difference in incentives to acquire information may overturn the revenue ranking among security designs when information is exogenous. I also characterize the revenue-maximizing linear contingent mechanism (mechanisms in which an agent’s payment linearly depends on the realized value when information is endogenous). In the optimal mechanism, the winner can keep all of the future cash flow if his reported value is high but only a small fraction of it when his reported value is low.

**Algorithmic Mechanism Design**

Another standard informational assumption in the mechanism design literature is that the prior distribution of agents’ private information is common knowledge. An optimal mechanism is often finely tuned to this prior distribution and viewed as too complicated and not “robust” in practice. These concerns have motivated many studies including that of the performance of simple mechanisms such as Vickrey-Clarke-Groves mechanisms. In the paper “Approximation in Mechanism Design with Interdependent Values”, I study the revenue maximization problem in environments where buyers have interdependent values and correlated types. I show that: firstly, when the system of feasible sets is a matroid and buyer valuations satisfy a single-crossing condition, the generalized Vickrey-Clarke-Groves mechanisms with lazy reserves (VCG-L) are ex-post incentive compatible and ex-post individually rational; secondly, if, in addition, the valuation distribution satisfies a generalized monotone hazard rate condition, the VCG-L mechanism with conditional monopoly reserves is approximately optimal. Then I construct an ascending auction that implements the truth-telling equilibrium of a VCG-L mechanism in ex-post equilibrium.
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- Fall 2014: Topics in Econometrics: Forecasting, University of Pennsylvania, Teaching Assistant for Professor Francis X. Diebold
- Spring 2013, 2014: Econometrics II: Methods (graduate), University of Pennsylvania, Teaching Assistant for Professor Francis X. Diebold
- Fall 2013: Introduction to Microeconomics, University of Pennsylvania, Recitation Instructor for Professor Rebecca M. Stein
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- Summer 2014: Federal Reserve Bank of Richmond, Dissertation Fellow
- 2012-2013: University of Pennsylvania, Research Assistant for Professor Frank Schorfheide
- 2009-2010: University of Rochester, Research Assistant for Professors Mark Aguiar and Mark Bils
- 2007-2008: Tsinghua University, Research Assistant for Professor Chong-En Bai

Professional Activities:

Extramural Presentations:
- December 2016: Federal Reserve Bank of Philadelphia, Philadelphia, PA
- October 2016: Midwest Econometrics Group Annual Meeting, Champaign, IL
- November 2015: Federal Deposit Insurance Corporation (FDIC), Washington, DC
- August 2014: EconCon Conference, Princeton, NJ (as presenter and discussant)
- June, August 2014: Federal Reserve Bank of Richmond, Richmond, VA

Intramural Seminars:
- University of Pennsylvania Econometrics Lunch (numerous times)
- University of Pennsylvania Econometrics Research/Reading Group (numerous times)

Referee Service:
- International Journal of Central Banking

Others:
- 2014-2015: University of Pennsylvania Econometrics Club Support Team
- 2013-2014: Co-chair, University of Pennsylvania Graduate Economics Society

Honors, Scholarships, and Fellowships:
- 2016: Robert Summers Dissertation Fellowship in Economics, University of Pennsylvania
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- 2012: Xinmei Zhang and Yongge Dai Fellowship, University of Pennsylvania
- 2012: Best Performance in Econometrics 1st Year, University of Pennsylvania
- 2011: University Fellowship, University of Pennsylvania
- 2010: Norman M. Kaplan Memorial Prize (best first-two-year performance), University of Rochester
- 2009: Lionel and Blanche McKenzie Family Fellowship (best 1st-year performance), University of Rochester
Research Papers:

Abstract: This paper constructs unit-specific density forecasts for a panel of firms or households using a dynamic linear model with common and heterogeneous parameters and cross-sectional heteroskedasticity. The distribution of the heterogeneous coefficients is modeled nonparametrically, allowing for correlation between heterogeneous coefficients and initial conditions as well as unit-specific regressors. A benchmark for the density forecasts is the (infeasible) oracle forecast which is defined as the posterior predictive distribution for the unit-specific outcomes under the assumption that the common parameters and the distribution of the heterogeneous coefficients are known. I develop a simulation-based posterior sampling algorithm specifically addressing the nonparametric density estimation of unobserved heterogeneous coefficients. I prove that both the estimated common parameters and the estimated distribution of the heterogeneous coefficients achieve posterior consistency, and that the density forecasts asymptotically converge to the oracle forecast. Monte Carlo simulations demonstrate improvements in density forecasts relative to parametric approaches. An application to young firm dynamics also shows that the proposed predictor provides more accurate density predictions.

[2] “Forecasting with Dynamic Panel Data Models” (joint with Hyungsik Roger Moon and Frank Schorfheide)

Abstract: We consider the problem of forecasting panel data with a large cross-sectional and a small time-series dimension. We consider a linear correlated random effects specification and construct a predictor using Tweedie's formula for the posterior mean of the heterogeneous coefficients. This formula utilizes cross-sectional information to transform the unit-specific (quasi) maximum likelihood estimator into an approximation of the posterior mean under a prior distribution that equals the population distribution of the random coefficients. We show that the risk of a predictor based on a non-parametric estimate of the Tweedie correction is asymptotically equivalent to the risk of a predictor that treats the correlated-random-effects distribution as known (ratio-optimality). Our empirical Bayes predictor performs well compared to various competitors in a Monte Carlo study. In an empirical application we use the predictor to forecast revenues for a large panel of bank holding companies and compare forecasts that condition on actual and severely adverse macroeconomic conditions.


Abstract: We use Lasso methods to shrink, select and estimate the network linking the publicly-traded subset of the world's top 150 banks, 2003-2014. We characterize static network connectedness using full-sample estimation and dynamic network connectedness using rolling-window estimation. Statically, we find that global banking connectedness is clearly linked to bank location, not bank assets. Dynamically, we find that global banking connectedness displays both secular and cyclical variation. The secular variation corresponds to gradual increases/decreases during episodes of gradual increases/decreases in global market integration. The cyclical variation corresponds to sharp increases during crises, involving mostly cross-country, as opposed to within-country, bank linkages.

**Abstract:** Financial institution networks potentially feature large structural changes over time, which would affect the systemic risk of the whole system. This paper focuses on the Diebold-Yilmaz connectedness measure obtained via variance decomposition, and provides a fused Lasso method to estimate structural changes in the VAR coefficients. To address the high-dimensionality problem along both cross-sectional and time-series dimensions, the fused Lasso estimator penalizes the VAR coefficients as well as their successive differences. I prove that under reasonably general conditions, the proposed method can consistently detect the unknown number of breaks, the estimated break dates are sufficiently close to the true dates, and the estimated coefficients asymptotically converge to the true values. Monte Carlo simulation evidence is presented, along with an application to stock return volatilities of the major financial institutions traded in the U.S. stock market. Results show that structural changes in the interaction pattern are more responsible for the recent financial crisis, while the effects of unfavorable individual shocks are negligible.


**Abstract:** We use variance decompositions from high-dimensional vector autoregressions to characterize connectedness in 19 key commodity return volatilities, 2011-2016. We study both static (full-sample) and dynamic (rolling-sample) connectedness. We summarize and visualize the results using tools from network analysis. The full-sample results reveal clear clustering of commodities into groups that match traditional industry groupings, but with some notable differences. The energy sector is most important in terms of sending shocks to others, and energy, industrial metals, and precious metals are themselves tightly connected.

**Computation Skills:** R, C++, MATLAB, EViews, Stata, SAS

**Languages:** English (fluent), Chinese (native)
My dissertation consists of four chapters that develop and implement shrinkage methods that facilitate estimation and improve forecasting performance in high-dimensional panels. Chapter 1 develops semiparametric Bayesian density forecasts for a panel of firms or households. Chapter 2 constructs a novel predictor for point forecasts in a similar panel data context utilizing Tweedie’s formula. Chapter 3 studies a network of global banks using a high-dimensional VAR, estimated via Lasso methods. Chapter 4 proposes a fused Lasso estimator to identify and analyze structural changes in high-dimensional networks.

1. “Density Forecasts in Panel Data Models: A Semiparametric Bayesian Perspective”
   (Job Market Paper)

Panel data, such as a collection of firms or households observed repeatedly for a number of periods, are widely used in empirical studies and can be useful for forecasting individuals’ future outcomes, which is interesting and important in many cases. For example, in the context of young firms, accurate forecasts can help investors select promising startups and assist policymakers in regulating entrepreneur funding. This chapter constructs unit-specific density forecasts using a dynamic linear panel data model with common and heterogeneous parameters and cross-sectional heteroskedasticity.

For illustrative purposes, let us consider a simple dynamic panel data model:

\[ y_{it} = \beta y_{i,t-1} + \lambda_i + u_{it}, \quad u_{it} \sim N\left(0, \sigma^2\right), \]

where \( i = 1, \ldots, N \), and \( t = 1, \ldots, T + 1 \). The \( y_{it} \)'s are observed individual outcomes, \( \beta \) and \( \sigma^2 \) are common parameters, \( \lambda_i \)'s are unobserved individual effects with an underlying distribution \( f^\lambda \). Based on the observed panel up to time \( T \), I am interested in providing density forecasts of \( y_{i,T+1} \). Specifically, density forecasts can capture uncertainty about individual \( i \)'s future outcome, and thus are preferable in applications potentially involving sizeable uncertainties for some units. Once density forecasts are obtained, one can easily recover point and interval forecasts.

A benchmark for evaluating density forecasts is the posterior predictive distribution for \( y_{i,T+1} \) under the assumption that the common parameters and the distribution of the heterogeneous coefficients \( f^\lambda \) are known. I refer to this predictive density as the (infeasible) oracle forecast. Even in the oracle forecast, there are two sources of uncertainty, shocks \( u_{it} \) and heterogeneous individual effects \( \lambda_i \). The latter is due to the lack of time-series information available to infer individual \( \lambda_i \).

In practice, however, \( f^\lambda \) is unknown and unobservable, thus becoming another source of uncertainty. A good feasible predictor calls for a good estimate of \( f^\lambda \). Here I model \( f^\lambda \) nonparametrically where the prior is constructed from a mixture model and allows for correlation between \( \lambda_i \) and \( y_{i0} \) (i.e., a correlated random effects model). Then, I pool the cross-sectional information to make inferences about \( f^\lambda \). The proposed semiparametric Bayesian procedure produces better estimates of the underlying distribution \( f^\lambda \) than parametric approaches, hence more accurate density forecasts of the future outcomes.

The contributions of this chapter are threefold. First, I develop a posterior sampling algorithm specifically addressing nonparametric density estimation of the unobserved \( \lambda_i \)'s. For a random effects model, which is a special case with zero correlation between \( \lambda_i \) and \( y_{i0} \), the \( f^\lambda \) part becomes a relatively simple unconditional density estimation problem. I impose a Dirichlet Process Mixture prior on \( f^\lambda \) and construct a posterior sampler building on the blocked Gibbs sampler proposed by Ishwaran and James (2001, 2002). For a correlated random effects model, I further adapt the proposed algorithm to the much harder conditional density estimation problem using a probit stick breaking process prior suggested by Pati et al. (2013).

Second, I establish the theoretical properties of the proposed semiparametric Bayesian predictor when the cross-sectional dimension \( N \) tends to infinity. Firstly, I provide conditions for identifying both the parametric component \( (\beta, \sigma^2) \) and the nonparametric component \( f^\lambda \). Then, I prove that both the estimated common parameters and the estimated distribution of the heterogeneous coefficients achieve posterior consistency, which is an essential building block for bounding the discrepancy between the proposed predictor and the oracle. Compared to previous literature on posterior consistency, there are several challenges in the current setting: (1) disentangling unobserved individual effects \( \lambda_i \) and shocks \( u_{it} \), (2) incorporating unknown shock size \( \sigma^2 \), (3) adding lagged dependent variables as covariates, and (4) addressing correlated random effects from a conditional density estimation point of view.
Finally, I show that the density forecasts asymptotically converge to the oracle forecast in weak topology, which is new to the nonparametric Bayesian literature and specifically designed for density forecasts.

To accommodate many important features of real-world empirical studies, I extend the simple model to a more general specification. First, a realistic application also incorporates other observables with common effects \((\beta'x_{i,t-1})\), where \(x_{i,t-1}\) can include lagged \(y_{i,t}\). Second, it is helpful to consider observables with heterogeneous effects \((\lambda'w_{i,t-1})\), i.e. a correlated random coefficients model. Finally, beyond heterogeneity in coefficients \((\lambda_i)\), it is desirable to take into account heterogeneity in shock sizes \((\sigma_i^2)\) as well. All numerical methods and theoretical properties are further established for the general specification.

Third, Monte Carlo simulations demonstrate improvements in density forecasts relative to predictors with various parametric priors on \(f^\lambda\), evaluated by log predictive score. An application to young firm dynamics also shows that the proposed predictor provides more accurate density predictions. The better forecasting performance is largely due to three key features (in order of importance): the nonparametric Bayesian prior, cross-sectional heteroskedasticity, and correlated random coefficients. The estimated model also helps shed light on the latent heterogeneity structure and how different factors (e.g. R&D, recession, etc.) contribute to the forecasts.

2. "Forecasting with Dynamic Panel Data Models"
   (with Hyungsik Roger Moon and Frank Schorfheide)

In this chapter, we tackle a different problem in a similar panel data setup as described in Chapter 1. Instead of providing density forecasts via a full Bayes approach, here we consider point forecasts and use an empirical Bayes method that builds on Tweedie's formula to obtain the posterior mean of the heterogeneous coefficients. This formula utilizes cross-sectional information to transform the unit-specific (quasi) maximum likelihood estimator into an approximation of the posterior mean under a prior distribution that equals the population distribution of the correlated random coefficients. Moreover, we show that the risk of a predictor based on a nonparametric estimate of the Tweedie correction is asymptotically equivalent to the risk of a predictor that treats the correlated-random-effects distribution as known (ratio-optimality). Our empirical Bayes predictor performs well compared to various competitors in a Monte Carlo study. In an empirical application we use the predictor to forecast revenues for a large panel of bank holding companies and compare forecasts that condition on actual and severely adverse macroeconomic conditions.

   (with Mert Demirer, Francis X. Diebold, and Kamil Yilmaz)

We use Lasso methods to shrink, select and estimate the network linking the publicly-traded subset of the world’s top 150 banks, 2003-2014. We characterize static network connectedness using full-sample estimation and dynamic network connectedness using rolling-window estimation. Statically, we find that global banking connectedness is clearly linked to bank location, not bank assets. Dynamically, we find that global banking connectedness displays both secular and cyclical variation. The secular variation corresponds to gradual increases/decreases during episodes of gradual increases/decreases in global market integration. The cyclical variation corresponds to sharp increases during crises, involving mostly cross-country, as opposed to within-country, bank linkages.

4. “Structural Changes in Networks: Estimation and Evidence from Financial Institutions”

This chapter provides a fused Lasso method to estimate structural changes in networks. To address the high-dimensionality problem along both cross-sectional and time-series dimensions, the fused Lasso estimator penalizes the VAR coefficients as well as their successive differences. I prove that under reasonably general conditions, the proposed method can consistently detect the unknown number of breaks, the estimated break dates are sufficiently close to the true dates, and the estimated coefficients asymptotically converge to the true values. Monte Carlo simulation evidence is presented, along with an application to stock return volatilities of the major financial institutions traded in the U.S. stock market. Results show that structural changes in the interaction pattern are more responsible for the recent financial crisis, while the effects of unfavorable individual shocks are negligible.
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Research Papers:
“Government Debt and Risk Premium” (Job Market Paper)
I document that government debt is related to risk premia in various asset markets: (1) Debt-to-GDP ratio (BY) positively predicts excess stock returns with out-of-sample R-squared up to 35 percent in a five-year horizon, outperforming many popular predictors. (2) Higher BY is correlated with higher credit risk premia in both corporate bond excess returns and yield spreads. (3) Higher BY is associated with lower real risk free rate. (4) Higher BY predicts lower average returns on government debt. (5) BY positively comoves with fiscal policy uncertainty. I rationalize these empirical findings in a general equilibrium model featuring recursive preferences, endogenous growth, and time-varying fiscal uncertainty. In the model, the tax risk premium is sizable and its time variation is driven by fiscal uncertainty. Furthermore, the model generates endogenous positive relationship between BY and fiscal uncertainty: Fiscal uncertainty increases debt valuation through discount rate channel while higher debt conversely raises uncertainty because of future fiscal consolidation.

“Volatility Risk Pass-Through”, with Ricardo Colacito, Mariano M. Croce and Ivan Shaliastovich
We produce novel empirical evidence on the relevance of output volatility (vol) shocks for both currency and international quantity dynamics. Focusing on G-17 countries, we document several facts: (1) consumption and output vols are imperfectly correlated within countries; (2) across countries, consumption vol is more correlated than output vol; (3) the pass-through of relative output vol shocks onto relative consumption vol is moderate, especially if the uncertainty shocks originate from small countries; and (4) consumption differentials vol and exchange rate vol are disconnected, in contrast to the perfect correlation implied by a model of perfect risk-sharing with time-additive preferences. We rationalize these findings in a frictionless model with multiple goods and recursive preferences featuring a novel-and-rich risk-sharing of vol shocks.

“Volatility, Financial Intermediaries and Exchange Rates”, with Xiang Fang
This paper studies how financial market volatility drives exchange rates through the risk management practice of financial intermediaries. We build a model that the major participants of the international financial market are levered intermediaries subject to Value-at-Risk constraints. Higher portfolio volatility translates into tighter funding conditions. Thus, intermediaries require higher compensation for exchange rate risks. Our model can resolve the Backus-Smith puzzle and forward premium puzzle quantitatively. The relationship between exchange rate, portfolio volatility and funding condition tightness is consistent with the data.
This paper examines growth spillovers between emerging markets (EMs) and advanced economies (AEs). Our empirical results based on a two-bloc set-up and covering the period 1991 to 2015 are twofold. First, we show that the size of the spillovers running from EMs to AEs is about one fifth of that running from AEs to EMs. Second, results point to spillovers from EMs to AEs having increased over the second half of the sample period. We present suggestive evidence that the (evolving) structure of interdependencies play an important role in explaining the existence of “asymmetrical spillovers” between these similar sized blocs.
Dissertation Abstract

Yang Liu

My research has focused on the intersection of macroeconomics and asset pricing. In particular, I study (1) the implications of government debt for asset prices, (2) the international transmission of output volatility shocks to both currencies and international quantity dynamics, and (3) the determination of exchange rates through the risk management practice of financial intermediaries.

Government Debt and Risk Premia

A major issue for economists and policymakers has been the macroeconomic effects of government debt. The importance of government debt is also manifested in financial markets. This paper documents a set of new facts about the effects of government debt on asset prices in the United States. High debt-to-GDP ratio is related to high equity risk premium, high credit risk premium, low risk free rate and low expected return on government debt. Furthermore, debt-to-GDP ratio positively reflects fiscal policy uncertainty. In a general equilibrium model, I propose and quantify a fiscal uncertainty channel. Through this channel, the government debt has asset pricing implications consistent with the facts.

Firstly, government debt-to-GDP ratio positively predicts excess stock return. Although stock returns are documented to be forecastable by many financial and macroeconomic variables, the debt-to-GDP ratio contains information beyond existing predictors, thus improving the predictive power. In a univariate predictive regression using debt-to-GDP ratio, the out-of-sample $R^2$ reaches 35 percent in five-year horizon. In comparison, out-of-sample $R^2$ of many popular predictors are marginally positive.

Secondly, high government debt is related to high credit risk premia. One measure of credit risk premia is the expected excess return on corporate bonds. The debt-to-GDP ratio positively predicts excess returns on investment grade and high yield corporate bonds. Furthermore, yield spreads measure credit risk premium but also capture liquidity premium. Beyond the recent finding that government debt reduces liquidity premium, I show that government debt raises the credit premium component of yield spreads.

Thirdly, higher debt-to-GDP ratio is associated with lower risk free rate and lower expected return on government debt. In the default-free case, the government budget constraint implies that high debt-to-GDP ratio is rationalized by three channels: (1) high future primary surplus, (2) high future growth, or (3) low future return on government debt. I find that the third discount rate channel is empirically important.

Why does government debt have such significant effects on asset prices? Major existing channels of government debt such as liquidity, safety and crowding out are silent or inconsistent with these facts. I propose a new channel--fiscal uncertainty--that can rationalize the empirical findings jointly. Government debt reflects the risks in fiscal policy that drive the variation of risk premia. I propose a measure of fiscal policy uncertainty by utilizing 169 macro variables and estimating a dynamic factor model with stochastic volatility. Fiscal uncertainty is measured as the common component of the conditional forecast error volatility of the fiscal policy instruments. Empirically, fiscal uncertainty fluctuates over time and positively comoves with the debt-to-GDP ratio with a correlation of 0.5. Furthermore, fiscal uncertainty affects asset prices in the same way as the debt-to-GDP ratio.
Through the fiscal uncertainty channel, the government debt has large asset pricing effects. I quantify this mechanism in a general equilibrium model. The key ingredients of the model include recursive preferences, endogenous growth through innovation and fluctuations in the volatility of corporate income tax rate. Tax hikes depress the economic growth so that the persistent tax change is a source of growth risk. Stock price drops with tax hikes because of both the tax payment and the lower cash flow growth. For fear of the joint decrease of growth prospects and stock prices, agents demand a large equity premium. This risk compensation is even larger when the “quantity” of risks increases in time of high fiscal uncertainty. Hence, time variation in equity premium is driven by the fiscal uncertainty. In contrast, government bonds rally in time of high tax, because lower expected growth induces the agents to purchase bonds. Thus, government debt is a hedge against tax risks for investors and has a negative risk premium. In time of high fiscal uncertainty, the hedging motive drives down the premium. Moreover, uncertainty increases the precautionary saving motive and lowers the risk free rate.

The model generates the positive comovement between the debt-to-GDP ratio and the fiscal uncertainty. Uncertainty lowers government bond return and raises the debt-to-GDP ratio through the valuation channel. Conversely, debt generates uncertainty in future fiscal policy. The uncertain fiscal consolidation tends to be more active and volatile when debt is high. The two directions reinforce each other. In equilibrium, through the fiscal uncertainty channel, the debt-to-GDP ratio has implications for asset prices that are consistent with the empirical findings. Beyond justifying the novel evidence, the calibrated model quantitatively explains many observed features of asset market and macroeconomics dynamics.

**Volatility Risk Pass-Through**

(with Ricardo Colacito, Mariano M. Croce and Ivan Shaliastovich) We produce novel empirical evidence on the relevance of output volatility (vol) shocks for both currency and international quantity dynamics. Focusing on G-17 countries, we document several facts: (1) consumption and output vols are imperfectly correlated within countries; (2) across countries, consumption vol is more correlated than output vol; (3) the pass-through of relative output vol shocks onto relative consumption vol is moderate, especially if the uncertainty shocks originate from small countries; and (4) consumption differentials vol and exchange rate vol are disconnected, in contrast to the perfect correlation implied by a model of perfect risk-sharing with time-additive preferences. We rationalize these findings in a frictionless model with multiple goods and recursive preferences featuring a novel-and-rich risk-sharing of vol shocks.

**Volatility, Financial Intermediaries and Exchange Rates**

(with Xiang Fang) We study how financial market volatility drive exchange rates through the risk management practice of financial intermediaries. We build a model that the major participants of the international financial market are levered intermediaries subject to Value-at-Risk constraints. Higher portfolio volatility translates into tighter funding conditions. Thus, intermediaries require higher compensation for exchange rate risks. Our model can resolve the Backus-Smith puzzle and forward premium puzzle quantitatively. The relationship between exchange rate, portfolio volatility and funding condition tightness is consistent with the data.
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Undergraduate Studies:
B.A., Philosophy, Politics and Economics, St. Catherine's College, University of Oxford, First Class, 2010

Masters Level Work:

Graduate Studies:
University of Pennsylvania, 2012 to present
Thesis Title: “Social Interactions in Empirical Microeconomics”
Expected Completion Date: April 2017

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Development Economics, Social Economics and Networks, Public Economics, Political Economy

Teaching Experience:

University of Pennsylvania, Department of Economics
Fall, 2016  Statistics for Economists, T.A. for Prof. Benjamin Connault
Summer, 2016  Statistics for Economists, Instructor (average student rating 3.83/4)
Spring, 2016  Statistics for Economists, T.A. for Prof. Francis DiTraglia (rating 3.53/4)
Fall, 2015  Statistics for Economists, T.A. for Prof. Francis DiTraglia (rating 3.53/4)
Summer, 2015  Statistics for Economists, Instructor (rating 3.71/4)
Spring, 2015  Statistics for Economists, T.A. for Prof. Francis DiTraglia (rating 3.64/4)
Fall, 2014  Statistics for Economists, T.A. for Prof. Francis DiTraglia (rating 3.31/4)

Research Experience and Other Employment:

Summer 2015  World Bank and Lagos EKO Project, Consultant
2013-2014  Vivid Economics, Consultant
2011  Vivid Economics, Analyst
2010  Pump Aid Malawi, Monitoring and Evaluation Officer

Professional Activities:

Presentations
2016  CSAE Conference (University of Oxford), DEVPEC (UC Berkeley), EconCon (Princeton University), Empirical Micro Workshop (University of Pennsylvania)
2015  NEUDC (Brown University), EconCon (University of Pennsylvania), Empirical Micro Club (University of Pennsylvania)

Refereeing

Honors, Scholarships, and Fellowships:

2014-2017  University Fellowship, University of Pennsylvania
2016  Joel Popkin Graduate Student Teaching Prize, University of Pennsylvania
2016  President Gutmann Leadership Award, University of Pennsylvania
2012-2014  Thouron Award
2012-2013  Fulbright Postgraduate Award
2011-2012  Economics Department Scholarship, University of Oxford
2011-2012  Vivid Economics Postgraduate Scholarship
2010  George Webb Medley Prize, Best Undergraduate Economics Thesis, University of Oxford
**Job Market Paper:**


Both the state and non-governmental organizations provide public goods in developing countries, potentially generating inefficiencies where they lack coordination. In rural Tanzania, more than 500 organizations have installed hand-powered water pumps in a decentralized fashion. I estimate the costs of this fragmented provision by studying how communities’ pump maintenance decisions are shaped by strategic interactions between them. I model the maintenance of pumps as a network game between neighboring communities, and estimate this model using geo-coded data on the location, characteristics and functionality of water sources, and human capital outcomes. Estimation combines maximum simulated likelihood with a machine learning algorithm that partitions the data into geographic clusters. Using exogenous variation in the similarity of water sources to identify spillover and free riding effects between communities, I find evidence of maintenance cost-reduction spillovers among pumps of the same technology and strong water source free-riding incentives. As a result, standardization of pump technologies would increase pump functionality rates by 7 percentage points. Moreover, water collection fees discourage free riding and would increase pump functionality rates by 11 percentage points if adopted universally. This increased availability of water would have a modest positive effect on school attendance. This effect is twice as large for girls relative to boys.

**Research in Progress:**

“Strategic Interactions in the Estimation of Spillover Effects” (with Daron Acemoglu and Camilo Garcia-Jimeno)

Recent improvements in program evaluation techniques have allowed researchers to estimate the effects of treatment on both participants (direct effects) and non-participants (spillover effects). However, this paper shows that in the presence of strategic interactions between individuals affected by the treatment, estimates of direct effects and spillover effects are biased. We propose a two-step procedure to test for and correct this bias. The first step is a simple regression-based test for strategic interactions. Conditional on finding evidence of strategic interactions, the second step uses a simple, parsimonious model to estimate the underlying structural parameters. When the treatment variable is continuous, the second step is a simple two-stage least squares regression and gives unbiased estimates of the direct and spillover effects. However, when treatment is binary, the approach requires a Heckman-style correction to ensure that the instrumental variable is valid when individuals choose whether to comply with their assignment to treatment. We apply our methodology to three recent papers, and discuss how it can be applied to other empirical contexts.

Last updated: October 16 2016
ROSSA O’KEEFFE-O’DONOVAN
Dissertation Abstract

My dissertation comprises two chapters and examines how social interactions affect public goods provision and affect analysis of treatment effects in developing countries. My job market paper demonstrates that social interactions have significant effects on the availability of public goods in a setting where provision is highly decentralized. In particular, I find evidence that free riding and spillover effects between communities investing in water pump maintenance in rural Tanzania affect water access and related human capital outcomes. The second chapter of my dissertation is methodological: it proposes a procedure to make unbiased estimates of the direct and indirect effects of a treatment in the presence of social interactions between potential recipients of the treatment. We combine a two-step experimental design with a simple structural model and apply our procedure to empirical data from three recent papers.

My job market paper, Water, Spillovers and Free Riding: Provision of Local Public Goods in a Spatial Network, analyzes the provision of water in sub-Saharan Africa, where approximately 32 percent of people lack access to an improved source of drinking water within 1km of their household. Globally, more than one billion people rely on hand-powered pumps as their main source of water, but about one third of these pumps are non-functional. Both the state and non-governmental organizations provide public goods in developing countries. In Tanzania, more than 500 organizations have installed water pumps, potentially generating inefficiencies arising from lack of coordination on the technology and location of pumps. I analyze whether this fragmentation of water provision in Tanzania can help explain the low functionality rate of pumps, by affecting communities' costs of maintaining their pumps and their incentives to do so.

I model the maintenance of pumps as a network game, in which communities decide whether to maintain their pump given the existing network of installed water sources and their neighbors' maintenance decisions. The model incorporates free riding between communities by allowing a community to use a neighbor's water source if their own pump is non-functional, with the cost of access depending on the distance they must travel and the characteristics of the alternative water source. There may also be spillovers in the cost of pump maintenance: a community's cost of maintaining its pump depends on the maintenance decisions of its neighbors. The cost of maintenance decreases for each neighbor that chooses to maintain its water source, with the size of the discount depending on the distance between the water sources and how similar they are. These maintenance spillovers may occur through a number of mechanisms, including the creation of markets for spare parts, skill development, or sharing of maintenance costs and information.

Distinguishing social interactions from correlated effects is a major challenge in estimating network models (Manski, 1993). In this context, spatial correlations in pump functionality may be driven by social interactions or spatial correlation of unobserved variables. To overcome this identification challenge, I exploit the decentralized nature of pump installation and use exogenous variation in the similarity of water sources as a shifter in the strength of spillovers possible between them. I assume that the strength of spillovers between neighboring communities depends on whether they have the same technology of pump, but spatially correlated shocks (e.g. weather) are independent of technology. Evidence from reduced form analysis and from a survey of water sector experts in Tanzania and other developing countries validates this assumption. However, regression methods can only estimate the net effect of spillovers and free riding, so I develop and estimate a model to disentangle these two effects, estimate their magnitude and test the mechanisms through which they work.

I estimate the model using new geo-coded administrative data on more than 8,500 rural communities in Tanzania with hand-powered water pumps. Estimation of a network game with binary action space (maintain the pump or not) is difficult, because community choices are not independent of each other and because multiple equilibria are possible. To address these challenges, I use machine learning to partition the water
sources into geographic clusters, and I assume that each cluster is playing an independent game. In each cluster, I calculate the probability that each action profile is an equilibrium and estimate the likelihood of the observed action profile by using a probabilistic equilibrium selection rule. I estimate the model by maximum simulated likelihood, allowing for spatially correlated shocks to the cost of maintenance.

The results indicate that free riding and pump maintenance spillovers are important factors in explaining variation in pump functionality. In particular, positive spillovers are stronger between nearby communities with pumps of the same technology. I estimate that standardization of technologies installed in Tanzania would increase the pump functionality rate by 7 percentage points. I also find strong evidence that communities free ride on their neighbors' water sources, but free riding decreases when users have to pay to collect water. I estimate that the pump functionality rate would increase by 11 percentage points if all communities charged fees for water collection. To test the welfare consequences of pump functionality, I estimate the impact of increased functionality on health and education outcomes and find evidence of a modest positive effect on school attendance. This effect is twice as large for girls, who are typically responsible for water collection, as it is for boys.

Modeling public goods provision as a game of strategic interactions may be particularly relevant for developing countries where the provision of many public goods, including health and education services, is carried out by a broad array of state and non-state actors. However, the modeling framework developed in this paper can potentially be applied to settings in developed countries, such as local investment in law and order, public spaces, reduction of pollution, and transport infrastructure. In future work, I plan to analyze public goods investments in a dynamic framework, where a community's decision might depend on the past, present and expected future decisions of other agents, including potential investments by non-governmental organizations. This will allow me to test the effect of aid dependency in the provision of public goods in developing countries.

The second chapter of my dissertation is titled Strategic Interactions in the Estimation of Spillover Effects (joint with Daron Acemoglu and Camilo Garcia-Jimeno). This is a methodological project in which we study the estimation of the effect of treatments on both participants (direct effects) and non-participants (spillover effects). Recent improvements in program evaluation have used a two-step experimental design in which individual-level randomization is used to estimate direct effects and randomization of the proportion of individuals assigned to treatment in a geographic area is used to estimate indirect effects. However, in some contexts spillover effects may depend upon an individual's treatment status, and may therefore impact their decision to participate in the treatment. We show that these strategic responses confound the estimation of direct and indirect effects, and that the bias may be large. We propose a two-step procedure to test for and correct this bias. The first step is a simple regression-based test for strategic interactions. Conditional on finding evidence of strategic interactions, the second step uses a simple, parsimonious model to estimate the underlying structural parameters. When the treatment variable is continuous, the second step is a simple two-stage least squares regression and gives unbiased estimates of the direct and spillover effects. However, when treatment is binary, the approach requires a Heckman-style correction to ensure that the instrumental variable is valid when individuals choose whether to comply with their assignment to treatment. We apply our methodology to data from three recent papers and discuss how it can be applied to other empirical contexts.

My plans to continue this research agenda include: using dynamic games and tools from IO to analyze the provision of public goods in settings where strategic interactions may be important; and combining experimental designs with structural models to analyze development policies in cases where these methods are complementary and can enhance the value of our analysis.
EUN-YOUNG (Grace) SHIM

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Employment
Postdoctoral Scholar, Department of Economics, University of San Diego, July 2014-Present

Short-term visiting position
Federal Reserve Bank of Saint Louis, CSWEP Summer Research Fellow, July-August, 2013

Education:
Ph.D., Economics, University of Pennsylvania, 2007-2014
BA, Economics, Yonsei University, Highest Honors, 2002-2006
Visiting Student, University of Waterloo, Ontario, Canada, 2004

Research

Publication

Working paper
“The Impact of Conditional Cash Transfer Programs Under Risk-Sharing Arrangements: Schooling and Consumption Smoothing in Rural Mexico”

Research in progress
“Valuing School Choice: Welfare and Program Evaluation of Private School Vouchers” (with Peter Arcidiacono, Karthik Muralidharan, and John D. Singleton)
“Measuring Heterogeneity in Demand for in-Kind and Cash Transfers: Evidence from Two Choice-Based Experiments in India” (with Karthik Muralidharan, Paul Niehous, and Sandip Sukhtankar)

Other work
Theoretical Appendix for “Quality and Accountability in Healthcare Delivery: Audit-Study Evidence from Primary Care in India” (by Jishnu Das, Alaka Holla, Aakash Mohpal, and Karthik Muralidharan), forthcoming in AER
**Seminar and conference presentations**

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<tr>
<td>2016</td>
<td>Empirical Microeconomics Workshop at Banff</td>
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<td>2015</td>
<td>University of Hawaii at Manoa, University of California at San Diego</td>
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<tr>
<td>2014</td>
<td>University of Pennsylvania, Bank of Korea, Korea Institute International Economic Policy, Northeast Universities Development Consortium Conference</td>
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<td>2013</td>
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**Fellowship**

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<td>2013</td>
<td>CSWEP Summer Economics Fellows</td>
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**Teaching experience**

University of Pennsylvania (Teaching Assistant)
- Business in the Global Political Environment
- Business Environment in Developing Countries
- Managerial Economics
- Advanced Econometrics Techniques and Applications
- Development Economics
- Topics in Development
- Macroeconomic Principles
- Introduction to Economics for Business
Valuing School Choice: Using a Randomized Experiment to Validate Welfare Evaluation of Private School Vouchers (with Peter Arcidiacono, Karthik Muralidharan, and John D. Singleton)

While parents and students value schools for many reasons, evaluation of school choice programs often focuses on impacts on students’ test scores alone. In this paper, we pursue a unique research design to credibly identify the welfare benefits of private school vouchers using data from Andhra Pradesh School Choice Program, a randomized controlled trial of private school vouchers in rural India.

We first develop and estimate a model of school choice with and without credit constraints using rich control group data. We then externally validate the estimates by simulating a voucher program in the control group to compare with the experimental outcomes.

We find that, although both models with and without credit constraints fit the control group data well, accounting for credit constraints is important for accurately predicting voucher takeup and implies substantial welfare gains to recipients. Our preliminary results show that the voucher program generated 1 to 5 dollars welfare gain per dollar spending when credit constraints were considered. Ignoring credit constraints led to predictions of lower voucher takeup rate and net negative welfare effect of the program. Preliminary welfare decomposition results show that the gain from the change in short-term test scores only explains 4 percent of the total welfare gain for the beneficiary families, suggesting that basing school choice policy decisions solely on short-term test scores may lead to disconnection of the policy from what the beneficiary families experience.

Measuring Heterogeneity in Demand for In-Kind and Cash Transfers: Evidence from Two Choice-Based Experiments in India (with Karthik Muralidharan, Paul Niehaus, and Sandip Sukhtankar)

Although it is well understood that estimating heterogeneity in treatment effect is important in policy evaluation, not much effort has been made to incorporate heterogeneous treatment effect in designing optimal policy. In this paper, we measure heterogeneity in beneficiary preference using revealed preference approach enabled by a unique choice-based experiment in the context of food security policy in India and argue that beneficiary welfare can be maximized by allowing beneficiaries to make a choice between in-kind (status quo) and cash transfer instead of imposing one or the other.

Targeted Public Distribution System is the major tool of the government of India to secure food supply for the poor by providing limited amount of rice, wheat, sugar, and kerosene at heavily subsidized price. While the necessity of securing food supply for the poor is widely accepted, the current TPDS suffers
from both inefficiency and leakage, and many states are considering migrating to direct cash transfer system.

In our choice-based experiment, selected TPDS beneficiary households in the states of Bihar and Rajasthan received coupons which they could exchange with rations as usual or cash equivalent to the fiscal value of the rations. In a separate experiment in Bihar, the amounts of cash offered varied randomly across beneficiaries in an attempt to elicit the cash-equivalent value of rations. In Rajasthan, beneficiaries stated their cash-equivalent value of rations in a household survey.

The distribution of cash-equivalent value of rations were nonparametrically estimated based on the experimental and stated outcomes. The estimated distribution displayed wide dispersion of beneficiaries' valuation from its fiscal value within each state. We found that if the current system is replaced by cash transfer system, the total monthly welfare gain will be 0.3 billion Rupees in Bihar and negative 0.3 billion Rupees in Rajasthan. On the other hand, if beneficiaries are allowed to choose between cash and in-kind transfers, monthly welfare gain will reach 2.3 billion Rupees in Bihar and 1.3 billion Rupees in Rajasthan.

The Impact of Conditional Cash Transfer Programs under Risk-Sharing Arrangements: Schooling and Consumption Smoothing in Rural Mexico

An important reality of the lives of poor families in developing countries is that, in the absence of formal lending opportunities, they manage income risk through transfers among relatives and neighbors, often referred to as informal risk sharing. There is evidence that public transfers targeted to specific groups, such as old age pension programs or conditional cash transfers (CCT), are shared by others through informal risk sharing. Most of the existing studies about the effect of CCT programs on children's schooling have modeled the behavior of households without consideration of the presence of informal risk sharing.

This paper develops and estimates a model of informal risk sharing with limited commitment that incorporates children's school attendance choices. The model is estimated using Mexican rural villages data from the PROGRESA experiment and is used to analyze how the presence of informal risk sharing influences schooling and child labor choices, as well as the effectiveness of CCT programs. In particular, I compare the outcomes (schooling, child labor, and consumption) generated under the informal risk-sharing model with those that would be obtained, forcing households to make choices under autarky.

I find that the number of years of schooling completed at age 18 is 0.3 years lower under autarky than with risk sharing. Also, given a set of parameter values the effect of CCT on schooling outcomes and welfare of households is larger under autarky than under risk sharing, and CCT increases consumption volatility under risk sharing. When the autarky model parameters are re-calibrated to fit the observed schooling outcomes in the data, the predicted difference in the effect of CCT on schooling outcomes under autarky and under risk sharing disappears. However, the difference in the welfare effects persists.
In this theoretical appendix, I develop a theoretical framework for a doctor-patient transaction in rural India. The challenge was to explain a seemingly unintuitive observation that public doctors who receive a fixed salary and no high-powered financial incentives tend to dispense as many medicines as private doctors, who charge for medicines, do. This observation did not change when the sample was restricted to public doctors who also practice at private clinics. Other observations were intuitive (e.g. public doctors complete less checklist items, spent less time with patients, and less likely to provide correct treatment), providing confidence to the quality of the data.

To provide a potential mechanism to interpret the findings of the main paper, I apply Bayes learning process where a doctor exerts effort to draw a noisy signal to update belief about the true underlying illness of a patient (consultation stage). The accuracy of the signal depends on the level of effort. Given the posterior belief about the true illness, the doctor determines the treatment to maximize own payoff, partially internalizing the patient’s health outcome (treatment stage).

Because public doctors have less incentive to exert effort, the signal they draw is nosier. They decide how to treat the patient with larger uncertainty about the true illness, and thus, prescribe many medicines to increase the chance of treating the illness. On the other hand, private doctors exert more effort, have better idea what the illness is, but because of financial incentive, they also prescribe many medicines. Given the number of medicines prescribed, private doctors choose the correct medicine with higher probability. The number of medicines prescribed is bounded because too many medicines may cause complication or longer-term health problems, which decreases the payoff of both public and private doctors.

The prediction of this mechanism also supports the authors’ argument that in an environment where public-sector effort level is low as in rural India, the benefits of unregulated market incentive for higher diagnostic effort may outweigh the costs of over-treatment.
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Graduate Studies  
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Thesis Title: “Essays in Labor Economics”  
Expected Completion Date: May 2017

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Spring 2015  
Labor Economics, Teaching Assistant

Fall 2014  
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Research Experience:  
2015 – 2016  
Institute for Employment Research (IAB), Recurring Visiting Researcher

Fall 2015  
University of Pennsylvania, Research Assistant for Professor Andrew Shephard

2013 – 2014  
University of Pennsylvania, Research Assistant for Professor Hanming Fang
**Professional Activities:**

Presentations

Refereeing
International Economic Review, Labour Economics, Macroeconomic Dynamics

**Honors, Scholarships, and Fellowships:**

2016 – 2017  Dissertation Completion Fellowship, University of Pennsylvania
2016  Dissertation Internship, New York Fed
2016  Heinz Koenig Award (best paper award), ZEW
2015  Hiram Haney Fellowship Award (third year paper prize), University of Pennsylvania
2011 – 2013  ERP Fellowship
2011  Lawrence Klein Fellowship, University of Pennsylvania

**Research Papers**

*Employment and Welfare Effects of Short-Time Work* (with Kilian Niedermayer)
We study the employment and welfare effects of short-time work – a government program that subsidizes part-time work during economic downturns – in Germany during the Great Recession. Using novel administrative data, we document that take-up of short-time work is increasing in experience and tenure, almost all short-time workers eventually return to full-time work, and – in contrast to unemployment – short-time work is not associated with a long-term loss in earnings. We develop a theory of short-time work that is consistent with these facts. Our model features search frictions, aggregate and idiosyncratic shocks, long-term contracts, and general- and firm-specific human capital. Productivity shocks differ in duration and magnitude, and when hit by an adverse temporary productivity shock, firms can curtail their losses by reducing working hours. Firms' ability to adjust working hours is limited, because workers may quit. The main determinants of short-time take-up are worker's human capital and the duration of productivity shocks. Using our estimated model, we find that short-time work was important in reducing job loss in the Great Recession. However, the welfare gains are modest, because workers who would have been laid off without short-time work are workers for whom the earnings loss associated with unemployment is low.

*Very Simple-Markov Perfect Industry Dynamics: Theory* (with Jaap Abbring, Jeff Campbell, Nan Yang)
Revise and Resubmit at Econometrica
This paper develops a simple model of firm entry, competition, and exit in oligopolistic markets. It features toughness of competition, sunk entry costs, and market-level demand and cost shocks, but assumes that firms’ expected payoffs are identical when entry and survival decisions are made. We prove that this model has an essentially unique symmetric Markov-perfect equilibrium. We provide an algorithm that computes this equilibrium. Because this algorithm simply finds the fixed points of a finite sequence of contractions, it is guaranteed to converge quickly.

*Very Simple-Markov Perfect Industry Dynamics: Empirics* (with Jaap Abbring, Jeff Campbell, Nan Yang)
This paper develops an econometric model of firm entry and exit in oligopolistic markets. The model has an essentially unique symmetric Markov-perfect equilibrium that can be computed very quickly. We use a nested fixed point procedure to estimate the model. We show that firms' profits, fixed costs, and sunk costs of entry are identified from market-level data of the number of active firms and demand shifters. We apply our model to the U.S. local cinema industry using data from the County Business Patterns. Since our estimation algorithm is very fast, we estimate a separate equilibrium for each of the 573 markets in our data. The estimated model points to very tough competition for film exhibition rights. Sunk costs make the industry's transition following a permanent demand shock last 10 to 15 years. The complete econometric development of our model asserts that it is indeed very simple.
**Honor Among Thieves: Reputation Dynamics in the Market for Illicit Drugs** (with Nick Janetos)

We analyze reputation dynamics in an online market for illicit drugs using a novel dataset of prices and ratings. The market is a black market, and so contracts cannot be enforced. We document the role reputation plays in alleviating adverse selection in this market. Consistent with prior literature, there is a positive correlation between the price and the rating of a seller. We show that this effect is increasing in the number of reviews left for a seller. A mature highly-rated seller charges a 20% higher price than a mature low-rated seller, while for young sellers, the rating has no correlation with the price. Sellers with more reviews charge a higher price than sellers with low reviews regardless of rating, and low-rated sellers are more likely to exit the market and make fewer sales. We show that these stylized facts are explained by a dynamic model of adverse selection, ratings, and exit, in which buyers form rational inferences about the quality of a seller jointly from his rating and number of sales. Sellers who receive low ratings initially charge the same price as high rated sellers since early reviews are less informative about quality. Bad sellers exit rather than face lower prices in the future.

**Research Papers in Progress**

**A Dynamic Model of the Marriage Market** (with Andrew Shephard)

We present a methodological framework for analyzing life-cycle labor supply and household formation and dissolution decisions in an equilibrium limited commitment collective framework that allows for marriage both within and across birth cohorts. Our model features a life-cycle component, endogenous human capital accumulation, home production, and labor market earnings risk. The household decision weights evolve endogenously over time as a function of each spouse's outside option. This outside option in turn depends on future prospects in the marriage market, which are governed by the entire distribution of potential future spouses. Our model makes explicit that these distributions are determined in equilibrium and dynamically evolve in response to policy changes. We characterize these distributions and develop an algorithm to compute them. This makes our framework suitable to study the long-run equilibrium effects of policy interventions on both the marriage and the labor market.

**Employment and Welfare Effects of Indexing Minimum Wages to Inflation**

I provide evidence from the Current Population Survey (CPS) to show that the notable absence of employment effects of minimum wage increases in the U.S. can be partially attributed to the fact that most minimum wages in the U.S. are not indexed to inflation. I develop a dynamic equilibrium model of the labor market with search frictions based on Flinn (2006) that allows for time-variation in the real value of the minimum wage. I estimate the model using actual policy variation across states and time. The model estimates imply that in the short-run, a permanent minimum wage hike results in more than two-fold the employment loss of a temporary minimum wage hike of the same nominal amount.

**Scientific Software**

- matchingR: Fast Computation of Matching Algorithms in R and C++
- taoR: R Bindings for the Toolkit for Advanced Optimization (TAO)
- cbpR: R Package for the Census County Business Patterns
- knitroR: R Interface for the Commercial Non-Linear Constraint Optimizer KNITRO

All software packages are available at [https://github.com/jtilly](https://github.com/jtilly)
The overarching theme of my dissertation is to develop and estimate structural models to understand and evaluate the impact of public policy.

In the first chapter of my dissertation, joint with Kilian Niedermayer, we study the employment and welfare effects of short-time work. Short-time work is a government program that subsidizes part-time work in recessions. When employers cut their workers’ hours and — in proportion — earnings, the government compensates workers for the reduction in income. Short-time work is based on the premise that during recessions, some productivity declines are temporary. It provides financial incentives to prevent workers from being laid off in response to temporary productivity declines. It is in contrast to traditional unemployment insurance that only pays benefits to workers that were laid off.

Short-time work is a popular labor market instrument in several European countries and also exists in numerous U.S. states. We focus on Germany’s experience with short-time work during the Great Recession. Between 2008 and 2010, a large fraction of Germany’s labor force was in short-time work, reaching as much as 6.5% in 2009.

We assemble a novel administrative dataset for the universe of workers in the metropolitan area of Nuremberg. We then document three facts. First, short-time take-up is concentrated among workers with high experience and high tenure. Second, short-time workers overwhelmingly return to full-time work. Third, short-time workers do not experience a long-term effect on earnings or employment. In contrast, we document that workers who are laid off experience long-term earnings losses and these losses are largest for workers who are experienced and have high tenure at the time of the separation.

We develop and structurally estimate an equilibrium life-cycle model that is consistent with the data. The model features search frictions, aggregate and match-specific shocks, and general- and firm-specific human capital. In the model, some of the match-specific productivity shocks that firms and workers experience are temporary. When exposed to an adverse but temporary match-specific productivity shock, the firm can reduce the worker’s hours to curtail its losses. In the model, these match productivity shocks interact with worker’s firm-specific human capital. Workers slowly accumulate firm-specific human capital on the job. The more firm-specific human capital a worker has, the less attractive unemployment becomes, because once rehired at a different firm, the worker starts out on the bottom rung of the firm-specific human capital ladder. Workers who have acquired a substantial amount of firm-specific human capital are unlikely to quit or be fired in response to a temporary match productivity shock. Since the value from unemployment is low relative to continued employment, these workers are also willing to accept a temporary reduction in hours and total compensation. This explains why short-time take-up is increasing in tenure and why these workers experience severe earning losses when they do lose their jobs (e.g. due to a permanent adverse match productivity shock). Workers with little firm-specific human capital have a relatively high value from unemployment. When hit by temporary productivity shock, these workers
quit or are laid off. These workers rather quit than endure a temporary reduction in hours or earnings, because the earnings loss associated with unemployment is relatively low.

Using our estimated model, we find that short-time work was important in reducing job loss in the Great Recession. We find that without short-time work, the unemployment rate in 2009 would have been 7.7% instead of 6.4%. Welfare gains are modest, because workers who would have been laid off without short-time work are workers for whom the earnings loss associated with unemployment is low. The average worker values the policy at about 1.0% of annual income. The combined cost to the government and firms totals about 0.7% of the average worker’s annual income.

In the second chapter of my dissertation, I study how indexing minimum wages to inflation affects employment. In the United States, minimum wages are mostly set in nominal terms. In real terms, minimum wages slowly depreciate in value over time. Some states recently began indexing minimum wages to inflation. I provide evidence from the Current Population Survey to show that the notable absence of employment effects of minimum wage increases in the U.S. can be partially attributed to the fact that most minimum wages in the U.S. are not indexed to inflation. I develop a dynamic equilibrium model of the labor market with search frictions based on Flinn (2006) that allows for time-variation in the real value of the minimum wage. I estimate the model using actual policy variation across states and time. The estimated model implies that in the short-run, a permanent minimum wage hike results in more than two-fold the employment loss of a temporary minimum wage hike of the same amount.

In the third chapter of my dissertation, joint with Andrew Shephard, we contribute to the growing literature on the interaction between the marriage and the labor market. Not only does marital status influence labor supply decisions, future earnings prospects also affect marriage decisions. Public policies ranging from taxation to education policy and divorce laws have consequences for the labor and the marriage market. We present a methodological framework for analyzing life-cycle labor supply and household formation and dissolution decisions in an equilibrium limited commitment collective framework that allows for marriage both within and across birth cohorts. Our model features a life-cycle component, endogenous human capital accumulation, home production, and labor market earnings risk. The household decision weights evolve endogenously over time as a function of each spouse’s outside option. This outside option in turn depends on future prospects in the marriage market, which are governed by the entire distribution of potential future spouses. Our model makes explicit that these distributions are determined in equilibrium and dynamically evolve in response to policy changes. We characterize these distributions and develop an algorithm to compute them. This makes our framework suitable to study the long-run equilibrium effects of policy interventions on both the marriage and the labor market.
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Research Papers:

“Taxing Firms Facing Financial Frictions”, with Gustavo Camilo (Job Market Paper)
Abstract: In the U.S., corporate income is taxed several times at different source. Profits are taxed at the firm level, dividends and capital gains are taxed at the individual level, and interest payments on debt are taxed at the personal income rate. We investigate how the different rates above affect firm investment and the allocation of capital in the economy. To do so, we construct and calibrate a model with heterogeneous firms, borrowing constraints, costly equity issuance and endogenous entry and exit. Because of the financial frictions, the taxes mentioned are not perfect substitutes and distort different margins. In our model firms enter small and grow over time to reach an optimal size. The corporate income tax decreases earnings and net worth. Moreover, the amount of leverage optimally chosen by firms during the growth process is proportional to their net worth. As a result, small firms grow more slowly as capital accumulation is delayed. Taxes on dividends, capital gains and interest income do not reduce net worth. We use the model to quantitatively analyze the steady state consequences of a reform that replaces the corporate income tax by a common tax on shareholders. We find that such reform improves the allocation of capital in the economy, increasing total factor productivity by 2.1%.

“Fighting for the Best, Losing with the Rest: On the Desirability of Competition in Financial Markets”, with Juan Hernandez
Abstract: The Jumpstart Our Business Startups (JOBS) act of 2012, aims at increasing funding access for young firms by easing securities regulation. Motivated by this, we ask if there is a role for the regulation of the market of funds for firms that lack collateral and have a large uncertainty about their ability to generate profits. To answer this question, we characterize optimal financial contracts in a competitive environment with risk, adverse selection and limited liability. We find that competition among financial intermediaries always forces them to fund projects with negative expected returns both from a private and a social perspective. Intermediaries use steep payoff schedules to screen entrepreneurs, but limited liability means this can only be done by giving more to all entrepreneurs. In equilibrium, competition for the profitable entrepreneurs forces intermediaries to offer better terms to all customers. Hence, there is cross subsidization among entrepreneurs and intermediation profits are nil. The three main features of our framework (competition, adverse selection and limited liability) are necessary in order to get the inefficient laissez-faire outcome and a role for financial regulation. Our result remains robust when firms can collateralize some portion of the credit as long as there is still an unsecured fraction.
**Work in Progress:**

“Optimal Income Taxes and Entrepreneurial Choice”, with Ali Shourideh and Juan Hernandez

**Abstract:** We characterize optimal business and labor income tax schedules in an environment in which agents can choose to be entrepreneurs or workers. Agents privately observe their skill for each occupation and also privately decide the corresponding investment and effort intensities. The different nature of the incentive structure in each sector results in a distortion along the occupational choice margin, and the resulting sector specific tax schedules are different from what they would be in a world without sector mobility. In the case where workers supply hours inelastically, a Rawlsian planner always sets the marginal tax on labor income higher than the marginal tax on operating profits. In particular, consumption is not equalized among workers.

**Publications (pre-PhD):**


**Abstract:** Informality is at the center of the economic debate in Colombia, fueled by the high level prevalent in the country and its substantial increase during the 1990s. We study the effect of labor market rigidities, namely the increase in non-wage costs and the minimum wage on the size of the informal sector, the transition into and out of informality, and wages. Our results indicate that rises in non-wage costs and the minimum wage, increase the probability of transition into informality as well as the size of the informal sector. The analysis of these effects along the income distribution points towards strong exclusion motives for low skilled informal workers, mainly driven by labor demand adjustments in response to increasing hiring costs; and argues somehow in favor of exit motives for workers at the top of the wage distribution. Furthermore, there is strong indexation of salaries to the minimum wage, except for low skilled informal workers. In addition, firms adjust salaries in response to increasing non-wage costs for all workers within the labor force.

**Computer Skills:**

Julia, Stata, Matlab, C++, Office

**Languages:**

Spanish (native), English (fluent), French (bilingual)
My dissertation explores the links between entrepreneurial decisions, financial markets and taxation.

“Taxing Firms Facing Financial Frictions”, with Gustavo Camilo (Job Market Paper)

Corporate income in the United States is taxed several times and at different sources. First, profits are taxed at the firm level. Next, individuals pay taxes on dividends and capital gains. If households own bonds, interest payments are taxed at the personal income tax rate. A broad literature has asked if corporations are taxed efficiently and how the rates described above should compare. We contribute to answering these questions by constructing and calibrating a model with heterogeneous firms, borrowing constraints, costly equity issuance and endogenous entry and exit. Because of financial frictions, the taxes mentioned above are not perfect substitutes and distort different margins. In our model firms enter small and grow over time to reach an optimal size. In particular, the corporate income tax decreases earnings and net worth. Moreover, the amount of leverage optimally chosen by firms during the growth process is proportional to their net worth and as a result small firms grow more slowly as capital accumulation is delayed. Taxes on dividends, capital gains and interest income do not reduce net worth. In brief, the corporate tax adds a distortion above and beyond the inter-temporal wedge, exacerbating capital misallocation in the economy. We calibrate the model using data from the Compustat annual industrial files from 2003 to 2015. Despite its simplicity, the model reproduces central features of the data, including investment, the average and frequency of equity issuances, and average leverage. We then proceed to use the model to quantitatively analyze the steady state consequences of a reform that replaces the corporate income tax by a common tax on shareholders. Taxing at the shareholder level instead of the corporate income level improves the allocation of capital in the economy. For a firm with average productivity, the time to grow to the unconstrained level decreases from 15 to 9 years, and steady state total factor productivity increases by 2.07%.

"Fighting for the Best, Losing with the Rest: On the Desirability of Competition in Financial Markets", with Juan Hernandez

The Jumpstart Our Business Startups (JOBS) act of 2012, aims at increasing funding access for young firms by easing securities regulation. Motivated by this, we ask if there is a role for the regulation of the market of funds for firms that lack collateral and have a large uncertainty about their ability to generate profits. To answer this question, we characterize optimal financial contracts in a competitive environment with risk, adverse selection and limited liability. We find that competition among financial intermediaries always forces
them to fund projects with negative expected returns both from a private and from a social perspective. Intermediaries use steep payoff schedules to screen entrepreneurs, but limited liability implies this can only be done by giving more to all entrepreneurs. In equilibrium, competition for the profitable entrepreneurs forces intermediaries to offer better terms to all customers. There is cross subsidization among entrepreneurs and intermediation profits are nil. The three main features of our framework (competition, adverse selection and limited liability) are necessary in order to get the inefficient laissez-faire outcome and a role for financial regulation. Our result remains robust when firms can collateralize some portion of the credit as long as there is still an unsecured fraction.

"Optimal Income Taxes and Entrepreneurial Choice", with Ali Shourideh and Juan Hernandez (in progress)

We characterize optimal business and labor income tax schedules in an environment in which agents can choose to be entrepreneurs or workers. Agents privately observe their skill for each occupation and privately decide the corresponding investment and effort intensities. The different nature of the incentive structure in each sector results in a distortion along the occupational choice margin. The resulting sector specific tax schedules are different than they would be in a world without sector mobility. In the case where workers supply hours inelastically, a Rawlsian planner does not equalize consumption among workers. Although workers supply hours inelastically, the optimal marginal tax prevents skilled entrepreneurs to chose to become unskilled workers instead, and vice versa. However, we show that the marginal tax on labor income is always higher than the marginal tax on operating profits for such case.