



**Essays on the Economics of Public Health Insurance**  
Dissertation Abstract

**Laura Dague**  
University of Wisconsin-Madison

**Chapter 1. Effects of Medicaid Premiums and Copayments on Insurance Coverage, Utilization, and Health: A Regression Discontinuity Approach**

I take advantage of the structure of Wisconsin's Medicaid program to identify the effects of cost-sharing on insurance status, utilization, and health outcomes for low-income families. This is typically difficult since those who expect higher utilization tend to pick insurance plans with lower cost sharing. Wisconsin's program features premium and copayment requirements that change discretely at different family income levels of enrollees, which enables me to use a regression discontinuity design that identifies directly the effects of these provisions on several outcomes while avoiding the problems associated with the endogenous assignment of health insurance plans. I use a three year administrative panel of enrollment data and health insurance claims for the universe of enrollees to inform my estimates of the price elasticity for medical care and the effects of cost-sharing on health outcomes. I check for manipulation of income on the part of enrollees using state unemployment insurance wage reporting data and find no evidence for it. I find that a \$10 premium results in 1.4 fewer months enrolled and reduces the probability of a one year enrollment spell by 12 percentage points, but other discrete changes in premium amounts do not affect enrollment. Copayments for emergency department visits of \$15-60 reduce total visits by as much as 50%, but the reductions come from both necessary and unnecessary care. The results are not driven by enrollment patterns; premium paying enrollees and non-premium paying enrollees are equally likely to have an emergency department visit in the first month of enrollment.

**Chapter 2. Estimating Crowd-out in Public Insurance Expansions Using Administrative Data**

With colleagues from Wisconsin's BadgerCare Plus evaluation team, I use a combination of administrative and survey data to estimate the fraction of individuals newly enrolled in public health coverage that had access to private, employer-sponsored health insurance at the time of enrollment and the fraction that dropped this coverage. We estimate that after expansion of eligibility for public coverage, approximately 20% of new enrollees had access to private health insurance at the time of enrollment and only 8% dropped this coverage. We also identify an "upper bound" estimate, which suggests that the percentage of new enrollees with private insurance coverage at the time of enrollment is, at most, 27%.

**Chapter 3. Adverse Selection in Health Insurance Markets with a Public Option: Evidence From Chile**

In markets for health insurance, consumers may have private information about their risk factors that leads to self-selection into more generous insurance plans. This phenomenon, known as adverse selection, can result in market failures. In joint work with Gaston Palmucci, I use individual-level claims data covering the universe of private insurance enrollees in Chile from 2006-2009 to investigate the degree of adverse selection in the Chilean market for private health insurance using both traditional reduced form tests and a structural model of consumer demand. The institutional features of the Chilean health insurance market offer an interesting setting in which to consider adverse selection because it has both a public sector in which anyone can enroll and a competing private sector that screens applicants on observable risk factors, consistent with the 'public option' idea sometimes discussed in U.S. policy debates. In such a system, one concern is that rather than providing competition for the private sector, the public sector serves only those customers who are undesirable from a profit perspective. We are able to examine the degree to which such risk selection occurs within the private sector.



# **Dynamic Models of Labor Supply and Retirement**

## Dissertation Abstract

**Xiaodong Fan**  
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### **Chapter 1. Cold Turkey and Retirement.**

In the first chapter, I document “sharp retirement”—a discontinuous decline in labor supply at retirement—across three data sets, and proposes and estimates a life-cycle labor supply model with “working habits” wherein sharp retirement can be explained by workers quitting “cold turkey.” In much the same way that one might quit smoking, workers with accumulated working habits exit the labor force with a pronounced, discontinuous decline in labor supply. This working habits model is more consistent with data than other explanations for sharp retirement in the literature. Detailed comparisons between the working habits approach and the fixed costs approach are discussed. Besides rationalizing sharp retirement, the working habits model also helps explain the discrepancy between micro and macro elasticities of labor supply by generating a very small elasticity on the intensive margin and a relatively larger elasticity on the extensive margin.

### **Chapter 2. A Ben-Porath Model with Labor Supply and Endogenous Retirement.** (with Ananth Seshadri and Christopher Taber)

In the second chapter, we develop and estimate a lifecycle human capital model in which individuals make decisions on consumption, human capital investment, labor supply, and retirement. Specifically, our model allows both an endogenous wage process (which is typically assumed exogenous in the retirement literature) and endogenous retirement decision (which is typically assumed exogenous in the human capital literature). This integration is important to achieving unbiased estimation, which is critical for most counterfactual analysis. For instance, when evaluating the effect of increasing the Social Security retirement age on workers' labor supply and retirement decisions, not only does one have to consider how the change affects the wage process and the retirement decision directly, one also needs to consider how the wage process affects the retirement decision and vice versa. Structural parameters for preferences and technology are estimated using the method of simulated moments to match the life cycle profiles of wage, hours, and income that are generated by the model to those that are estimated from the PSID data. Various counterfactual simulations are examined in the paper.

### **Chapter 3. Working History and Asymmetric Employer Learning.**

In the third chapter, I test for asymmetric employer learning in the labor market following a multi-period (three or more) model with a match component of wages. When a worker makes her quit/stay decision in a labor market with three or more periods, she must consider the signaling effect of her decision in subsequent periods. This breaks down some implications derived from two-period models, which dominate the empirical testing literature. The unconditional quit rate is not necessarily negatively connected with ability in this multi-period asymmetric learning model. I suggest two alternative hypothesis tests for asymmetric employer learning in the model. The first test scrutinizes the negative relationship between conditional quit rates and abilities. The second test examines the evolution of weighted average within-group ability variation. Under this model, the variation should decrease over one worker's career history due to sorting on ability. I use the NLSY79 Work-History data and find evidence of asymmetric employer learning from these tests.



**Essays on Liquidity and Monetary Policy**  
Dissertation Abstract

**Chao He**

University of Wisconsin-Madison

**Chapter 1. Cash Holdings of Entrepreneurial Firms and Monetary Policy**  
– Job Market Paper, October 2011

Firms' cash holdings have attracted increasing attention from both mass media and academic circles. These cash holdings seem relevant to the central bankers, yet they have been long ignored by the literature on monetary policy. This paper explores the implications of cash holding decisions by entrepreneurial firms on optimal monetary policy. In the model, a working capital requirement together with borrowing constraints gives entrepreneurs an incentive to hold cash: to reduce possible missed profits due to borrowing constraints when receiving positive productivity shocks. I use this framework to study the effects of long-run and short-run monetary policy. I find that when agents are allowed to make occupational choices, higher long run inflation, at low levels, can increase economic growth by depressing wages thus encouraging entrepreneurship. This channel is novel and helps explain why the empirical relationship between inflation and growth is nonnegative at low levels of inflation while all the existing general equilibrium theories predict a negative relationship. I further show how open market operations can differ from lump sum transfers because they affect the unconstrained and constrained entrepreneurs asymmetrically.

**Chapter 2. Housing and Liquidity** (with Randall Wright and Yu Zhu, September 2011)

We study economies where houses, in addition to providing utility, also facilitate transactions when credit is imperfect, because home equity can be used to collateralize loans. We document big increases in real home equity loans since 1999, coinciding with the start of the housing price boom, and suggest an explanation. When it can be used as collateral, housing can bear a liquidity premium. Since liquidity is endogenous, depending at least partially on beliefs, as we show, even when fundamentals are constant and agents are fully rational, house prices can display complicated equilibrium paths resembling bubbles. This is so with either exogenous or endogenous supply. Some of these paths look very much like the data. The framework is still tractable, reducing in some cases to supply and demand analysis, extended to capture special features of housing, including its role in credit transactions. The role of monetary policy is also discussed.

**Chapter 3. The Virtue of Being Small Lenders** (work in progress)

During the 2008 financial crisis, some entrepreneurs were denied credit from national commercial banks (big lenders), which used to be their usual sources, but they still found funding from finance companies (small lenders), who in turn received loans from the banks. This poses two theoretical puzzles: (1) why were the small lenders ready to lend while the big lenders refused to do so during economic hard times; (2) why are these small lenders, including venture capitalists, able to coexist with their well diversified big counterparts. I propose that the moral hazard problem between shareholders and loan officers inside big lenders can explain these two puzzles.



**Essays on Semiparametric Models with Partial Identification**  
Dissertation Abstract

**Shengjie Hong**  
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***Chapter 1. Inference in Semiparametric Conditional Moment Models with Partial Identification***

This chapter develops inference methods for conditional moment models in which the unknown parameters are partially identified and may contain infinite-dimensional components. I consider testing the hypothesis that a given restriction on the parameter is satisfied by at least one element of the identification set. I propose to use the sieve minimum of a Kolmogorov-Smirnov type statistic as the test statistic, derive its asymptotic distribution, and provide consistent bootstrap critical values. In this way a broad family of restrictions can be consistently tested, rendering the proposed procedure applicable to various types of inference under partial identification. In particular, I show how to: (1) test the semiparametric model specification; (2) construct confidence sets for unknown parametric components; and (3) construct confidence sets for unknown functions at a given point. The specification test is consistent against fixed alternatives. The confidence sets have correct asymptotic size, excluding any value outside the identification set with asymptotic probability one. My methods allow for the moment functions to be nonsmooth. A Monte Carlo study demonstrates finite sample performance.

***Chapter 2. Set Estimation Based on Conditional Moment Restrictions Containing Unknown Functions***

In this chapter I consider estimation in conditional moment models containing unknown functions without assuming point-identification. Extending results in Chernozhukov et al. (2007), I construct set estimators for the identification sets of the possibly infinite-dimensional parameters. The estimated sets are consistent with respect to a properly defined Hausdorff distance. Rates of convergence in the Hausdorff distance are derived. I examine finite sample performance by Monte Carlo simulations. Focusing on estimation, this chapter complements the inference results in Chapter 1.

***Chapter 3. Estimation in Dynamic Discrete Choice Panel Data Models with Fixed Effects***

I consider estimation in dynamic discrete choice panel data models of short time series, in which neither the cross-sectional heterogeneity nor the initial condition is observed. The major challenges are: (1) point-identification often fails in these models as demonstrated by Honoré et al. (2006); and (2) the heterogeneity cannot be differenced out by the standard “within” or first difference transformations due to nonlinearity. I show that the parameter can be equivalently defined by a finite number of conditional moment equalities. Under the fixed effects specification, the moment functions contain the unknown conditional distribution of the heterogeneity as a nuisance parameter. I provide fixed-T consistent estimators using the method developed in Chapter 2. Finally, I present simulation evidence on finite sample performance.



**Essays in Applied Microeconomics**  
Dissertation Abstract

**Tim Huegerich**  
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**Interpreting High Returns to Microenterprise Investment: Poor Households Invest More Slowly**  
– Job Market Paper

The average microenterprise in a developing country has very high marginal returns to capital (on the order of 100% annually), according to several recent studies. Financial constraints are part of the explanation for how these high returns persist. But, given these constraints, it remains to explain the limited self-financing by the households running these businesses. In particular, little is known about the elasticity of intertemporal substitution (EIS) of poor households, which describes how quickly households save in response to rates of return higher than their rate of time preference. If poorer households have a lower EIS, reflecting the difficulty of reducing their already low consumption to finance investment, then they will save slowly in response to high returns despite having a normal rate of time preference, or discount rate. However, separately identifying the EIS from the discount rate is difficult because it requires variation in the returns to capital, which is not present in many data sets. I examine extant data on microenterprises in Sri Lanka and document gradual investment in most firms in response to their very high returns. The data include the results of a field experiment distributing grants to a random selection of firms, which aids in identifying households' varying returns to capital. I estimate the discount rate and EIS of these households by simulated maximum likelihood. The results indicate that these microenterprise owners indeed have a normal rate of time preference, around 5%, but a low EIS of 0.2. This estimate of the EIS is substantially lower than recent estimates around 0.7 for US and UK households, consistent with the hypothesis that poorer households have a lower EIS.

**The Implications of Search Frictions for Measuring Workers' Preferences for Job Characteristics**

This paper examines the impact of labor market frictions on the equilibrium relationship between wages and non-pecuniary job characteristics. In a search equilibrium, firms providing greater non-pecuniary job amenities have incentives to offer higher overall utility to workers. Thus workers at lower amenity levels are impeded from advancing to preferred positions with better amenities. This positive correlation between amenity level and utility contrasts with the perfect competition framework in which all workers weakly prefer their current job to all available alternatives.

**On-the-Job Search and On-the-Job Training** (with Seung-Gyu Sim)

This paper analyzes the complex interactions between training and on-the-job search in an equilibrium search model. Firms seeking workers post both a wage contract and a training rate, taking into account the effect of endogenous turnover on their expected payoffs from training the worker. Due to the non-verifiable nature of informal on-the-job training, firms may not fully commit to training rates. The model provides a framework for using observed patterns of on-the-job wage growth and job-to-job wage changes to estimate the impact of search frictions on training rates.



# Essays on Identification of Social Interactions and Robust Control Theory

## Dissertation Abstract

**Hon Ho Kwok**  
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### **Part 1. Identification of Social Interactions by Matrices Decompositions**

This part develops new methods of social interactions identification, which are based on the spectral decompositions of matrices. First, the spectral decompositions of social effect matrices express social effects as scalar multiplications instead of matrix multiplications. Thus the proposed methods provide simple derivations of necessary and sufficient conditions for identification. Second, this part gives a detailed analysis of differencing methods. The spectral decompositions of differencing matrices help us identify which subspace's information is lost from differencing, and hence offer a method to minimize information loss from differencing. Third, this part develops a theory of identification by the spectral decompositions of covariance matrices for models without observable independent variables. The method of variance contrasts proposed by Graham (2008, *Econometrica*) is a special case of this method. While Graham's method assumes homoskedasticity and no within-group correlations in unobservable variables, and identifies only the social interaction parameter; the covariance matrix decomposition method allows heteroskedasticity and within-group correlations in unobservable variables, and identifies the social interaction parameter and all second moments of the unobservables. Although spectral decompositions apply only to models with diagonalizable matrices, the methods are extendable to models with non-diagonalizable matrices by using the Jordan canonical forms of matrices.

### **Part 2. Robust Control Theory under Implementation Lag Uncertainty**

This part develops a robust control theory under implementation lag uncertainty. The theory is applied to a Ramsey taxation problem. An example would make the idea clear. Suppose an economy's dynamic is determined by  $x_{t+1} = A(L)x_t + B(L)u_t + \varepsilon_t$ , where  $x_t$  and  $u_t$  are columns of state and control variables,  $\varepsilon_t$  is a column of i.i.d. shocks. Implementation lag refers to the lag polynomial  $B(L)$ . A policy maker wants to maximize welfare of the economy. Although the policy maker has an estimate of  $B(L)$ , he does not totally trust the estimate and think that any lag polynomial close to the estimated  $B(L)$  could be the true  $B(L)$ . The closeness is measured by  $L^2$  norm. The policy maker applies the robust control concept of Hansen and Sargent (2007, *Robustness*). Robust control refers to maxmin decision making. For any choice of policy, the policy maker assume an adversarial agent that minimize the welfare by choosing a lag polynomial that is close to the estimated  $B(L)$  in  $L^2$  sense. The intertemporal correlations of the policies are the sources for the adversarial agent to minimize welfare.



# **Bootstrap for Moment Condition Models: Improved and Robust Inference**

Dissertation Abstract

**SeoJeong (Jay) Lee**

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Inferences based on the generalized method of moment (GMM) estimators and the empirical likelihood (EL) estimators are widely used for overidentified moment condition models. However, models may be misspecified and it is hard to detect model misspecification in finite samples. In the presence of misspecification, classic inference methods will be flawed. I resolve this dilemma by presenting a simple bootstrap procedure robust to unknown model misspecification.

## **“Asymptotic Refinements of a Misspecification-Robust Bootstrap for GMM Estimators”**

In the first chapter, I propose a nonparametric iid bootstrap that achieves asymptotic refinements for  $t$  tests and CI's based on GMM estimators even when the model is misspecified. In addition, my bootstrap does not require recentering the bootstrap moment function, which has been considered as a critical procedure for bootstrapping GMM. The elimination of the recentering combined with a robust covariance matrix renders the bootstrap robust to misspecification. Regardless of whether the assumed model is correctly specified or not, the misspecification-robust bootstrap achieves the same sharp magnitude of refinements as the conventional bootstrap methods of Hall and Horowitz (1996, *Econometrica*), Andrews (2002, *Econometrica*), and Brown and Newey (2002, *Journal of Business and Economic Statistics*), all of which establish asymptotic refinements in the absence of misspecification using recentering. The key procedure is to use a misspecification-robust variance estimator for GMM, suggested by Hall and Inoue (2003, *Journal of Econometrics*), in constructing the sample and the bootstrap versions of the  $t$  statistic. Two examples of overidentified and possibly misspecified moment condition models are provided: (i) Combining data sets, and (ii) invalid instrumental variables. Monte Carlo simulation results are provided as well.

## **“Asymptotic Refinements of a Misspecification-Robust Bootstrap for EL Estimators”**

In the second chapter, I propose a nonparametric iid bootstrap for EL estimators, including the exponentially tilted empirical likelihood estimator by Schennach (2007, *The Annals of Statistics*). My bootstrap achieves sharp asymptotic refinements for  $t$  tests and CI's regardless of whether the assumed moment condition model is correctly specified or not. This result is new, because asymptotic refinements of bootstrapping for the EL estimators have not been established in the literature even under correct model specifications. Monte Carlo simulation results are provided.

## **“Weak Identification and Misspecification Robust Test Statistics for Overidentified Moment Condition Models”**

The third chapter is devoted to constructing a test statistic robust to misspecification as well as weak identification. As a first step, I investigate the limiting behavior of K-statistic by Kleibergen (2005, *Econometrica*) under misspecification. The K-statistic is based on GMM criterion and is designed to be robust to weak identification. I show that the limiting distribution of the statistic under misspecification is not asymptotically pivotal, which invalidates the use of the K-statistic when the model is misspecified.

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Dissertation Title: Three Essays on Monetary Policy under Model Uncertainty

Abstract Summary: This dissertation explores several issues of monetary policy making under model uncertainty. The first and second chapters of my dissertation are about the timing of the Federal Reserve's policy response to the current financial crisis. When the Federal Reserve is uncertain about the intensity of the financial crisis, waiting for more information and delaying the policy response may be optimal. The third chapter studies the role of model uncertainty in international monetary policy coordination. Without coordination, the domestic policy maker will be more concerned about model misspecification of the foreign economy, under coordination, information is shared between the domestic and foreign policy maker, this concern will vanish. Assuming that the domestic policy maker adopts robust control to deal with model misspecification, coordination will enhance welfare gain.

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# **Three Essays of Monetary Policy under Model Uncertainty**

Dissertation Abstract

**Haixi Li**

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## **Did the Federal Reserve Respond Too Late to the 2007 Financial Crisis?**

### **Part 1, A Known Alternative Approach:**

In this chapter, I study the timing of the U.S. monetary policy response to the 2007 financial crisis. The spread between LIBOR-OIS jumped significantly on Aug 9, 2007, indicating an unusual increase in the stress of the financial sector, but it was not until Aug 17, 2007, that the Federal Reserve responded with 50 basis points reduction of the primary credit rate after an unscheduled meeting. I employ mathematical tools developed in the quickest change detection literature to study the timing of the monetary policy regime switch. Assuming the policy maker knows the intensity of the coming financial crisis, I find that the optimal timing should be Aug 9, 2007, contradictory to the observed response time of Aug 17, 2007.

## **Did the Federal Reserve Respond Too Late to the 2007 Financial Crisis?**

### **Part 2, An Unknown Alternatives Approach:**

In Part 1, it is assumed that the policy maker knows the intensity of the financial crisis, which can not explain the observed response time of Aug 17, 2007. In this part, this assumption is relaxed. I assume the policy maker is uncertain about the intensity of the financial crisis, and monetary policy respond to more severe financial crisis more intensively. Hence, if the policy maker chooses the wrong policy regime, there will be cost. In order to reduce the cost, and increase the accuracy of choosing the right policy regime, waiting for more information about the financial crisis may be desirable. I employ the mathematical tool of Bayesian sequential change diagnosis to study this problem. I find that the optimal timing of the Federal Reserve's policy response should be Aug 15, 2007 for certain specifications of the intensity of the financial crisis. I conclude that uncertainty about the intensity of the financial crisis plays an important role in the timing decision of the policy maker.

## **Monetary Policy Coordination Revisited with Robust Control**

The consensus is that international monetary policy coordination is welfare improving, but some argue that the improvement is not significant quantitatively. This paper studies the role of model uncertainty in international monetary policy coordination, and find that considering model uncertainty can enhance welfare gain of coordination. This is because without coordination, due to information asymmetry, domestic policy maker will be more concerned about model misspecification of the foreign economy. Under coordination, with full information sharing between domestic policy maker and the foreign policy maker, this concern will vanish. Assuming that the domestic policy maker adopts robust control to deal with model misspecification, coordination will enhance welfare gains.



# **Four Essays on Continuous-Time Principle-Agent and Firm Dynamics Models**

Dissertation Abstract

**Rui Li**

University of Wisconsin-Madison

## **Chapter 1. Dynamic Agency with with Persistent Shocks**

Several empirical studies have documented the phenomenon of “pay for luck” a CEO's compensation may depend on factors completely beyond his control. I present a continuous-time repeated moral hazard model which explains this phenomenon, and I develop a theoretical method to characterize the optimal contracts. In my model, an investor hires a manager to administrate a firm by offering a long term contract. In addition to the idiosyncratic disturbance influencing the manager's performance, I introduce exogenous uncontrollable shocks impacting the firm's profitability, which are publicly observable, unpredictable and persistent. I show the optimal way to pay the manager for luck (the factors beyond his control) and his performance in the optimal contracts. An optimal contract determines whether the manager should be rewarded or punished upon the arrival of a good or bad impact to the firm, with the reward-punishment pattern being history-dependent.

## **Chapter 2. Moral Hazard, Investment, and Firm Dynamics (with Hengjie Ai)**

We present a dynamic general equilibrium model with heterogeneous firms. Owners of the firms delegate investment decisions to managers, whose consumption and investment are private information. We solve the optimal incentive compatible contracts and characterize the implied firm dynamics. Optimal risk sharing requires managers' equity share decrease with the firm size. This in turn implies that it is harder to prevent private benefit in larger firms, where managers have lower equity stake under the optimal contract. Consequently, smaller firms invest more, pay less dividends, and grow faster. Quantitatively, we show that our model is consistent with the Pareto-like size distribution of firms in the data, as well as the pattern of the relationships between firm size and firms' investment and dividend policies.

## **Chapter 3. Repeated Partnership with Persistent Disturbances**

In this paper, I investigate a continuous-time two-player repeated partnership game with persistent disturbances of the effort costs of corporation. Namely, the normal form of the stage game possesses stochastic changes. I investigate the corporation behavior of the two players with uncontrollable shocks. The main contribution of this paper is an algorithm to completely compute the efficient frontier of the payoffs, generated by perfect public equilibria, and the equilibrium strategies.

## **Chapter 4. Private Information and The Cross Section of Asset Returns: An Irrelevance Result (with Hengjie Ai)**

How does the presence of private information affect the expected returns of firm's asset? We show under fairly general conditions the presence of private information does not affect the risk exposure of firms' asset, and therefore their expected returns under the optimal contract. Design of optimal contract can be viewed as a process of assigning continuation utilities across time and states of nature. We show optimality requires that marginal cost of utility provision must not co-move with macroeconomic shocks. If managers' utility function is separable with respect to consumption and effort, this implies the marginal utility of the agent must be perfectly correlated with the pricing kernel of the economy. If both the principal and the agent have identical expected utility, their consumption must have the same elasticity with respect to aggregate shocks.



# Essays on Model Averaging Estimators

## Dissertation Abstract

**Chu-An Liu**

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### **Chapter 1. A Plug-In Averaging Estimator for Regressions with Heteroskedastic Errors**

The first chapter proposes a novel model averaging estimator for the linear regression model with heteroskedastic errors. I derive the asymptotic distribution of the averaging estimator with fixed weights in a local asymptotic framework, which allows me to characterize the optimal weights. The optimal weights are obtained by minimizing the asymptotic mean squared error. I propose a plug-in estimator of the optimal weights and use estimated weights to construct a plug-in averaging estimator of the parameter of interest. The optimal weights cannot be estimated consistently because the optimal weights depend on the local parameters which cannot be estimated consistently. Estimated weights are asymptotically random, and this must be taken into account in the asymptotic distribution of the plug-in averaging estimator. To address this issue, I show the joint convergence in distribution of all submodel estimators and estimated weights. It turns out that the asymptotic distribution of the plug-in averaging estimator is a non-linear function of the normal random vector. Monte Carlo simulations show that the plug-in averaging estimator has much lower expected squared error and achieves the minimax risk and minimax regret. As an empirical illustration, the proposed methodology is applied to cross-country growth regressions. My estimator has the smallest variance of the regression coefficient of the convergence term of the Solow growth model, though my regression coefficient is close to those of other estimators.

### **Chapter 2. Plug-In Confidence Intervals in Linear Regression after Model Averaging**

This chapter studies the properties of confidence intervals after model averaging in the heteroskedastic regression model analyzed in Chapter 1. The confidence interval is constructed by inverting the t-statistic based on the parameter of interest. I show that the asymptotic distribution of the model averaging t-statistic depends on unknown local parameters, and thus cannot be directly used for inference. I propose a plug-in method to construct the confidence interval. The plug-in confidence interval is constructed based on the simulated quantile. Monte Carlo simulations show that the coverage probability of plug-in confidence interval is close to the nominal level, while the confidence interval based on normal approximations leads to distorted inference.

### **Chapter 3. Averaging Estimators for Kernel Regressions**

In this chapter, I propose a model averaging approach to reduce the mean squared error (MSE) and weighted integrated mean squared error (WIMSE) of kernel estimators of regression functions. At each point of estimation, I construct a weighted average of the local constant and local linear estimators. The optimal local and global weights for averaging are chosen to minimize the MSE and WIMSE of the averaging estimator, respectively. I propose two data-driven approaches for bandwidth and weight selection and derive the rate of convergence of the cross-validated weights to their optimal benchmark values. Monte Carlo simulations show that the proposed estimator can achieve significant efficiency gains over the local constant and local linear estimators.



# **Three Essays on the Effects of Information on Demand**

Dissertation Abstract

**Peter W. Newberry**

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## **Chapter 1: Dynamic Pricing and Learning in the Market for Digital Music**

In markets where a product is of unknown quality and consumers observe some information on the previous actions of others, models of observational learning often predict herding behavior by consumers. One consequence of this herding behavior may be that consumers will ignore a high quality product (bad herd), which will decrease the expected revenue for a high quality producer and distributor of high quality products. Using a data set from an online digital music store named Amie Street Music, I quantify the effects of moving away from the traditional fixed pricing scheme (iTunes, Amazon.com) to a dynamic pricing scheme on the probability of a bad herd on a high quality song. I find that there is a 63% reduction in bad herds on high quality songs in the Amie Street market. However, this result does not hold when the overall quality of artists in the market is increased. I also quantify the effect of changing the learning environment from one in which the consumer only sees the purchase decisions of other consumers, to one in which consumers observe both the purchase decision and the decision to search the product. The added information reduces bad herds by 30%.

## **Chapter 2: 'Vettes and Lemons on eBay**

Using bid data from 8,000 new and used Chevrolet Corvettes sold on eBay, this paper empirically tests Akerlof's (1970) hypothesis that the used car market is characterized by low quality and informational problems. The hypothesis states that the used market has a higher proportion of low quality cars than the new market and buyers account for the difference by discounting their value for a used car relative to a new car. This is tested by comparing bids on new and late model used 'Vettes. The paper finds little evidence of a premium for new 'Vettes. The paper also considers a natural generalization of Akerlof's (1970) model, which allows potential bidders to have different and incomplete private information about the quality of the used car. One implication is that a rational bidder will bid late in the auction in order to reduce the likelihood of other bidders observing her private information. A second implication is that a rational bidder will discount her bid in order to reduce the likelihood of winning the auction because her private information is incorrect (the winner's curse). We test the first implication by comparing bid times on new and used cars and by comparing bid times on newer and older used cars. Akerlof (1970) suggests that the quality and informational problems will be larger with used cars relative to new cars, and other empirical work suggests that quality and informational problems are larger for older used cars relative to newer used cars. Therefore, we expect to find more late bidding on used cars relative to new cars and older used cars relative to newer used cars. If anything, we find that the opposite is true for 'Vettes. To test the second implication we compare bidding on used 'Vettes for auctions with different numbers of expected bidders. Recent theory suggests that bidders facing a winner's curse problem will bid less as the number of expected potential bidders increase. Our analysis suggests bidders bid slightly more in auctions with a higher number of expected bidders. Overall, for used Chevrolet Corvettes sold on eBay, there is little empirical support for the hypothesis presented in Akerlof (1970). It is not clear, however, whether these results generalize to other cars sold on eBay or cars sold in the off-line used market.

## **Chapter 3: Bidding Behavior with Simultaneous Auctions: A Study of eBay Corvette Auctions**

On auction websites such as eBay, there are often auctions for similar items occurring simultaneously. In this paper, I examine the question of if, and by how much, bidders change their bidding strategy when these other auctions are present. I develop a simple model of a second price auction where bidders have the opportunity to bid in a second auction for an equally valued good if they lose the first auction. It is shown that bidders will shade their bid down by the exact amount of their expected profit in the second auction. This theory is tested using Corvette auctions on eBay and different measures of competition. The measure that includes all Corvette auctions in a given time frame does not seem to consistently affect bidding behavior, while the measure that takes into account the characteristics of the competing Corvettes is found to have an impact on bidding behavior. Because these indices are considered to be better measures of competition, it is concluded that competition from other Corvette auctions does affect bidding behavior.



**Essays on Instrumental Variables**  
Dissertation Abstract

**Enrique Pinzon Garcia**  
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**Job Market Paper: Estimation and Model Selection with Many Weak and Irrelevant Instruments and Heteroskedasticity**

This paper analyzes a many weak instrument setting that extends the Chao and Swanson (2005) framework to consider a potentially large number of irrelevant instruments. In this setting a new 2SLS estimator is proposed that addresses two concerns: first, the selection of the relevant instruments; and second inconsistent estimates that arise in a 2SLS context with many weak and irrelevant instruments. The methodology put forth in this paper, as will be demonstrated theoretically and confirmed by simulations, addresses the first concern by disregarding with high probability those instruments that should not be included in the model using an adaptive absolute shrinkage and selection operator (LASSO). The second concern comes from the fact that in the environment described the traditional 2SLS estimator is not consistent. The estimator proposed is proved to be simultaneously consistent and asymptotically normal in the presence of many weak and irrelevant instruments.

The first stage can also be constructed using a mean independent instrument assumption to provide the possibility of a nonparametric version of the adaptive LASSO. The methodology allows for heteroskedasticity, which has been proved to affect the consistency of the structural parameter in a setting with many weak instruments. However, using the adaptive LASSO yields first stage estimates with considerable bias. To address this concern and exploit the instrument selection properties of the adaptive LASSO, an OLS regression with the selected instruments is performed in the first stage as is suggested by Belloni and Chernozhukov (2010).

**A Cross-validated Spline Method for Nonparametric IV Estimation (Work in Progress)**

In this chapter, a solution to the nonparametric instrumental variable problem is found within the context of reproducing kernel Hilbert spaces (RKHS) recognizing that the object of interest is the solution to a Friedholm integral equation of the first kind. RKHS are characterized by the fact that linear functionals in the space are bounded. Therefore, the results of the previous literature, which assume the function of interest lies in a bounded Hilbert space, can be mapped into a RKH.

The methodology proposed in this paper is, as was typified by Nychka et al. (1984), a cross-validated spline solution. Within this framework the solution can be thought of as a penalized least squares estimate. The penalty over the roughness of the function, characteristic of these setups, is controlled by a regularization parameter that is chosen by Generalized Cross Validation (GCV). Except for Gagliardini and Scaillet (2007), the previous papers have no explicit mechanism to choose the regularization parameter and some, like Newey and Powell (2003), recognize their estimator is very sensitive to the choice of parameters. One advantage of GCV over the methodology of Gagliardini and Scaillet (2007) is that its optimality has been established by Wahba (1977) within the context of integral equations which are the object of interest in the literature of nonparametric endoge



# **Three Essays on Microeconomic Theory**

## Dissertation Abstract

**Ryoji Sawa**  
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### **Chapter 1. Core stochastic stability in decentralized networks and markets**

This chapter examines a dynamic process of unilateral and/or joint deviations of agents and the resulting stochastic evolution of social conventions. Over time agents unilaterally or jointly revise their strategies based on the improvements that the new strategy profile offers them. In addition to the dynamic optimization process, there are persistent random shocks on agents' utility that potentially lead to switching to suboptimal strategies. Under a logit specification of choice probabilities, we are able to characterize the set of states that will be observed in the long-run as noise vanishes. We apply these results to examples including a subset of potential games and network formation games, most notably the formation of free trade agreements across countries.

### **Chapter 2. Small mutation costs and large population costs in the double limits for stationary distributions**

This chapter examines an evolutionary model in which a population of agents plays  $K$ -strategy population games. We study the long run behavior of the Markov process when the mutation rate is small and the population size is large. We find that there are two factors, called the mutation cost and the population cost, which determine the equilibrium selection. The mutation cost represents the likelihood of transitions as the mutation rate vanishes, and captures the same forces as the stochastic potential of Young (Econometrica 1993). Similarly, the large population cost represents the likelihood of transitions as the population size approaches infinity. We show that the mutation cost is the primary factor to determine the selection in the double limits and that the effect of the population cost is secondary; it only determines the selection among states with the minimum mutation costs.

### **Chapter 3. Price competition for a sequence of informed buyers**

This chapter examines dynamic price competition with private information on the demand side. Two sellers each offer a different variety of a good to a finite sequence of buyers. A buyer is endowed with a private binary signal on the relative quality of the goods. Sellers and buyers are able to observe all the decisions that previously have been made. We characterize the levels of the signal precision that leads to herding behaviors.



# **Three Essays on College Selectivity**

## Dissertation Abstract

**Mai Seki**

University of Wisconsin – Madison

### **Chapter 1: Heterogeneous Returns to College Quality and the Value of Graduate Degree Attainment**

Existing studies on the returns to college quality have mixed results, mainly due to the difficulty of controlling for selection into higher quality colleges. In particular, researchers have not considered graduate degree attainment in the analysis of labor market returns to college quality. I examine how college quality affects wages and advanced degree attainment using the factor structure model of Carneiro, Hansen, Heckman (2003). I extend the factor structure model to be used with two datasets, Baccalaureate and Beyond 93/03 and NELS88, both of which are required for identification of the model parameters. The results apply to all levels of college quality, and identification of unobserved ability is explicit and robust to measurement error in admission test scores. In addition, the model allows me to calculate heterogeneous returns to college quality, which depend on both observable characteristics and unobservable math and verbal abilities. The results show that graduating from a college of 1 standard deviation higher quality leads to a 2% higher hourly wage 10 years after college graduation. I further decompose the college quality return into two parts: the direct return for a holder of a bachelor's degree (and no advanced degree) and the expected return to a graduate degree. In the estimation, the former is positive but the latter is negative. This negative gradient between graduate degree returns and college quality is driven by medical and doctoral degrees. For MBAs, law school, and engineering M.A.s, the gradient is always positive.

### **Chapter 2: The Returns to Attending a Selective College: Human Capital or Signaling?**

In this chapter, I examine employer learning and the signaling effect of college selectivity by applying the identification strategy of Altonji and Pierret (2001) using NLSY79. I assume that the distribution of test scores (ASVAB score) summarizes workers' true ability. In the wage regression, I check whether the coefficient on the ASVAB score increases over time, implying that employers gradually learn worker's true abilities. If the coefficient on college quality decreases over time, this indicates that the signal becomes less useful. I also examine how the signaling effect varies by race, gender, and college major.

### **Chapter 3: Hidden Barriers to Access and Success in Higher Education: Heterogeneity in Cost to Acquiring Information in College Application Process**

I examine whether the information acquiring costs during the college application process affect college enrollment of low socio-economic-status (SES) students differently from high SES students. I use NLSY97's college application data. A student chooses the number of applications which maximizes the benefit of sending applications minus the cost of applying. The benefit is the labor market returns of going to college times the probability of college completion. The cost varies by the student's socio economic status and any indicator that represents access to college application information (i.e., the share of people with some college in students' hometowns). I identify the relative importance of college application costs from other competing factors affecting college enrollment: heterogeneous preferences for schooling, academic preparedness, and borrowing constraints.



**Essays in Empirical Political Economy**  
Dissertation Abstract

**Carly Urban**  
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**Dollars on the Sidewalk: Should U.S. Presidential Candidates Advertise in Uncontested States?**  
(with Sarah Niebler)

Presidential candidates in the United States do not intentionally advertise in states that do not have rigorous competition for electoral votes. However, some areas of non-competitive states are exposed to political ads because media markets overlap with battleground states. These spillover advertisements allow us to examine the relationship between advertisements and individual campaign contributions, with data from the Wisconsin Advertising Project and the Federal Election Commission. While many previous papers in the economics and political science literature focus on the effects of advertising on voter turnout or vote choice, ours is the first paper to examine how advertising influences campaign contributions. Using propensity score matching within uncontested states, we find aggregate giving in zip codes exposed to political ads was approximately \$6,800 (31.3% of mean contributions) more than in similar zip codes without advertisements in 2008. After including data from the 2004 Presidential election, we show that zip codes in uncontested states who received spillover ads in one election year and not the other donated more in the year they saw ads. We conclude that advertising in markets fully contained within uncontested states may provide a new fundraising opportunity for presidential candidates, generating substantially more contributions than the cost of running ads.

**Negative Advertising and Political Competitions (with Amit Gandhi and Daniela Iorio)**

Why is negative advertising such a prominent feature of competition in the political market? We propose an explanation that is based on the number of competitors in a political race. The typical election in the United States is a two-candidate race. In duopoly contests, there is a simple economic rationale for “going negative” relative to non-duopoly contests: when the number of competitors is greater than two, engaging in negative ads creates positive externalities for opponents that are not the object of the attack. In contrast, positive ads benefit only the advertiser. To empirically investigate the hypothesis that the number of competitors can explain the volume of negative advertising in an election, we focus on U.S. non-presidential primary contests in 2004, where the nature of primaries provides us with a cross section of independent races and large variation in the number of entrants. Our estimation employs data from the Wisconsin Advertising Project, which contains information on all political advertisements aired in the top 100 media markets in 2004 races. We find that duopolies are twice as likely to air a negative ad when compared to non-duopolies, and that doubling the number of competitors drives the rate of negative advertising in an election close to zero. These results are robust to the inclusion of a variety of controls and media market level fixed effects.

**Explaining Out-of-State Contributions to Congressional Candidates**

Individuals are the largest group of campaign contributors, and Congressional candidates rely on these dollars to finance their campaigns. However, while one usually thinks of Congressional elections as a state-level phenomenon, Congressmen develop policies whose effects extend beyond their districts. In 92 races in 2008 (18% of Congressional races) candidates received more money from out-of-state donors than in-state donors. In this paper I examine the characteristics of individuals who give to out-of-state Congressional candidates, and particularly those who give to out-of-state candidates of both parties. Using data from the Center for Responsive Politics, I identify all contributions by an individual in a given election cycle. Matching individuals’ occupations to candidates’ committee assignments, I determine if out-of-state contributors are more likely to give to candidates whose committees align with the individual’s job sector. I also look at candidates who change committees after an election to see how individual-level contributions change after the switch. I separate this by sector to detect which sectors are most likely to receive out-of-state dollars from individuals and compare this to the change in money received by candidates in these sectors from PACs.



# **Three Essays in Macroeconomics**

## Dissertation Abstract

**Xiangrong Yu**

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### **1. Family Linkages and Social Interactions in Human Capital Formation**

This essay introduces parent-child interactions into the Beckerian model of human capital. The acquisition of human capital, jointly determined by parental investment and child effort, is an equilibrium outcome of this type of intergenerational interaction. This essay shows that the equilibrium outcome is not affected by the parental authority over child behavior, which is in the spirit analogous to Becker's (1974) "Rotten Kid Theorem", but is usually lower than the level that maximizes the instantaneous aggregate family welfare. In a family with more than one child, siblings not only compete for parental investments but also directly interact with each other in their effort choices. Exploring these intragenerational connections and their interplay with intergenerational forces, this essay gives a more complete theory of family linkages in the development of human capital. Social interactions among children from different families induce intra-generational feedback effects that accelerate regression towards the mean in the economic status of families. This essay generalizes the notion of social multipliers to conceptualize the role of interactive family influences in peer behaviors under a linear specification. Finally, allowing for endogenous group formation, this essay characterizes the conditions, which reflect the interplay between intrafamily interactions and social effects, for the emergence of segregation in equilibrium.

### **2. Measurement Errors and Policy Evaluation in the Frequency Domain**

This essay explores frequency-specific effects of measurement errors that are present in economic data on the design of stabilization policy rules. The spectral approach employed in this essay integrates a rich set of design limits that are not explicit in the time domain into policy analysis and provides a precise characterization of the full range effects of data noise in the frequency domain, which is informative to the policymaker. In a linear feedback model with noisy state observations, ignorance of measurement errors seriously distorts the performance of the policy rule that is optimal for the noise-free system. Adjusting the policy design or filtering the data, the policymaker becomes less responsive to raw observations in general. In the frequency domain, the model – when applied to evaluate the implications for the choice of monetary policy rules in a simple AR (1) environment – shows that a white noise process of measurement errors has little impact at low frequencies and induces policy inertia at high frequencies, but the process may lead to more active control at medium frequencies. The local robustness analysis indicates that measurement errors also reduce the policymaker's reaction to model uncertainty, especially at medium and high frequencies.

### **3. Variance Decomposition and Systemic Risk in Financial Networks**

This essay proposes a variance decomposition (VD) approach for the analysis of systemic risk in financial networks. In an interconnected financial market, the stability of a financial institution depends on that of its immediate and indirect counterparts through financial linkages. The essence of the VD approach is to decompose the variance, a natural measure of risk, of the state variable that determines the system stability into the sum of orthogonal components. Then one can distinguish between the impacts of idiosyncratic shocks and network-wide common shocks and infer how systemic risk depends on the network structure exploiting the relation between the variance-covariance properties and network structure. This essay characterizes conditions on network structure and associated covariance matrices for this type of systemic risk analysis. In this framework, this essay also shows that financial innovations that reduce risks for individual institutions may potentially amplify systemic risk embedded in the whole network, which, the author believes, explains some important aspects of the 2008 financial crisis.



**Essays in Industrial Organization**  
Dissertation Abstract

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**Chapter 1 - The Effect of Sulfur Content Regulation on the U.S. Diesel Market**

The first chapter studies the impact of the U.S. Environmental Protection Agency's increased restriction in the sulfur content of on-road diesel fuel. In 2006, the EPA decreased the maximum level of sulfur in diesel fuel from 500 parts per million to 15ppm. The policy change constrains a refinery's choices in the type of crude oil that can be used as inputs because all crude oil contains various amounts of sulfur. Due to technology differences between plants and differences in the availability of crude oil conditional on the location of a refinery, each refinery may react differently to the policy change. Unlike traditional heterogeneity in total factor productivity, heterogeneity in the refinery industry is the differentiation in output share of petroleum products. I present a model that captures this difference between plants. In the model, each plant chooses the profit maximizing type of crude oil and output distribution conditional on the location and technologies of a plant. The model also takes into account the type of crude oil used by a refinery will also impact the output share of each petroleum product. With data from 1994 to 2009, I estimate the model using maximum likelihood. Simulation result shows the policy change resulted in an increase in cost of 8.4 cents per gallon, 65% higher than the originally predicted cost increase by the EPA.

**Chapter 2 –Oil Production Disruptions and U.S Petroleum Industry**

More than half of the crude oil used in U.S. is imported from foreign countries and much of this crude oil are produced in politically unstable countries. Any disruption to the production of crude oil may have significant impact on U.S. petroleum products production. Since crude oil is a differentiated input, U.S. refiners may not be able to perfectly substitute the disrupted crude oil with other types of crude oil. Chapter 2 uses a production function that allows different grades of crude oil to impact each petroleum output differently, while conditional on the technology of the refinery. I measure the substitutability between different grades of crude oil and investigate the affect of the crude oil disruption on the prices of petroleum products.

**Chapter 3 – Static Model of Entry and Exit with Capacity Choices in the Airlines Industry**

The second chapter investigates the relationship between seat capacity and market structure in the airlines industry. Existing entry and exist literature allows a firm to enter an industry as two types, for example as a high quality type or low quality type. However the decision process for an airline is to decide on the number of seats available on a route. In this scenario, an incumbent may choose to over-invest in its capacity to deter entry from competitors. I present a model where each potential entrant chooses the profit maximizing capacity in a market. After the capacity is chosen, it is observed by all competitors and each firm decides on the optimal price. I estimate this model using data on short route flights from 1996 to 2008. To estimate this model, I use moment inequalities based on the methodology introduced in Pakes, Porter, Ho and Ishii (2007) and I do not make any assumptions on equilibrium selection. The result shows that in 20% of the existing monopoly markets, airlines over invest in seat capacity to deter potential entrants.