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**Dissertation Title:** *“Essays in First-Price Auctions”*

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Ph.D., Economics, Yale University, May 2012 (expected)  
M.Phil., Economics, Yale University, 2009  
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Yale University, Dissertation Fellowship, 2011  
Yale University, Graduate School Summer Fellowship, 2007  
Yale University, Carlos F. Diaz-Alejandro Prize, 2006 - 2010  
Yale University, Doctoral Fellowship, 2006 - 2011  
UNLP, Banco Hipotecario Fellowship, 2002 - 2003  
UNLP, Department of Economics, Manuel Belgrano's Honor to the top five graduates in the Economics major, 2002  
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Department of Economics (UNLP) and Buenos Aires Province Ministry of Economics, Fellowship, 2001

**Publications:**

"Realizing the Gains from Trade: Export Crops, Marketing Costs, and Poverty", joint with I. Brambilla and G. Porto. *Journal of International Economics*, 78 (2009), pp. 21-31

**Chapters in Books:**

"Globalization and Complementary Policies. Poverty Impacts in Rural Zambia", joint with G. Porto, in A. Harrison (ed.), 2007, *Globalization and Poverty*, University of Chicago Press for the National Bureau of Economic Research, Boston, Massachusetts.

"An Analysis of the WTO Development Round on Poverty in Rural and Urban Zambia", joint with I. Brambilla and G. Porto, in B. Hoekman and M. Olarreaga (eds.), 2007, *Global Trade and Poor Nations: The Poverty Impacts and Policy Implications of Liberalization*, Brookings Press, Washington DC.

"The WTO Doha Round, Cotton Sector Dynamics and Poverty Trends in Zambia", joint with G. Porto, in T. Hertel and A. L. Winters (eds.), 2006, *Poverty Impacts of the Doha Development Agenda*, Palgrave Macmillan, Washington DC.

**Working Papers:**

"Highway Procurement and the Stimulus Package: Identification and Estimation of Dynamic Auctions with Unobserved Heterogeneity" (Job Market Paper)

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"Identification and Estimation of Affiliated Private Values Auctions with Unobserved Heterogeneity" (2011)  
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Yale University, Teaching Fellow, "Introduction to Economics", Spring 2011, Fall 2008  
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Universidad Nacional de La Plata, Visiting Professor, "Recent Developments in Empirical Industrial Organization" (Graduate), Summer 2009  
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Research Assistant, Prof. Phil Haile, Yale, 2009 – present  
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Research Assistant, Prof. Dirk Bergemann, Yale, 2008  
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## Dissertation Abstract

### Chapter 1. Highway Procurement and the Stimulus Package: Identification and Estimation of Dynamic Auctions with Unobserved Heterogeneity

The American Recovery and Reinvestment Act of 2009 (hereafter, the stimulus package) stipulated a large injection of funds (over \$800 billion) into the economy in a short period of time. This paper investigates the effects of this demand expansion on equilibrium prices paid by the government for highway construction projects. Using data from California, I answer the following questions: (1) How much were the costs of these projects driven up by the accelerated pace of new projects? (2) What was the effect of the demand expansion on the prices of other state projects that came afterwards? and (3) What was the effect on efficiency? The first question aims at quantifying the trade-off the government faces between getting money in people's hands right away and getting more public goods out of the stimulus funds. The second question makes explicit certain overlooked costs associated with the stimulus funds received by the states. The third question investigates the effect of the stimulus package on the cost of resources to society.

Road construction projects are awarded by auctions, therefore, I develop a structural dynamic auction model in order to answer the questions raised above. The model builds on three key features. First, I allow for upward sloping marginal costs, i.e., firms' current costs can be affected by their committed resources from uncompleted projects awarded in previous periods. Second, I include an auction-level unobserved heterogeneity, a project-level factor that affects firms' behavior but is not observed by the econometrician. Finally, I allow for endogenous firm participation, i.e., I let firms' participation decisions depend on project characteristics (both observed and unobserved). I apply this model to highway procurement data from California to estimate the structural parameters, and then perform simulations to assess the issues raised above.

My estimation approach uses concepts from the control function and measurement error literatures to show that the structural model is nonparametrically identified under the presence of unobserved heterogeneity. I use the first order condition at the bidding stage to express each firm's private cost as a function of its bid, the conditional distribution of equilibrium bids, and the value function representing the discounted sum of future payoffs. The identification result combines several key ideas. First, provided that the distribution of unobserved heterogeneity is identified, the value function can be written as a function of the distribution of equilibrium bids. A second key idea is similar in spirit to the control function approach. Although I require a strict monotonicity assumption, I depart from the traditional method by allowing the control function to be an "imperfect" one. That is, I do not require the observables in the relationship to be a sufficient statistic for the unobserved heterogeneity. Rather, I exploit features of the procurement setting that provide a second "imperfect" control function. The information obtained from these two noisy controls then resembles a measurement error problem where we have access to multiple measurements. I attain identification of the conditional distribution functions using the results in Hu (2008) for nonlinear models with misclassification error.

This paper contributes to the auction literature in several ways. I improve on the method of Jofre-Bonet and Pesendorfer (2003) by allowing for endogenous participation. To my knowledge this is the first attempt to control for unobserved heterogeneity in a dynamic auction model. I also relax the structural assumptions in the control function approaches used previously in the

auction literature by allowing the control function to be an imprecise measure of the unobserved heterogeneity. In a recent attempt to control for unobserved factors in a static context, Krasnokutskaya (2011) uses a deconvolution method to identify an independent private values model, in which unobserved heterogeneity enters linearly in the valuation and is independent of the idiosyncratic components of bidders' values. In my model, I allow the unobserved heterogeneity to enter nonlinearly, and I let the idiosyncratic component of the firm's valuation to be correlated with the unobserved component.

The estimation results suggest that both the effect of capacity constraints and unobserved heterogeneity are important. I find that, on average, when the unobserved heterogeneity increases from its lowest to its highest level, the equilibrium winning bid increases by 15% and the cost of a firm increases by 51%. Furthermore, although monotone, the effects are nonlinear in the level of unobserved heterogeneity. Changing the backlog level of one regular firm from a low level to a high one, increases the cost of that firm by 7.4%, and the equilibrium price in the auction increases by 4.7%.

Turning to the main questions of the paper, using the estimates of the structural parameters of the model in counterfactual simulations indicate that the government paid prices for stimulus funded projects that are 6.2% higher (and prices for other projects that are 4.8% higher) due to the effect of the stimulus projects on firms' backlogs. These results imply that the government could have acquired \$335 million worth of extra road projects (or 19.7% of the stimulus money received by California) by forgoing any stimulus effect from ARRA. By no means does this imply that the \$335 million were "lost," since the money was actually transferred to the firms, thus serving the government's stimulus objective. The result just makes explicit that part of the demand expansion went into higher prices instead of quantities. In another simulation I find that the opportunity cost of delaying the stimulus projects by 3 months reaches \$44 million (or 2.6% of the stimulus funds). If instead the government delays the projects by 6 months, the opportunity cost totals \$62 million (or 3.7% of the stimulus funds).

## **Chapter 2. Identification and Estimation of Affiliated Private Values Auctions with Unobserved Heterogeneity**

The independent private values model can be restrictive in practice as bidders may have private values related to each other. In contrast, the affiliated private values (APV) model allows for dependence among bidders' private values while retaining a bidder's private utility for the auctioned object. For example, Li and Zhang (2010) find a significant level of affiliation among companies using timber auction data from the Oregon Department of Forestry.

I show in this chapter that in a static setting, the methods developed in Chapter 1 can be extended to a first-price auction model with conditional APV. That is, I allow bidders' private valuations to be affiliated even after controlling for observable auction level characteristics and an unobservable characteristic. While recent work has dealt with unobserved heterogeneity in an APV setting (e.g., Haile, Hong and Shum (2006) and Campo, Perrigne and Vuong (2003)) they rely on a control function approach. I contribute to this literature by relaxing the structural assumptions required to obtain the control function. I show that the model is nonparametrically identified and propose a semiparametric estimator. Finally, I perform a Monte Carlo exercise to show that the method performs well in small samples.