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May 2006 (Oral) Development Economics, Labor Economics  
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**Dissertation Title:** *Fertility, Rural Labor Market Inefficiencies and Household Outcomes*

**Committee:**

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**Expected Completion Date:** May 2009

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Ph.D., Economics, Yale University, (expected May 2009)  
M.Phil., Economics, Yale University, 2007  
M.A., Economics, Yale University, 2005  
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Yale Dissertation Fellowship, 2008  
Sasakawa Research Award, Yale University, 2007

Ryoichi Sasakawa Young Leaders' Fellowship, Yale University, 2007-08  
 Economic Growth Center Fellowship, Yale University, 2004--2007  
 Yale University Graduate Fellowship, 2004--2008  
 Phi Beta Kappa, University of Chicago, 2004  
 Donnelley Scholar, University of Chicago, 2001-2003  
 Gates Millennium Scholar, University of Chicago, 2000--2003

**Teaching Experience:**

Teaching Assistant, Microeconomic Theory (Masters), Yale University (Fall 2007, Fall 2008)  
 Teaching Assistant, Econometrics (Masters), Yale University (Spring 2007)  
 Teaching Assistant, Introductory Macroeconomics, Yale University (Summer 2007, Summer 2008)  
 Yale College Tutor, Yale University (2006-2007)  
 Teaching Assistant, Financial Theory, Yale University (Fall 2006)

**Papers:**

"Fertility and Rural Labor Market Inefficiencies – Evidence from India" (Job Market Paper)

"Changes in the Characteristics of American Youth – Implications for Adult Outcomes," (with Joseph Altonji and Fabian Lange)

*Submitted*

"Atmospheric Air Pollution and Birth Weight," (with Juan Eberhard)

"Impacts of Changes in Marriage Law - Consequences for Fertility and Educational Attainment of Women"

"The Partition of India: Demographic Consequences," (with Asim Khwaja and Atif Mian)

*Submitted*

"The Big March: Migratory Flows after the Partition of India," *Economic and Political Weekly*, Vol. 43, No. 35. (with Asim Khwaja and Atif Mian)

"Fertility and Women's Labor Supply in Rural India" (in progress)

"Air Pollution and Elderly Mortality," (with Juan Eberhard, in progress)

**Presentations:**

Northeastern Universities Development Conference, Boston University (2 sessions), November 2008  
 Trade and Development Workshop, Yale University, October 2008  
 North American Summer Meeting of the Econometric Society, Pittsburgh, June 2008  
 Environmental Economics Seminar, Yale School of Management, May 2008

## References

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## Dissertation Abstract

My dissertation examines the link between fertility and household labor supply. In the first chapter, I study how fertility can mitigate rural labor market inefficiencies: larger families reduce the costs of informational asymmetries arising from the use of hired labor. In the second chapter, I study the causal effects of fertility on the labor supply of women, concluding that women with more children spend less time performing household chores and supply greater labor on the farm. In the third chapter, I evaluate the impact of a change in marriage law on women's fertility, educational attainment and subsequent workforce participation. I find that delaying marriage causes a decrease in fertility and an increase in educational attainment, but that workforce participation in the long run remains unaffected.

### I. Fertility and Rural Labor Market Inefficiencies – Evidence from India (Job Market Paper)

Labor markets are plagued by informational frictions between employer and worker. These frictions can lead to costly inefficiencies; for example, if employers cannot observe workers' types, workers may not be allocated optimally across tasks according to their comparative advantages. Rural labor markets are particularly prone to such informational frictions. Agricultural production is split into two periods: pre-harvest, in which the worker's effort and output are not easily observed, and harvest, in which both effort and output are easily observed. As a result, the successful completion of pre-harvest tasks often involves costly monitoring of effort.

Research on labor market inefficiencies has largely focused on the existence or development of contracts that alleviate information asymmetries, such as permanent labor contracts and land leasing or sharing contracts. In contrast, in this paper I examine the role of family size – and the related employment of family labor on the farm - as a way to mitigate the costs of monitoring associated with informational frictions.

The two major components of rural labor markets are family labor and labor hired in a daily spot market. Unless supervised, a hired worker doing pre-harvest tasks such as weeding may find it optimal to shirk. Family laborers, on the other hand, are less likely to shirk, since they have repeated interaction with the farm owner and can be punished in non-pecuniary ways. Moreover,

family laborers often partake in a share of the farm's output. Using this insight, I develop a theoretical framework which suggests that family size matters more in pre-harvest tasks: larger families should employ less hired labor in tasks where effort is not easily observed. By employing less hired labor, larger families also spend less time supervising pre-harvest tasks. In contrast, in the harvest period, the worker's effort and output are easily observable. Harvesting and threshing are often paid based on output in India (piece rate wages), eliminating workers' incentives to shirk. Therefore, in harvesting tasks, under well-functioning markets, my model predicts that there should be no systematic relationship between family size and quantity of hired labor employed.

Family size is the result of a complex set of decisions, many of which are taken jointly with labor requirements on the farm. It is thus likely that a simple regression of labor usage on family size will yield biased coefficients. Testing the model requires finding a source exogenous variation in fertility. I adopt a novel approach to this endogeneity problem, using the variation in sterilization take-up induced by a family planning policy as an instrument for family size. The federal and state governments of India paid men and women cash incentives to encourage sterilization as a method of permanent contraception. My instrumental variables approach interacts the cash incentive payment with rainfall shocks to obtain exogenous variation in family size. While sterilization incentives lead to increased overall take-up, take-up was greater when families were hit by negative income shocks induced by drought.

The key aspect of my strategy is that I can control for the main effects of the incentive payment and rainfall shock and *only* use the interaction. Intuitively, the strategy makes use of the differential benefit of the incentive during a time of low-income shock. Hence, my approach circumvents the common problems associated with using just the incentive payment or just rainfall shocks (which affects relative prices, incomes, asset accumulation etc.).

The empirical results confirm that larger families hire less labor for pre-harvest tasks. In contrast, for tasks during the harvest period, there is no systematic substitution between family and hired labor. Moreover, larger families experience lower supervision costs in pre-harvest tasks, precisely because they substitute hired labor with family labor. My results show that there is a link between fertility decisions and rural labor market inefficiencies, and suggest that family planning policies such as incentives for contraception should take into account the costs of smaller families in agricultural households.

## **II. Fertility and Female Labor Supply in Rural India (In Progress)**

Women in rural India spend a considerable amount of time working - whether at home in the form of chores, or on the farm in tasks such as weeding and transplanting of crops. The second chapter of my dissertation uses the essential identification of exogenous variation in family size developed in the first chapter to determine how labor supply of women changes as a consequence of their fertility decisions. By untangling the usually complex and conjoint decisions of how many children to have and how much time to spend working outside the home, my paper arrives at a better understanding of the consequences of fertility for women in rural India. I find that women with more children do *fewer* chores and only slightly more work on their farm; as a result of higher fertility, more children are employed for household chores as well as farm work. Thus, women consume more leisure when family size increases.

## **III. Impacts of Changes in Marriage Law - Consequences for Fertility and Educational Attainment of Women**

In 1957 the state of Mississippi amended its marriage law. Changes included raising the minimum age for men and women, requiring parental consent, and mandating compulsory blood tests and proof of age. As a result, the number of marriages performed in Mississippi fell by more than 60 percent in 2 years. This paper examines the impact of this change in marriage law on marriage rates, fertility and educational attainment of women. I find that the law affected black marriage rates more than white marriage rates. Among black women affected by the change in law, fertility declined and educational attainment rose. There is weak evidence implying the same results for white women. Among white women I also find an upward trend in illegitimate births starting in 1957. Wages and workforce participation rates of women affected by this change in law are not affected.