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**Land market liberalization and wealth differentiated land access:
Panel evidence from Honduras and Peru**

Stephen Boucher
Department of Agricultural and Resource Economics
University of California – Davis
One Shields Avenue
Davis, CA 95616
boucher@primal.ucdavis.edu

Bradford L. Barham
Department of Agricultural and Applied Economics
University of Wisconsin – Madison
427 Lorch Street
Madison, WI 53716
barham@aae.wisc.edu

*Selected Paper prepared for presentation at the American Agricultural Economics
Association Annual Meeting, Denver, Colorado, August 1-4, 2004*

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1. Introduction

Land market liberalizations - ranging from de-collectivization of agrarian reform cooperatives, provision of private property titles, and the elimination of legal restrictions over rental and sales transactions - have been implemented in many Latin American countries in the 1990's. These policies have typically been part of broader programs of liberal reform that have attempted to fortify private markets in ways that enhance efficiency and equity outcomes. Specifically, in rural Latin America where severe poverty and inequality persist, one core objective has been to break the strong link between land ownership and operation by facilitating market-led transfers (primarily via rentals) from the land rich to the land poor.

Economic theory suggests several channels – increased tenure security, reduced transaction costs, and increased credit supply - through which these market-oriented land reforms can promote greater investment, more land transfers, and more efficient use of available land (Boucher et al., 2004). Despite their popularity and a well- established theoretical literature on property rights and investment, the effects of this latest round of titling and market friendly policies on the performance of Latin American land markets have received relatively little empirical attention (Olinto et al., 2000; de Janvry et al., 2001), perhaps in part because of the scarcity of panel data that spans reform periods.

This paper addresses the empirical gap by deploying two such panel data sets from Honduras and Peru to estimate econometric models of the relationship between operational and owned land holdings pre and post land market liberalization efforts. In short, we empirically examine the degree to which land liberalization policies have broken down the dependence of operational area on owned area by promoting more land

rentals especially to relatively land-poor households. The econometric approach also allows us to disentangle the impacts of changes in credit supply conditions from the changes in overall tenure security.

The current structure of the paper first introduces the country settings and data used to examine these issues. An initial look at the descriptive statistics demonstrates for both Honduras and Peru that the proportion of households participating in land rental transactions increased significantly over the two time periods, but that the volume of land rentals remains quite low. The econometric estimations done in this draft of the paper only for Peru show that ...

2. Country Settings

(a) Honduras

In Honduras, the Law for Modernization and Development of the Agricultural Sector (LMDSA) was enacted in 1992 and became operative in the middle of 1993¹. It replaced the 1975 Agrarian Reform Law, thereby rescinding several key statutes including the commitment to eliminate minifundios (5 hectares or less), the prohibition of land rentals by beneficiaries of land reform, and the prohibition on sale of land adjudicated to cooperatives or parcels controlled by individuals in the cooperative. The LMDSA also promoted the titling of land to individuals or couples holding “illegally occupied national lands” prior to 1989. It also strengthened women’s formal rights to hold and receive land (Deere and Leon, 2001) and obliged the government to facilitate land market transactions by improving the security of property rights and the titling and land registry process.

¹ See Thorpe (2000) for a more in-depth description of the LMDSA in Honduras.

Measures were also taken by the Honduran government to rationalize the rural financial sector by strengthening incentives for the private sector to assume a leadership role. Specifically, rural interest rates were liberalized, and BANADESA, the state's agricultural development bank and the main source of formal credit for small farmers, was restructured through a reduction in personnel, an increase in lending rates to market levels, and a limit of \$50,000 in the maximum loan size for a single borrower. The aim was to stimulate commercial bank lending by deregulating interest rates and by ensuring that BANADESA, the government development bank, would not crowd out or repress private sector participation in rural financial markets.²

A major thrust of the LMDSA has been to reinvigorate the Land Titling Project (PTT) that had been promoted strongly in the 1980s but had diminished in the early 1990s³. After initially operating in only seven of Honduras' eighteen departments, the National Agrarian Institute (INA) extended the PTT nationwide after the LMDSA. Approximately 50,000 titles with an average size of 11 hectares were granted between 1983 and 1993, while over 100,000 titles averaging 8 hectares were granted in the post

² While the Honduran government acknowledged the potential for credit market failures for small farmers and thus established the legal base for a rural credit fund and land bank, these two financial institutions have not yet materialized. The World Bank and the European Community are currently operating pilot land bank programs to finance land purchase for small and landless farmers.

³ The initial funding for PTT was provided by USAID. See Nesman and Seligson (1989) for a description of the initial project.

reform years 1994 – 2000.⁴ In addition to extending the coverage of titling, INA also intensified efforts to collect the land debt from previous title recipients.⁵

(b)Peru

While liberalization came relatively late to Peru, when it arrived it was perhaps the most radical example in the Americas. The election of Alberto Fujimori in 1990, signified a dramatic swing of the policy pendulum away from the previous García administration's economic populism towards stabilization, structural adjustment and market liberalization. The changes in the agricultural sector were dramatic. Price controls and the state monopoly over inputs were eliminated. Financial liberalization occurred immediately - the elimination of interest rate controls was accompanied by the closing of the Banco Agrario in 1992. Finally, in an effort to provide incentive to private investment, a new land law was passed, which included elimination of the maximum land size regulation and all restrictions on rental and sales transactions. In addition, a large titling program was enacted in order to map and register every non-comunal parcel in the country. All of these policies were aimed at activating land markets.

The Peruvian government maintained its 'hands-off' credit market policy throughout most of the 1990's. Apart from channeling minimal amounts of subsidized credit to priority areas, the main policy implemented was to provide the legal foundation for rural credit unions (CRAC) and to strengthen the already existing municipal banks

⁴ Data on titles granted in the pre-reform period are from Salgado et. al. (1994). Data for the post reform period were collected in interviews with INA officials in Tegucigalpa.

⁵ The recipients of title to national lands paid two separate fees: a land purchase fee and a separate fee to cover administrative costs of the title. Initially, recipients were offered the option of debt-finance, whereby they would repay the costs of the land and title over a 10-year period.

(CMAC). By 1997, it was clear that the formal rural financial market in Peru was experiencing some limited success. Commercial banks had begun to increase loan volume to the small class of medium sized farmers, while the CRAC's and especially CMAC's had aggressively increased their loan and savings portfolios in the most agriculturally viable coastal valleys. Credit markets in the highlands, however, continued to languish.

Development of the nascent financial market came to a dramatic halt in 1998, as the country simultaneously experienced a macroeconomic crisis and a severe El Niño episode. This was followed immediately by the political crisis that culminated in the fraudulent presidential elections and eventual flight to exile of Fujimori in 2000/2001.

Rural credit policy has now returned to center stage. The Toledo administration recently yielded to pressure to re-establish an agricultural development bank (BANADES) - although the precise form is still being debated. The proposed research comes at a time a critical moment for Peruvian policy and will hopefully contribute to a more informed policy approach to rural financial, land market, and development policies.

3. Data Description

(a) Honduras Sample

In 2001, 850 producer households were surveyed in 5 departments in Honduras regarding the 2000 agricultural year.⁶ This sample can be broken into two distinct sub-

⁶ A criterion for selection was that the household either owned or cultivated a parcel in the previous agricultural year. Households were selected from the departments of Colón, Intibucá, Ocotepeque, Santa Bárbara, and Yoro.

samples: panel and cross section. Only the panel sample is used in this paper. The panel households (500) originate from a study conducted in 1994 (Lopez and Valdes, 2000) in which 450 farm households were interviewed to analyze the impacts of a initial land titling program. The 2001 survey attempted to follow both these baseline households and the land they cultivated. Of the original 450 baseline households, 362 were resurveyed. In addition, 138 “new” panel households were added via parcel transactions. The value of this panel sample for examining the impacts of the LMDSA in Honduras is that it spans a seven year period starting with the year the modernization law was initially passed.

(b) Peru Data

The Peru sample consists of a panel of 500 households interviewed in 1997 and again in 2003 in the north coast department of Piura. In contrast to the Honduras sample, which includes a combination of rainfed and irrigated agriculture, the Peru sample is exclusively irrigated agriculture.⁷ The sample was randomly drawn from the four main agricultural valleys within the department and was stratified on farm size.

A unique feature of this region is that is one of the few coastal regions that contain significant land under control of peasant communities. Until very recently, community members were granted individual usufruct right to land, while the community maintained ownership. Thus, members were not legally allowed to rent community land to non-members, although in practice some rental did occur. This status changed in 1999 when the peasant communities opted to move towards private property rights, and members were granted individual, private land titles by the government’s titling program. Again, this panel dataset offers pre and post-reform data, although in this case the span is

⁷ The Peruvian coast essentially a desert so that all agriculture is irrigated.

somewhat shorter, with the initial wave predating the reforms by two years and the second wave providing a view of land rental markets four years later.

4. Conceptual and Econometric Framework

The conceptual approach builds on Carter and Olinto (2003), and Olinto et al. (2000). Assume a world of constant returns to scale agricultural technology and imperfect substitutability between family and hired labor. If land and credit markets were perfect, heterogeneously endowed households would exchange land until the ratio of operated area to effective labor were equalized, thus ensuring full separability between the choice of how much area to operate and the household's endowment of owned land. Large landowners would rent out land, and small holders would rent in land until the rate of return across factors and households were equalized. This represents an optimistic scenario perhaps hoped for by the implementers of the land market reforms. In the pre-reform environment, in contrast, legal restrictions or the fear of expropriation reduce the amount of land that relatively land abundant households are willing to supply to the rental (or sales) market and in the extreme fully link land owned with land operated.

In the post reform setting, the relationship between owned and operated area for both land abundant and land scarce households also depends on their access to credit. Land scarce households, who face no risk of losing their land, will want to rent in land until the marginal returns to its factors are equalized. If they are unconstrained in credit markets, they do so, and separability between area operated and owned is achieved. However, credit-constrained, land scarce households will be unable to afford to rent in as much land as they seek and, as a result, the area operated by these households will be increasing in their land endowment. Non-separability will also hold for land abundant

households if they are credit constrained, as they will rent out a larger fraction of their land to help finance on-farm production.

The econometric model is similar to the credit market disequilibrium model employed by Feder et. al. (1990) to examine the impacts of credit constraints on farm productivity. Similarly, we use a Heckman approach to control for credit constraints in examining the impacts of how the relationship between owned and operated land has evolved following land market liberalization episodes. More specifically, we examine the determinants of household participation in land rental market transactions in a second stage specification that is contingent on the household's credit market status.

The first stage of the model identifies constrained and unconstrained households using a probit specification, with credit rationing status as the dependent variable.

Letting $C_i^* = \gamma'Z_i + u_i$ denote the unobserved difference between formal sector credit demand and supply, and C_i the observed credit rationing outcome, the first stage probit equation is:

$$C_{it} = \begin{cases} 1 & \text{if } \gamma_t'Z_{i,t} + u_{i,t} \geq 0 \\ 0 & \text{if } \gamma_t'Z_{i,t} + u_{i,t} < 0 \end{cases}$$

While the potential for rationing in credit markets prevents us from knowing the value of excess demand, the survey instrument does permit us to classify households into those that are price rationed versus non-price rationed (liquidity constrained).

The second stage examines the determinants of land rental market participation. Let RI_{it} be the area rented in by household i in period t , with $t=0$ for the pre-reform period and $t=1$ for the post-reform period. Then, area rented in is given by:

$$RI_{it} = \begin{cases} \beta'_{1,t} X_{1,it} + e_{1,it} & \text{if } \gamma_t' Z_{i,t} + u_{i,t} \geq 0 \\ \beta'_{2,t} X_{2,it} + e_{2,it} & \text{if } \gamma_t' Z_{i,t} + u_{i,t} < 0 \end{cases}$$

where $X_{1,it}$ $X_{2,it}$ are vectors of exogenous variables which affect the demand for land rental including owned farm area, human capital and the appropriate inverse-Mills ratio; Z_{it} is a vector of exogenous variables affecting both credit supply and demand; and $\beta_{1,t}$, $\beta_{2,t}$, and γ_t are the corresponding vectors of parameters to be estimated. Finally, $e_{1,it}$, $e_{2,it}$, and $u_{i,t}$ are random disturbances assumed to have a trivariate normal distribution, iid across households. Note that the parameter vectors in this regression are subscripted by t , indicating that the parameters may be different in the pre and post reform periods.

A parallel structure is utilized for land area rented out, with RO_{it} substituting for RI_{it} . The main substantive difference between the two regressions is that the supply of land rented out by a given household may be affected by the proportion of their land that is titled and thus more secure in its tenure status, while the demand for land is presumably not affected by similar concerns. Otherwise, all of the land rental regressions include the amount of land owned, the household labor endowment, the amount of agricultural capital endowment of the household, and the age of the head of household. One other notable difference across the regressions is that the vector of exogenous variables should be distinct for constrained versus the unconstrained households. Specifically, liquidity should positively affect the demand for land rentals and negatively affect the supply of land rentals among constrained households but liquidity should have no impact on the land rental market choices of unconstrained households.

5. Credit Rationing and Land Rental Market Activity – Pre and Post Reforms

In Honduras, land rental market activity underwent two major changes following the reforms. First, participation on both sides of the rental market grew dramatically. The proportion of households renting in land increased from 15% to 35%, while the proportion renting out land grew from 12% to 29%. Second, the average amount of land rented out per participating household fell considerably, especially on the land rented in side of the market from 5 manzanas to 2 manzanas. Thus, while land rental market activity became much more common among the respondents, the average amount of land rented fell almost as swiftly, such that the net amount of land rented-in only increased by about 10%. Moreover, the total share of cultivated land that is rented-in as of 2000 was only 7% among respondents in the sample, which means that despite the dramatic increase in land rental participation, there has been relatively little change in the relationship between land owned and operated in Honduras (Boucher et al. 2004).

The data in Table 1 compare changes in land rental market activity for constrained and unconstrained households across the two time periods in Honduras. Both types of households dramatically increased their propensity to both rent-in and rent-out land during the seven years. However, credit constrained households increased their propensity to rent-in land at a faster rate, while credit unconstrained households increased their propensity to rent-out land at a higher rate. Note also that the average area rented-in by credit constrained households fell from 2 manzanas in 1994 to 1.25 in 2001, which suggests that while land markets became more fluid, that the ability of the households to fully exploit increased access to land rentals was constrained by their lack of complementary access to credit.

Similar data for Peru show that... TABLE 2...

6. Determinants of Land Rental Activity in Honduras and Peru

The determinants of land rental activity are explored in this section. Currently, the section reports only regression results for Peru. The results for Honduras are pending. The variable description and means of the key regressors are reported in Table 3 for Peru. Note that the estimation strategy for the two-stage regression is done using the following procedure. In each country and year, four separate cross-sectional Tobit regressions were run: (1) Rental demand for credit constrained households; (2) Rental demand for credit unconstrained households; (3) Rental supply for credit constrained households; and, (4) Rental supply for credit unconstrained households. The regressors for each of the Tobit equations includes the appropriate inverse mills selection term from the first-stage probit on credit constrained data. While the two-rental demand and two rental supply equations could be estimated simultaneously, we opted for the less efficient strategy of single equation estimation due to data limitations.

The probit results on credit constraints are reported in Table 4 for 1997 and 2003. The 1997 regression provides a number of significant coefficient estimates regarding the factors influencing credit constraints, while the 2003 do not (they are more tentative because of recent data compilation). Drawing from the 1997 results primarily, we note that households tend to be constrained in their access to credit (non-price rationed) when:

- They lack title to their agricultural land;
- They have less in the way of agricultural assets;
- They are older;

- They have not had previous loans; and,
- They have problems with previous loan defaults.

The land rental regressions (Tables 4 and 5) show the importance of credit constraints in distinguishing land rental outcomes in 1997 but less so in 2003. Note that in both the rental demand and supply estimations for 1997 that the coefficient on liquidity is statistically significant and in the direction predicted by the conceptual framework discussed above. Namely, for credit-constrained households, increased liquidity increases their demand for land rental and decreases their supply of land to rental markets. The land rental regressions also show that for credit constrained households more owned land makes them significantly less likely to rent-in and significantly more likely to rent-out land. Thus, credit constraints appear to also push them in the direction of operating less land than they might otherwise. Combined with the fact that the credit constrained tend to be poorer (see Probit results), this means that credit market failures may tend to push land markets away from the more equalizing effect that they might otherwise have between the land abundant and land poor.

7. Conclusions

This paper examines empirical evidence from two countries in Latin America where policies aimed at activating land and credit markets were actively pursued in the 1990s. While the titling push and legal reforms supporting land market transactions appear to have activated rental activity especially in Honduras, muted improvements in rural credit access in Honduras and in Peru have limited the extent to which land rental markets can move significant amounts of land. It appears that further improvement in

land rentals especially among the land poor will require more attention to credit markets, and how they may constrain participation.

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Table 1
Land Rental Market Activity Among Credit Constrained
and Unconstrained Households - Honduras 1994, 2001
(percent, land area is manzanas)

	Credit Constrained	Credit Unconstrained
Proportion of 1994 Sample	38%	62%
Proportion of 2001 Sample	31%	69%
Proportion Renting-in 1994	16%	13%
Proportion Renting-in 2001	46%	30%
Proportion Renting-out 1994	10%	12%
Proportion Renting-out 2001	24%	34%
Ave. Area Rented-in 1994	2.01	8.58
Ave Area Rented-in 2001	1.25	2.8
Ave. Area Rented-out 1994	3.41	7.98
Ave. Area Rented-out 2001	5.26	4.75

All land measures are conditional on participation in the market.

Table 3. Variable Description for Peru

Variable Name	Variable Description	Mean	
		1997 (N=547)	2003 (N=499)
A_ owned	Area owned by household (ha.)	5.1	4.4
A_ titled	Titled area owned by household (ha.)	3.4	3.5
Liquid	Pre-planting liquidity (\$US)	1,707	909
Agassets	Value of agricultural assets (\$US)	2,320	846
Ag_HH	Age of household head	51.7	56.9
Ed_HH	Years schooling of household head	4.8	4.6
N_perm	Number of household members with permanent, off farm job	0.4	0.3
Loanhist	Number of formal loans taken by household	1.9	2.4

	prior to survey year		
Default	Dummy taking value 1 if household had a prior default on formal loan	0.2	0.2
Adults	Number of adults in household	4.1	3.9
Children	Number of children in household	1.7	1.3

Table 4. Estimated Coefficients of Probit Model: Peru
(Dependent variable is probability of being credit constrained)

Variable	Estimated Coefficient (t-value)	
	1997	2003
A_titled	-0.085 (-5.9)	-0.0038 (-1.28)
A_owned	0.082 (5.2)	0.0026 (0.86)
Liquid	0.00002 (0.51)	-0.00003 (-1.42)
Agasset	-0.00015 (-1.94)	0.00011 (1.21)
Age_HH	0.0082 (3.74)	0.0030 (1.47)
Ed_HH	-0.02 (-1.48)	-0.019 (-1.41)
N_perm	-0.04 (-0.56)	0.32 (1.25)
Loanhist	-0.2 (-3.77)	-0.071 (-1.65)
Default	0.73 (4.64)	0.35 (2.54)

Table 5. Regression Coefficients for Second-Stage Switching Regression for Rental Demand: Peru
(Dependent Variable is area rented in)

Variable	1997			2003		
	Constrained (N=304)	Unconstrained (243)	Pooled (547)	Constrained (N=249)	Unconstrained (250)	Pooled (499)
Liquid	0.00051 (2.97)	NA		0.000099 (0.86)	NA	
Adults	-0.57 (-0.82)	NA		0.039 (0.145)	0.32 (0.71)	
Children	-0.37 (-0.67)	NA		0.035 (0.12)	-0.29 (0.42)	
A_owned	-0.82 (-2.07)	-0.21 (-1.1)		-0.138 (-0.425)	-0.57 (-1.56)	
A_titled	-	-		0.134 (0.52)	-	
Agasset	-0.0005 (-0.43)	0.00017 (0.50)		-0.00059 (-0.26)	0.0017 (0.87)	
Age_HH	-0.069 (-1.04)	-0.055 (-1.26)		-0.65 (-1.99)	-0.16 (-0.25)	
Inverse-Mills	6.6 (4.2)	7.9 (3.94)		3.6 (2.64)	12.9 (1.6)	

Note: For 2003, constrained: Could not get convergence without A_titled

Note: For 2003 unconstrained: Could not get convergence if exclude Adults and Children and A_titled.

Table 6. Regression Coefficients for Second-Stage Switching Regression for Rental Supply: Peru
(Dependent Variable is area rented out)

Variable	1997			2003		
	Constrained (N=304)	Unconstrained (243)	Pooled (547)	Constrained (N=249)	Unconstrained (250)	Pooled (499)
Liquid	-0.00029 (-1.81)	NA		0.00032 (2.4)	NA	
Adults	-0.1 (-0.52)	NA		-0.52 (-1.15)	-0.34 (-0.67)	
Children	0.049 (0.28)	NA		-0.32 (-0.93)	0.44 (0.59)	
A_owned	0.17 (3.16)	-0.25 (-0.32)		0.16 (1.2)	-0.71 (-0.39)	
Agasset	-0.00067 (-0.76)	-0.000049 (-0.21)		-0.00043 (-0.64)	-0.0012 (-0.30)	
Age_HH	-0.032 (-1.62)	-0.033 (-1.48)		-0.013 (-0.57)	0.069 (2.04)	
Inverse-Mills	3.3 (3.92)	3.4 (2.53)		5.5 (2.60)	17.8 (4.5)	

Note: For 2003, constrained: Could not get convergence without A_titled

Note: For 2003 unconstrained: Could not get convergence if exclude Adults and Children and A_titled.