The Countervailing Investment & Rental-supply Effects of Securing Land Ownership: Theory and Evidence from Nicaragua.

Tengda Gong
University of Manitoba
tengda.gong@umanitoba.ca

2025 ASSA Annual Meeting
Jan 4, 2025

Motivation: Interralted effects of land tenure security

- **Resource Allocation Effects**: Capital, land, and labor.
  - *Land-attached investments*: Incentives and ability to invest (e.g., Feder et al., 1988; Carter and Olinto, 2003).
  - *Productive land transfers*: Transaction cost or risk of losing the rented-out land (e.g., Carter and Yao, 2002; Macours et al., 2010).
  - *Sectoral occupation choices*: Excessive labor in the agriculture sector (e.g., de Janvry et al., 2015; Gottlieb and Grobovšek, 2019).

Motivation: Interralted effects of land tenure security

- **Resource Allocation Effects**: Capital, land, and labor.
  - *Land-attached investments*: Incentives and ability to invest (e.g., Feder et al., 1988; Carter and Olinto, 2003).
  - *Productive land transfers*: Transaction cost or risk of losing the rented-out land (e.g., Carter and Yao, 2002; Macours et al., 2010).
  - *Sectoral occupation choices*: Excessive labor in the agriculture sector (e.g., de Janvry et al., 2015; Gottlieb and Grobovšek, 2019).

- **Interactions with non-security market frictions**: E.g., frictions in rural capital markets (Adamopoulos et al., 2022).

Motivation: Interralted effects of land tenure security

- **Resource Allocation Effects**: Capital, land, and labor.
  - *Land-attached investments*: Incentives and ability to invest (e.g., Feder et al., 1988; Carter and Olinto, 2003).
  - *Productive land transfers*: Transaction cost or risk of losing the rented-out land (e.g., Carter and Yao, 2002; Macours et al., 2010).
  - *Sectoral occupation choices*: Excessive labor in the agriculture sector (e.g., de Janvry et al., 2015; Gottlieb and Grobovšek, 2019).

- **Interactions with non-security market frictions**: E.g., frictions in rural capital markets (Adamopoulos et al., 2022).

This paper studies the investment and land transfer effects of land tenure security given imperfect land rental markets.

Motivation: Latin America

- **Expected Effects of Securing Land Ownership**: Boost agricultural growth and reduce rural poverty, especially in Latin America where land ownership distributions are highly unequal (e.g., de Janvry et al., 2001; Deininger, 2003).

Motivation: Latin America

- **Expected Effects of Securing Land Ownership**: Boost agricultural growth and reduce rural poverty, especially in Latin America where land ownership distributions are highly unequal (e.g., de Janvry et al., 2001; Deininger, 2003).
  - *Land-attached investments*: Incentives and ability to invest (e.g., Carter and Olinto, 2003).
  - *Productive land transfers*: Risk of tenants squatting land (e.g., Macours et al., 2010).
  - *Imperfect labor and capital markets*: Agency cost of hired labor and credit rationing (e.g., Eswaran and Kotwal, 1986; Carter, 1988).

Motivation: Latin America

- **Expected Effects of Securing Land Ownership**: Boost agricultural growth and reduce rural poverty, especially in Latin America where land ownership distributions are highly unequal (e.g., de Janvry et al., 2001; Deininger, 2003).
  - *Land-attached investments*: Incentives and ability to invest (e.g., Carter and Olinto, 2003).
  - *Productive land transfers*: Risk of tenants squatting land (e.g., Macours et al., 2010).
  - *Imperfect labor and capital markets*: Agency cost of hired labor and credit rationing (e.g., Eswaran and Kotwal, 1986; Carter, 1988).

- **Empirical "Puzzle" in Nicaragua**: A significant increase in land-attached capital but a mild expansion of land rental markets after salient land titling and registrations in the late 1990s (Deininger and Chamorro, 2004; Boucher et al., 2005).

Theoretical Perspective

- **Theoretical Argument**: Potential landlords face a trade-off between investing in attached capital and renting out land due to non-security barriers to long-term land rental contracts.
  - ◇ *Legal caps on land leasing durations and landlords' preferences for flexible short-term land leasings* (Díaz et al., 2002; Bandiera, 2007).

    $\Rightarrow$ Under short-term land rental contracts, tenants do not have sufficient incentives to take care of landlords' land-attached capital.

Theoretical Perspective

- **Theoretical Argument**: Potential landlords face a trade-off between investing in attached capital and renting out land due to non-security barriers to long-term land rental contracts.
  - ◇ *Legal caps on land leasing durations and landlords' preferences for flexible short-term land leasings* (Díaz et al., 2002; Bandiera, 2007).

    $\Rightarrow$ Under short-term land rental contracts, tenants do not have sufficient incentives to take care of landlords' land-attached capital.

- **Theoretical Prediction**: All else equal, landowners with higher initial investment capacities will be less likely to rent out land after an improvement in land ownership security.

This presentation focuses on the empirical evidence from Nicaragua.

Overview of Empirical Results

- **Contemporary Nicaragua**: One of the poorest countries in Latin America, which has suffered from insecure land ownership (e.g., Bandiera, 2007; Demombynes, 2008).
- **Main Findings**: Aligned with my theoretical prediction.
  - *Average Effects*: Security improvement programs significantly increased the amount of land-attached capital but not the area of rented-out land at the household level.
  - *Heterogeneous Effects*: Previously-credit-unconstrained households significantly increased land-attached investments but not rented-out land, whereas previously-credit-constrained households did the opposite.

Panel Survey Data

- **Rural Business Development Project**: An RCT that raised rural Nicaraguan households' incomes by helping them develop and implement agricultural business plans mostly through investments (Carter et al., 2019).

Panel Survey Data

- **Rural Business Development Project**: An RCT that raised rural Nicaraguan households' incomes by helping them develop and implement agricultural business plans mostly through investments (Carter et al., 2019).
- **Households**: Participation in security improvement programs + demographics (e.g., credit constraint status).
- **Plots**: Land-attached capital stocks and changes as well as land leasing (to be aggregated at the household level).

Security Improvement Programs

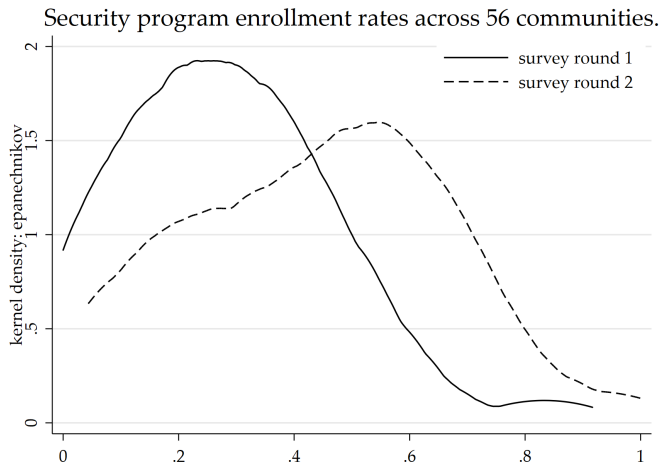
- **Major Program**: The World Bank's Land Administration Program that improved land ownership security by systematically demarcating land boundaries, resolving ownership conflicts, and titling as well as registering land (De la O Campos et al., 2023).

Security Improvement Programs

- **Major Program**: The World Bank's Land Administration Program that improved land ownership security by systematically demarcating land boundaries, resolving ownership conflicts, and titling as well as registering land (De la O Campos et al., 2023).
- **Other Programs**: Similar approaches. All programs as a whole significantly increased the perceived land ownership security.

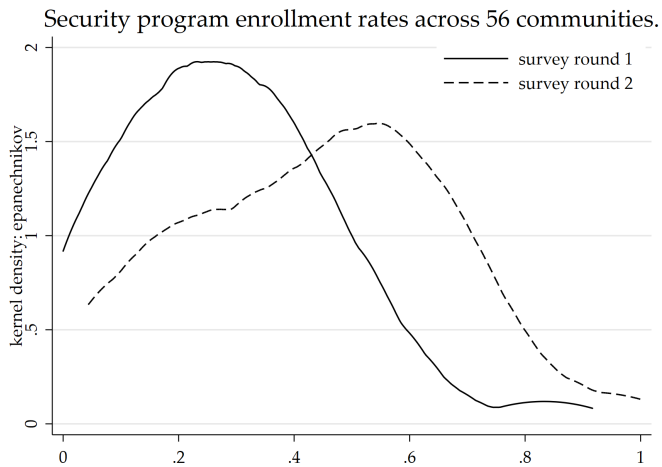
Security Improvement Programs

- **Major Program**: The World Bank's Land Administration Program that improved land ownership security by systematically demarcating land boundaries, resolving ownership conflicts, and titling as well as registering land (De la O Campos et al., 2023).
- **Other Programs**: Similar approaches. All programs as a whole significantly increased the perceived land ownership security.
- **Program Enrollment Rates**



Security Improvement Programs

- **Major Program**: The World Bank's Land Administration Program that improved land ownership security by systematically demarcating land boundaries, resolving ownership conflicts, and titling as well as registering land (De la O Campos et al., 2023).
- **Other Programs**: Similar approaches. All programs as a whole significantly increased the perceived land ownership security.
- **Program Enrollment Rates**



- **Where Increased More?**
  - Department of Chinandega
  - Communities with higher shares of female-headed households
  - Communities with higher shares of credit-unconstrained households

Summary Stats

Table 1: Summary Stats of Key Variables.

variable	round 1 (mean/s.e.)	round 2 (mean/s.e.)	difference (round 2 - round 1)
enrolled in any security program (0/1)	0.30	0.45	0.15***
	(0.02)	(0.03)	(0.01)
credit constrained (0/1)	0.43	0.40	-0.02
	(0.01)	(0.02)	(0.02)
amount of land-attached capital	15.18	18.38	3.20***
(1,000 córdoba or 50 US $)	(1.24)	(1.43)	(0.47)
having land-attached capital (0/1)	0.69	0.71	0.01***
	(0.02)	(0.02)	(0.00)
area of rented-out land,	0.55	0.63	0.07
(manzana or 0.7 hectare)	(0.14)	(0.15)	(0.07)
having rented out any land (0/1)	0.04	0.05	0.01
	(0.01)	(0.01)	(0.01)

Note: Standard errors are clustered at the community level. There are 1004 households in 56 rural Nicaraguan communities. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Empirical Design: Panel-IV Tobit

- **Stage 1**: A panel linear regression model.

$$\begin{aligned} program\_enrolled_{i,t} =& \alpha \times programrate_{j(i),t} + household_i + department_{k(i)} \times round_t \\ &+ linear\_confounding\_timetrends\_of\_community_{j(i)} \\ &+ \lambda \times rbp_{i,t} + u_{i,t}, \end{aligned}$$

- **Stage 2**: A panel Tobit regression model.

$$\begin{aligned} Y_{i,t} =& \beta \times program\_enrolled_{i,t} + \gamma \times \hat{u}_{i,t} + household_i + department_{k(i)} \times round_t \\ &+ linear\_confounding\_timetrends\_of\_community_{j(i)} + \mu \times rbp_{i,t} + v_{i,t}, \end{aligned}$$

Empirical Design: Panel-IV Tobit

- **Stage 1**: A panel linear regression model.

$$\begin{aligned} program\_enrolled_{i,t} =& \alpha \times programrate_{j(i),t} + household_i + department_{k(i)} \times round_t \\ &+ linear\_confounding\_timetrends\_of\_community_{j(i)} \\ &+ \lambda \times rbp_{i,t} + u_{i,t}, \end{aligned}$$

- **Stage 2**: A panel Tobit regression model.

$$\begin{aligned} Y_{i,t} =& \beta \times program\_enrolled_{i,t} + \gamma \times \hat{u}_{i,t} + household_i + department_{k(i)} \times round_t \\ &+ linear\_confounding\_timetrends\_of\_community_{j(i)} + \mu \times rbp_{i,t} + v_{i,t}, \end{aligned}$$

(1) $Y_{i,t}$ is the outcome variable for household i in survey round t, which is either the amount of land-attached capital or the area of rented-out land.
(2) $program_{i,t}$ indicates whether household i had participated in any security improvement program by survey round t.
(3) $programrate_{j(i),t}$ is the overall enrollment rate of security improvement programs in survey round t, community j in which household i resided.

Following Honoré (1992) and Das (2002), I employ the control function approach to estimate the panel-IV Tobit model above.

Results: Average Effects

Table 2: The Average Impacts of Security Improvement Programs.

	First Stage	Second Stage	
	program enrolled (0/1)	land-attached capital (1,000 córdoba)	rented-out land (manzana)
program enrolled (household-level)		38.6**	29.3
		[18.0]	[33.5]
program enrollment rate (community-level)	0.94***		
	[0.13]		
linear confounding trends	YES	YES	YES
household fixed effects	YES	YES	YES
department-round fixed effects	YES	YES	YES
rural business development	YES	YES	YES
No. of households	1004	1004	1004
Adjusted R^2	0.75	-	-
χ^2 (p-value)	-	21.66 (0.01)	5.03 (0.75)

Note: Standard errors are heteroskedasticity-robust. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Results: Heterogeneous Effects

Table 3: Impacts of Security Improvement Programs by Credit Constraint Status.

	land-attache capital (1,000 córdoba)	rented-out land (manzana)
Panel A: Full sample (1004 hhs).		
initially-credit-unconstrained households	54.7**	11.9
	[27.8]	[47.9]
initially-credit-constrained households	8.6	66.9**
	[18.1][b]	[33.2]
difference	46.1	-55.0
	[33.2]	[58.2]
χ^2 (p-value)	25.59 (0.06)	82.04 (0.00)
Panel B: Matched sample (530 hhs).		
initially-credit-unconstrained households	35.5	-60.2
	[37.6]	[62.3]
initially-credit-constrained households	0.5	69.3
	[40.3]	[80.1]
difference	35.0	-129.5*
	[55.1]	[69.7]

Note: Standard errors are heteroskedasticity-robust. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Evidence from Rural Business Development Project

The rural business development project significantly increased investments of land-attached capital (Carter et al., 2019). Any complementary effect?

Table 4: Interaction Effects of Security Improvement Programs & RBP

	land-attache capital (1,000 córdoba)	rented-out land (manzana)
security program with RBP	94.6*	-115.3
	[54.3]	[95.5]
security program without RBP	26.1*	46.2
	[15.7]	[35.0]
difference	68.5	-161.5
	[48.2]	[107.0]

Note: Standard errors are heteroskedasticity-robust. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Conclusion

- Securing land ownership significantly increased land-attached capital but not rented-out land in contemporary Nicaragua.
- This is possibly because potential landlords face the trade-off between investing in land-attached capital and renting out land due to non-security barriers to long-term land rental contracts.
- The countervailing investment and rental-supply effects of securing land ownership may disproportionately diminish welfare gains for the rural poor (Gong, 2024, WP).
- Future research may explore how these countervailing effects will affect the associated sectoral labor allocation effect of securing land ownership (Adamopoulos et al., 2022).

Thanks for your time and attention!

Email: tengda.gong@umanitoba.ca.

Personal website: https://tengdagong.com