

Land-Market Restrictions and Agricultural Productivity under Market Power

Julián Arteaga

University of California, Davis

World Bank Land Conference - Washington, DC

May 15, 2024

Motivation

- It is common for governments around the world to impose restrictions on rural land markets.
 - e.g. China, Mexico, Philippines, US Homestead Act. (Allen, 1991).
 - Bans on sales, use-contingent property rights, limits on area owned: **land ceilings**.

Motivation

- It is common for governments around the world to impose restrictions on rural land markets.
 - e.g. China, Mexico, Philippines, US Homestead Act. (Allen, 1991).
 - Bans on sales, use-contingent property rights, limits on area owned: **land ceilings**.
- Constraints have been shown to hinder productivity and labor mobility (de Janvry et al., 2015; Gottlieb and Grobovšek, 2019; Adamopoulos and Restuccia, 2020).
 - Major suspect for the *Agricultural Productivity Gap* (Restuccia et al., (2008); Gollin et al., (2014); Chari et al., (2021), Adamopoulos et al., (2022)...)

Motivation

- At the same time, farmland in many developing countries is concentrated in large, underutilized estates.

INTERNATIONAL INDICATORS				
Indicators	Latin America	Asia	Europe	United States
Number of holdings	10,281,607	143,934,358	7,625,520	1,911,859
Total area (hectares)	705,586,803	268,741,639	125,394,061	377,088,222
Average farm size	68.6	1.9	16.4	197.2
Land gini coefficient	.83	.52	.64	.75
Agricultural land (%)	65.7	91.8	70.6	88.9
Cropland (%)	20.4	99.5	65.6	52.1
Meadows and pastures (%)	79.6	.5	34.4	47.9
Land tenure (area; %):				
Owner and owner-like	85.5	88.7	61.4	33.9
Rented from other	3.6	2.8	23.3	11.6
Mixed and others	10.7	8.5	15.3	54.5
Below 10 hectares:				
Farms	58.7	97.4	74.5	29.5
Area	2.5	72.6	11.4	1.2

Source. World Census of Agriculture (1990, 2000).

Note. Latin America = Argentina, Brazil, Colombia, Chile, Honduras, Panama, Paraguay, Peru, Puerto Rico, Uruguay, and Venezuela. Asia = Bangladesh, Cyprus, India, Iran, Japan, Nepal, Pakistan, Philippines, Thailand, and Turkey. Europe = Austria, Belgium, France, Italy, Luxembourg, Portugal, Spain, Switzerland, and the United Kingdom.

Table: Assunção (2008)

Motivation

- Concentration and underutilization may reflect the presence of market failures in input markets.

Motivation

- Concentration and underutilization may reflect the presence of market failures in input markets.
- Imperfect competition induces owners to operate inefficiently large farms to distort input prices (Conning, 2003).
 - Monopoly power in land markets.
 - Monopsony power in labor markets.

Motivation

- Concentration and underutilization may reflect the presence of market failures in input markets.
- Imperfect competition induces owners to operate inefficiently large farms to distort input prices (Conning, 2003).
 - Monopoly power in land markets.
 - Monopsony power in labor markets.
- Is the presence of market power a large enough concern to merit the restriction of land transactions?
 - Do imperfect-competition arguments used as justification hold validity?

Motivation

- Concentration and underutilization may reflect the presence of market failures in input markets.
- Imperfect competition induces owners to operate inefficiently large farms to distort input prices (Conning, 2003).
 - Monopoly power in land markets.
 - Monopsony power in labor markets.
- Is the presence of market power a large enough concern to merit the restriction of land transactions?
 - Do imperfect-competition arguments used as justification hold validity?
- What are there distributional implications of imposing (or lifting) restrictions?

This Paper

- Examines the effects of a 1994 law in Colombia that set land ceilings of **varying height** and on **varying amounts of farmland** across municipalities.

This Paper

- Examines the effects of a 1994 law in Colombia that set land ceilings of **varying height** and on **varying amounts of farmland** across municipalities.
- Average land-market restriction levels:
 - Reduce agricultural land productivity (Revenue/hectare) by 14%.

This Paper

- Examines the effects of a 1994 law in Colombia that set land ceilings of **varying height** and on **varying amounts of farmland** across municipalities.
- Average land-market restriction levels:
 - Reduce agricultural land productivity (Revenue/hectare) by 14%.
 - Drop in productivity driven by low-concentration municipalities.

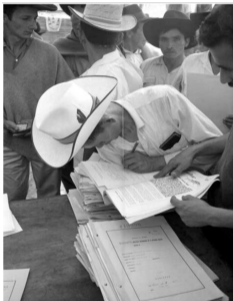
This Paper

- Examines the effects of a 1994 law in Colombia that set land ceilings of **varying height** and on **varying amounts of farmland** across municipalities.
- Average land-market restriction levels:
 - Reduce agricultural land productivity (Revenue/hectare) by 14%.
 - Drop in productivity driven by low-concentration municipalities.
 - Increased agricultural wages by 41%.
 - Increased the employment share of agriculture by 15%.

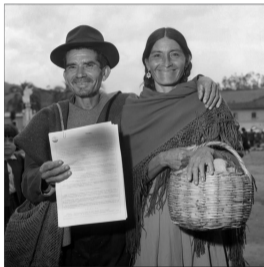
This Paper

- Examines the effects of a 1994 law in Colombia that set land ceilings of **varying height** and on **varying amounts of farmland** across municipalities.
- Average land-market restriction levels:
 - Reduce agricultural land productivity (Revenue/hectare) by 14%.
 - Drop in productivity driven by low-concentration municipalities.
 - Increased agricultural wages by 41%.
 - Increased the employment share of agriculture by 15%.
- Rationalize these results in an ag. production model with market power + land ceilings.

Institutional Context: Colombia's Allocation of Public Land



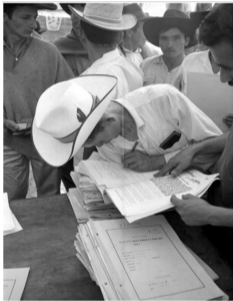
Allocation in Paz del Río, Boyacá – ca. 1966
Photo: Efraín García Abadía,
Collection of the Colombian National Museum



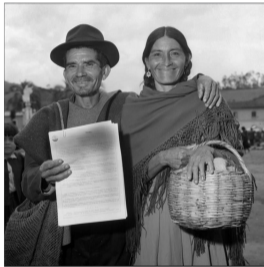
Rogelio Burgo Rosales and his wife with their property title – 1966
Photo: Efraín García Abadía,
Collection of the Colombian National Museum

- From 1960 to 2014: $\approx 550,000$ allocations, amounting to ≈ 22.3 million hectares.

Institutional Context: Colombia's Allocation of Public Land



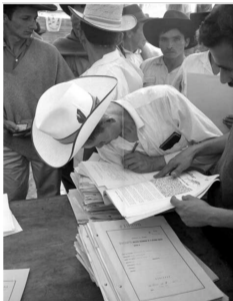
Allocation in Paz del Río, Boyacá – ca. 1966
Photo: Efraín García Abadía,
Collection of the Colombian National Museum



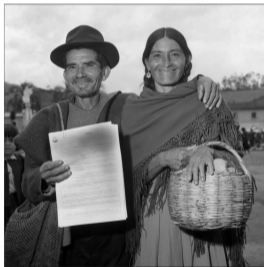
Rogério Burgo Rosales and his wife with their property title – 1966
Photo: Efraín García Abadía,
Collection of the Colombian National Museum

- From 1960 to 2014: \approx 550,000 allocations, amounting to \approx 22.3 million hectares.
- Roughly 50% of the country's privately-owned farmland today.

Institutional Context: Colombia's Allocation of Public Land



Allocation in Paz del Río, Boyacá – ca. 1966
Photo: Efraín García Abadía,
Collection of the Colombian National Museum



Rogelio Burgo Rosales and his wife with their property title – 1966
Photo: Efraín García Abadía,
Collection of the Colombian National Museum

- From 1960 to 2014: $\approx 550,000$ allocations, amounting to ≈ 22.3 million hectares.
- Roughly 50% of the country's privately-owned farmland today.
- But land inequality levels remain one of the highest in the world... Ibáñez & Muñoz, (2010).

Land in Colombia is Concentrated and Underutilized



Pergamon

World Development Vol. 27, No. 4, pp. 651-672, 1999

© 1999 Elsevier Science Ltd

All rights reserved. Printed in Great Britain

0305-750X/99 \$ - see front matter

PII: S0305-750X(99)00023-6

Making Negotiated Land Reform Work: Initial Experience from Colombia, Brazil and South Africa

KLAUS DEININGER *

The World Bank, Washington DC, USA

12. It is well known that market imperfections commonly encountered in rural areas of developing countries can lead to concentration of land in the hands of larger producers (e.g., Carter and Mesbah, 1993). But credit market imperfections alone—without policy interventions—cannot explain the heavy underutilization of land in Colombia where 75% of potential cropland is currently under pasture—it would presumably be more profitable for large landowners to rent out to sharetenants rather than to use land for extensive cattle ranching or to leave it completely fallow.

Land in Colombia is Concentrated and Underutilized

What we see now is a concentration of lands on the part of the company [...] and they do not care if they leave us without a job, [...] they never take into account the people from the municipality and, of course, if they buy all the land, we are left unemployed.

Focus group participant interviewed in (Pérez et al., November 2016)

Land in Colombia is Concentrated and Underutilized

What we see now is a concentration of lands on the part of the company [...] and they do not care if they leave us without a job, [...] they never take into account the people from the municipality and, of course, if they buy all the land, we are left unemployed.

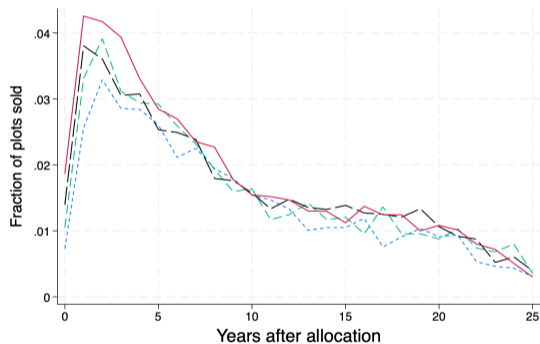
Focus group participant interviewed in (Pérez et al., November 2016)

[Community-owned lands] must be promoted, since in these lands communities are protected from the market's voracity, which monopolizes lands in latifundia and pushes out households from their farms.

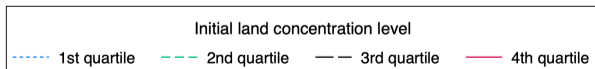
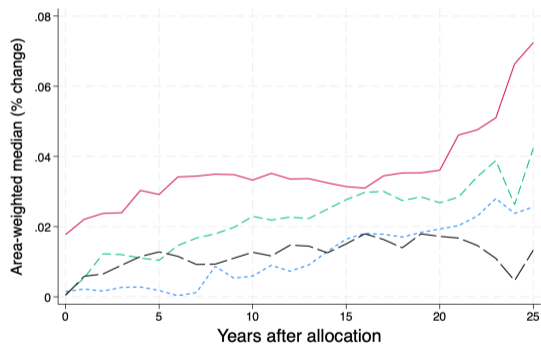
F. De Roux, chair of the Commission for the Clarification of Truth, November 2012

Baldíos are resold and accumulated faster in high-concentration municipalities

Land Sales



Owner-level Land Concentration



The Imposition of Land Ceilings: The Agricultural Family Unit

- Law 160 of 1994 imposed limits on the amount of land any individual could own.
 - Called the *Agricultural Family Unit* (UAF).

The Imposition of Land Ceilings: The Agricultural Family Unit

- Law 160 of 1994 imposed limits on the amount of land any individual could own.
 - Called the *Agricultural Family Unit* (UAF).
- Explicitly aimed at reducing land concentration levels.

The Imposition of Land Ceilings: The Agricultural Family Unit

- Law 160 of 1994 imposed limits on the amount of land any individual could own.
 - Called the *Agricultural Family Unit* (UAF).
- Explicitly aimed at reducing land concentration levels.
- The limit **only applied to land that at some point in the past had been part of the public land distribution program.**

The Imposition of Land Ceilings: The Agricultural Family Unit

- Law 160 of 1994 imposed limits on the amount of land any individual could own.
 - Called the *Agricultural Family Unit* (UAF).
- Explicitly aimed at reducing land concentration levels.
- The limit **only applied to land that at some point in the past had been part of the public land distribution program.**
- Limit defined as the amount of land needed to earn a 'decent livelihood'.

The Imposition of Land Ceilings: The Agricultural Family Unit

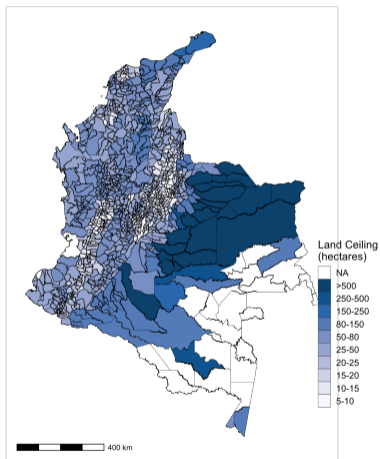
- Law 160 of 1994 imposed limits on the amount of land any individual could own.
 - Called the *Agricultural Family Unit* (UAF).
- Explicitly aimed at reducing land concentration levels.
- The limit **only applied to land that at some point in the past had been part of the public land distribution program.**
- Limit defined as the amount of land needed to earn a 'decent livelihood'.
- To account for agroecological differences, **ceiling height was set to vary at the municipal level.**

The Imposition of Land Ceilings: The Agricultural Family Unit

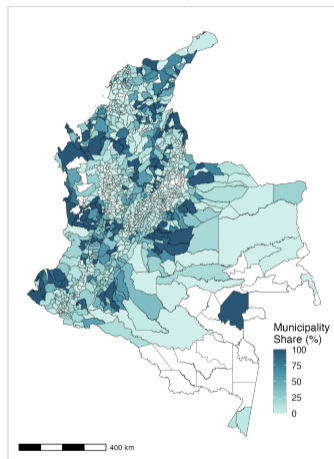
- Law 160 of 1994 imposed limits on the amount of land any individual could own.
 - Called the *Agricultural Family Unit* (UAF).
- Explicitly aimed at reducing land concentration levels.
- The limit **only applied to land that at some point in the past had been part of the public land distribution program.**
- Limit defined as the amount of land needed to earn a 'decent livelihood'.
- To account for agroecological differences, **ceiling height was set to vary at the municipal level.**
- Did not entail expropriation/redistribution of current landholdings: constraint only on future sales.

The Imposition of Land Ceilings: The Agricultural Family Unit

Measures of Land-Market Restrictions at the Municipal Level.



(a) Ceiling Height



(b) % of Government-Allocated Area in 1990

Empirical Strategy

- Lower ceilings + Larger share of municipal farmland allocated by govt. → More restricted land markets.

Empirical Strategy

- Lower ceilings + Larger share of municipal farmland allocated by govt. → More restricted land markets.
- Market restriction strength:

$$MR_m \equiv R_m \times S_{m,t^0} = \frac{1}{\text{Ceiling height}_m} \times \text{Share of farmland allocated}_{m,t^0}$$

Empirical Strategy

- Lower ceilings + Larger share of municipal farmland allocated by govt. → More restricted land markets.
- Market restriction strength:

$$MR_m \equiv R_m \times S_{m,t^0} = \frac{1}{\text{Ceiling height}_m} \times \text{Share of farmland allocated}_{m,t^0}$$

- Restrict estimation to pairs of contiguous municipalities that straddle an 'homogeneous zone' border, across which ceiling heights vary by decree.

Empirical Strategy

- Diff-in-diff model with municipality and municipality-pair \times year fixed effects:

$$y_{m,p,t} = \beta (\text{MR}_m \times T) + \alpha_1 (R_m \times T) + \alpha_2 (S_{m,t^0} \times T) + \phi_m + \kappa_{p,t} + \varepsilon_{m,p,t}$$

with

- $y_{m,p,t}$ = Outcome for municipality m , in municipality-pair p , year t .
- $R_m = (1/\text{Ceiling height}_m)$.
- S_{m,t^0} = Share of municipality area restricted.
- $T \equiv \mathbf{1}(t \geq 1994)$

Empirical Strategy

- Diff-in-diff model with municipality and municipality-pair \times year fixed effects:

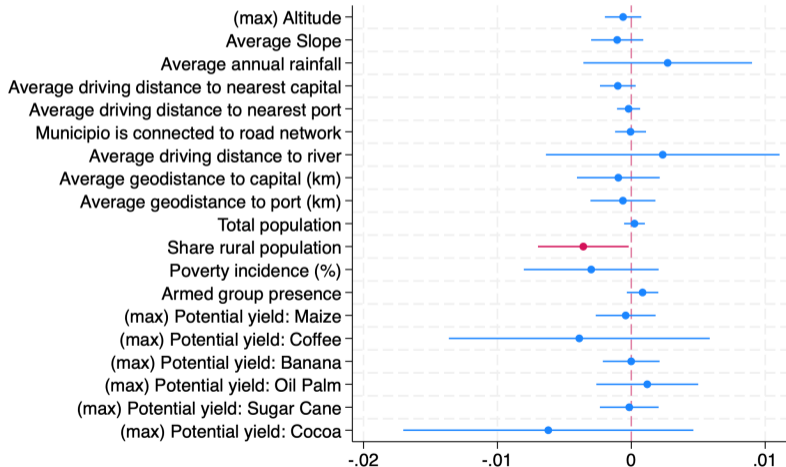
$$y_{m,p,t} = \beta (\text{MR}_m \times T) + \alpha_1 (R_m \times T) + \alpha_2 (S_{m,t^0} \times T) + \phi_m + \kappa_{p,t} + \varepsilon_{m,p,t}$$

with

- $y_{m,p,t}$ = Outcome for municipality m , in municipality-pair p , year t .
 - R_m = $(1/\text{Ceiling height}_m)$.
 - S_{m,t^0} = Share of municipality area restricted.
 - $T \equiv \mathbf{1}(t \geq 1994)$
- Identification comes from $E[\varepsilon_{m,p,t} | (\text{MR}_m \times T), \phi_m, \kappa_{p,t}] = 0$
 - Change in restriction stringency *across bordering municipalities* exogenous to time-varying confounders.

Balance on cross-section municipal characteristics:

$$MR_{m,p} = \beta_0 + \beta_1 X_m + \delta_p + \lambda_{d(m)} + u_{m,p}$$



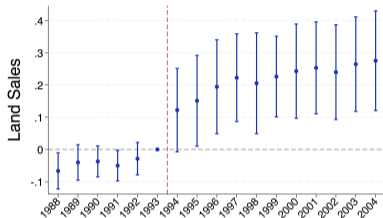
Data / Outcomes

- Municipal-level **agricultural productivity** 1987–2004: *Evaluaciones Agrícolas Municipales*
 - First comprehensive set of crop×muni×year yield data for this time period ($N \approx 136,000$).
- **Land sales** (SNR)
 - Transaction-level data for plots originally granted by the government.
 - ≈ 2 million distinct *transactions*: full sales, partial sales, consolidations, mortgages, etc.
- **Land concentration** (IGAC)
 - Average municipal farmsize & land ginis 1985, 1993, 2000–2010.
- **Labor Markets** (DANE)
 - Agriculture's employment share; Share of population in rural area.
 - Agricultural workers' monthly earnings → worker level.
- Aggregate all at the municipality-year level: (unbalanced) panel of 859 muni across 17 years.

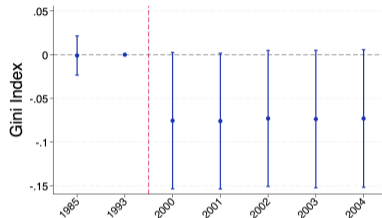
Results

Event Study for Main Outcomes

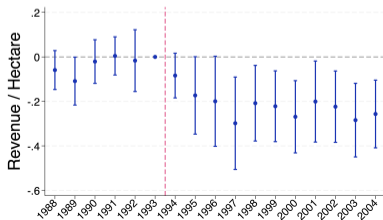
(a) Land Sales



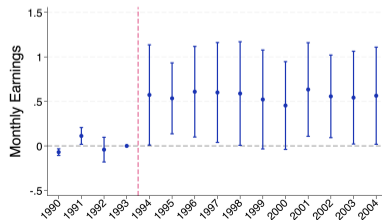
(b) Land Concentration



(c) Ag. Productivity



(d) Ag. Worker Earnings



Land-market restrictions increased land sales

Land Market Restrictions and Land Sales

	Transaction Type			
	Total Sales (1)	Full Property Transfer (2)	Fragmenting Sales (3)	Consolidating Sales (4)
$\hat{\beta}$: (log) Restriction Level \times Area restricted \times T	0.188*** (0.051)	0.191*** (0.046)	0.204*** (0.063)	-0.244** (0.092)
Observations	64,818	64,818	64,818	64,818
R ²	.956	.951	.892	.795
Mean Dep. Var.	21.708	15.612	5.133	1.025

Notes: All outcome variables in logarithms. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Levels

Land-market restrictions (slightly) reduced land inequality

Land Market Restrictions and Farm Size

	Average Farm Size (1)	Land Gini (2)
$\hat{\beta}$: (log) Restriction Level \times Area restricted \times T	-0.040 (0.084)	-0.074* (0.039)
Observations	37,186	31,774
R ²	.99	.958
Mean Dep. Var.	31.17	.637

Notes: All outcome variables in logarithms. *** p<0.01, ** p<0.05, * p<0.10.

Levels

Land-market restrictions reduced agricultural productivity

Land Market Restrictions and Agricultural Productivity

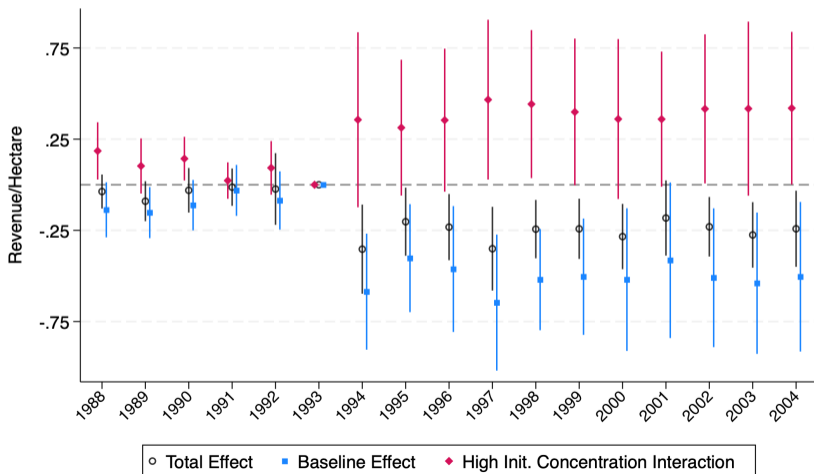
	Yield (Tons/Hectare)				
	Revenue per Hectare (1)	Corn (2)	Coffee (3)	Plantain (4)	Rice (5)
$\hat{\beta}$: (log) Restriction Level \times Area restricted \times T	-0.235** (0.080)	-0.160** (0.062)	0.233*** (0.031)	0.202*** (0.064)	0.158 (0.165)
Observations	41,510	27,772	11,278	16,410	4,748
R ²	.911	.911	.796	.857	.956
Mean Dep. Var.	12.113	2.652	.968	6.82	7.63

Notes: All outcome variables in logarithms. *** p<0.01, ** p<0.05, * p<0.10.

Levels

Effect on productivity is heterogeneous by initial land concentration

$$y_{m,p,t} = \beta (\text{MR}_m \times T) + \gamma (\text{MR}_m \times \text{High Conc.} \times T) + \alpha' X_{m,t} + \phi_m + \kappa_{p,t} + \varepsilon_{m,p,t}$$



Land-market restrictions increased workers earnings and wages

Land Market Restrictions and Labor Market Outcomes

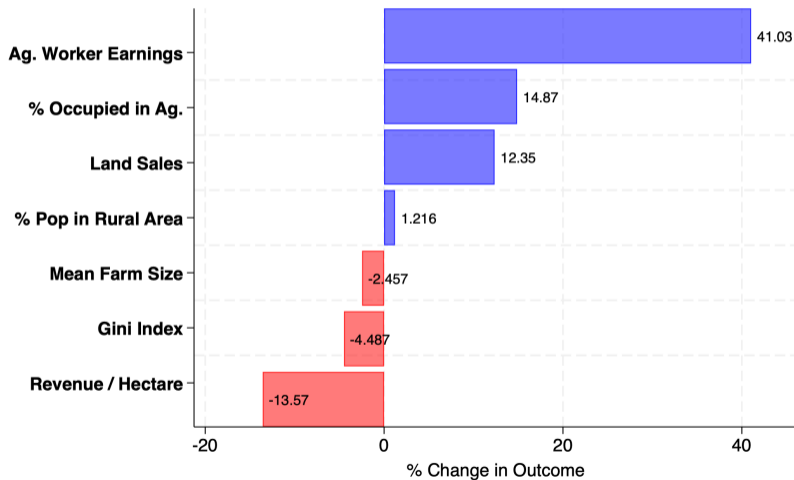
	Ag. Worker Earnings (1)	% Occupied in Ag. (2)	% Pop in Rural Area (3)
$\hat{\beta}$: (log) Restriction Level \times Area restricted \times T	0.554** (0.243)	0.223* (0.128)	0.019 (0.042)
Observations	102,123	5,904	5,904
R ²	.135	.93	.988
Mean Dep. Var.	802.595	.475	.625

Notes: All outcome variables in logarithms. *** p<0.01, ** p<0.05, * p<0.10.

Levels

Effect Size

- At mean restriction-stringency levels:



Consistent with imperfect competition in input markets

- Rationalize in a general-equilibrium model with market power + land market restrictions.
 - Restrictions distort the efficient reallocation of inputs but also curtail market power.
 - Net effects of restrictions depend on initial land-concentration levels.
 - + occupational choice component → Opposing effects of ceilings on productivity and wages.

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.
- Market power / land concentration matters for efficiency of the agricultural sector.

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.
- Market power / land concentration matters for efficiency of the agricultural sector.
- Imposition (or lifting) of limits can have important distributive implications.

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.
- Market power / land concentration matters for efficiency of the agricultural sector.
- Imposition (or lifting) of limits can have important distributive implications.
 - And so do land allocation policies, beyond the direct wealth transfer.

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.
- Market power / land concentration matters for efficiency of the agricultural sector.
- Imposition (or lifting) of limits can have important distributive implications.
 - And so do land allocation policies, beyond the direct wealth transfer.
- If govt. is politically constrained to break up large estates, restrictions can be 2nd-best policy.

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.
- Market power / land concentration matters for efficiency of the agricultural sector.
- Imposition (or lifting) of limits can have important distributive implications.
 - And so do land allocation policies, beyond the direct wealth transfer.
- If govt. is politically constrained to break up large estates, restrictions can be 2nd-best policy.
 - Tension between distinct sources of misallocation.

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.
- Market power / land concentration matters for efficiency of the agricultural sector.
- Imposition (or lifting) of limits can have important distributive implications.
 - And so do land allocation policies, beyond the direct wealth transfer.
- If govt. is politically constrained to break up large estates, restrictions can be 2nd-best policy.
 - Tension between distinct sources of misallocation.
- Is there an 'optimal restriction' level? Optimal taxation scheme?

Conclusion

- Land ceilings have held back the efficiency of the Colombian ag sector, but have likely benefitted landless wage laborers.
- Market power / land concentration matters for efficiency of the agricultural sector.
- Imposition (or lifting) of limits can have important distributive implications.
 - And so do land allocation policies, beyond the direct wealth transfer.
- If govt. is politically constrained to break up large estates, restrictions can be 2nd-best policy.
 - Tension between distinct sources of misallocation.
- Is there an 'optimal restriction' level? Optimal taxation scheme?

Thank you!
jgarteaga@ucdavis.edu

Empirical Strategy

- Municipalities with more than one neighbor will appear more than once in the estimation sample.
- Two-way clustered standard errors:
 - *Departamento* (State) level → autocorrelation & common treatment across m .
 - *Departamento* boundary-segment → correlation across neighbor-pairs with same m .
- All regressions weighted by the inverse number of pairs to which each municipality belongs to.

Descriptive Statistics

	Observations	N. Years	Mean	Std. Dev.	Min	Max
Land ceiling (hectares)	1,088	1	66.4	201	5	2,269
Govt. allocated area in 1990 (%)	1,031	1	.218	.319	0	1
Total yearly land sales	64,818	18	21.7	37.8	0	853
Number of yearly full sales	64,818	18	15.6	28.8	0	825
Number of yearly fragmenting sales	64,818	18	5.13	12.4	0	255
Number of yearly consolidating sales	64,818	18	1.03	3.66	0	83
Average farm size (hectares)	37,186	8	31.2	106	.0631	2,790
Land ownership gini index	37,186	8	.635	.171	.0264	.972
Revenue per hectare (million COP)	41,510	17	12.1	15.2	.0131	243
Annual Corn Yield (tons/hectare)	27,772	17	2.65	2.43	.0533	110
Annual Coffee Yield (tons/hectare)	11,278	17	.968	.571	.0006	18.8
Annual Plantain Yield (tons/hectare)	16,410	17	6.82	22.5	.0085	1,130
Annual Rice Yield (tons/hectare)	4,748	17	7.63	4.63	.0437	25.6
Ag. worker monthly earnings (1000 COP)	109,459	15	779	1,232	8.03	67,159
Occupied in agriculture (%)	5,904	2	.475	.214	.0051	.913
Share of rural population (%)	5,904	2	.625	.226	.0136	.983
Latifundia Intensity in 1984 (%)	617	1	.125	.167	0	.988

Notes: Summary statistics for main dependent variables and outcomes. Column 1 indicates the number of municipality-pair observations. Column 2 indicates the number of years for which there is information available on the outcome variable. All monetary values are expressed in real 2018 Colombian pesos (COP).

Land-market restrictions and land sales - levels

Land Market Restrictions and Land Sales

	Transaction Type			
	Total Sales (1)	Full Property Transfer (2)	Fragmenting Sales (3)	Consolidating Sales (4)
$\hat{\beta}$: Restriction Level \times Area restricted \times T	2.915** (1.263)	3.336*** (0.959)	3.524 (2.093)	-4.273* (2.181)
Observations	64,818	64,818	64,818	64,818
Mean Dep. Var.	21.708	15.612	5.133	1.025

Notes: All outcome variables in logarithms. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Back

Land-market restrictions and land inequality - levels

Land Market Restrictions and Farm Size

	Average Farm Size (1)	Land Gini (2)
$\hat{\beta}$: Restriction Level \times Area restricted \times T	-0.00034* (0.00018)	-0.00004 (0.00007)
Observations	37,186	31,774
Mean Dep. Var.	31.17	.637

Notes: All outcome variables in logarithms. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Back

Land-market restrictions and agricultural productivity - levels

Land Market Restrictions and Agricultural Productivity

	Yield (Tons/Hectare)				
	Revenue per Hectare (1)	Corn (2)	Coffee (3)	Plantain (4)	Rice (5)
$\hat{\beta}$: Restriction Level \times Area restricted \times T	-3.217* (1.820)	-2.175** (0.746)	2.685*** (0.362)	1.496 (1.250)	6.414* (3.104)
Observations	41,510	27,772	11,278	16,410	4,748
Mean Dep. Var.	12.113	2.652	.968	6.82	7.63

Notes: All outcome variables in logarithms. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Back

Land-market restrictions and labor market outcomes - levels

Land Market Restrictions and Labor Market Outcomes

	Ag. Worker Earnings (1)	% Occupied in Ag. (2)	% Pop in Rural Area (3)
$\hat{\beta}$: Restriction Level \times Area restricted \times T	7.965** (3.005)	5.117** (1.910)	-0.083 (1.073)
Observations	102,123	5,904	5,904
Mean Dep. Var.	802.595	.475	.625

Notes: All outcome variables in logarithms. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

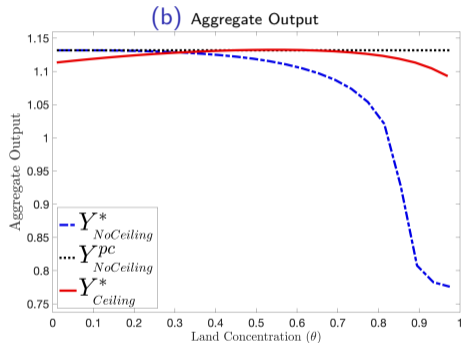
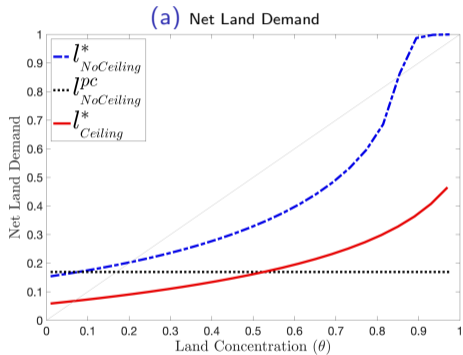
Back

Heterogeneity by Initial Land Concentration

Table: Restrictions and Productivity - Heterogeneity by Initial Land Concentration

	Split Sample		Full Sample	
	Low (1)	High (2)	(3)	(4)
$\hat{\beta}$: Restriction Level \times Share area restricted \times T	-0.307 (0.192)	-0.201* (0.106)	-0.217*** (0.071)	-0.420** (0.145)
$\hat{\gamma}$: Restriction Level \times Share area restricted \times T \times High Init. Concentration				0.319* (0.170)
R^2	0.913	0.896	0.907	0.907
Observations	11,822	7,780	30,300	30,300

Back



Back