

## Note on: Cooperative Property Rights and Development: Evidence from Land Reform in El Salvador

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First and foremost, I want to thank Anders Kjelsrud, Andreas Kotsadam, and Ole Rogeberg for their careful and thoughtful replication of [Montero \(2022\)](#). In their replication efforts, documented in [Kjelsrud et al. \(2023\)](#), they uncover a data mistake which affects the results reported in Table 5 and Figure 6 of [Montero \(2022\)](#). This table and figure had presented evidence that land reform cooperatives had lower earnings inequality compared to *haciendas*. Once the data merging error is corrected, these results are no longer valid. Below I discuss in greater detail the data merging error and, to motivate future research, present an alternative, correlational analysis that explores whether collective ownership is associated with lower inequality using more recent data.

[Montero \(2022\)](#) examines how a land reform that created agricultural cooperatives in El Salvador affects crop choices, productivity of agriculture, and worker earnings. In Table 5 and Figure 6 of the paper, I examine whether the land reform led to reduced worker inequality. To test this, I used household survey data from El Salvador. The primary data mistake occurred because I incorrectly joined household survey modules together, resulting in duplicated observations. In particular, the household survey data I accessed was broken up into multiple modules, and the identifiers I used to join the modules together were not unique in all modules. This mistakenly created incorrect, duplicated observations prior to collapsing the data to the property-year level, and I did not notice these duplicates.<sup>1</sup> As correctly noted in [Kjelsrud et al. \(2023\)](#), once the data is corrected, there are no longer enough individuals in the household data to confidently examine differences in income and income inequality across properties.

I sincerely apologize for this inadvertent mistake. Ultimately, I hope that my mistake does not discourage future research on the topic of how land reforms and cooperatives affect

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<sup>1</sup>For reference, the relevant R code snippet that incorrectly joins the modules and the 2011 survey modules as an example are posted [here](#).

income and inequality. To motivate future analysis, I provide some correlational evidence linking the land reform in El Salvador to lower inequality today.

A key limiting factor to extending the analysis of [Montero \(2022\)](#) is that there is not enough property-level income data. In the absence of enough property-level income data, one alternative approach would be to compare income and income inequality levels across cantons with different degrees of exposure to the land reform. In other words, one could compare worker incomes and inequality levels across cantons that had a higher vs. lower share of land in 1980 that was above the 500 ha cumulative ownership reform threshold. While this approach does not explore differences across specific properties and is less well-identified, this approach has the benefit of potentially capturing broader impacts and spillovers of the reform on income and inequality.

Using now-publicly available household survey data for 2008-2016 from DIGESTYC (that already joins modules correctly), [Table 1](#) presents the results for earnings and earning inequality across cantons with a higher vs. lower share of properties above the reform threshold in 1980.<sup>2</sup> Columns 1 and 2 examine the impacts on worker earning levels, while columns 3 and 4 examine the effect on the inter-quartile range of worker earnings. Panel A uses all properties in the land ownership records to construct the independent variable, while Panel B focuses on properties within 300 ha of the reform threshold that were plausibly more similar prior to the reform. The alternative results presented in [Table 1](#) suggest that cantons that had a higher share of land above the reform threshold have lower levels of inequality. Similarly, [Figure 1](#) presents the quantile regression estimates for household earnings. The estimates suggest that the effect on worker earnings of residing in a canton with a higher share of land subject to the 1980 reform is highest and positive in the lowest quantile and is smaller in higher quantiles.

Again, I thank [Kjelsrud et al. \(2023\)](#) for bringing the data error to my attention. I hope that future research can better shed light on the causal effects of land reforms, cooperatives, and inequality across varied settings.

## References

- [Kjelsrud, Anders, Andreas Kotsadam, and Ole Rogeberg](#), "Cooperative Property Rights and Development: Evidence from Land Reform in El Salvador: Comment," 2023. *I4R Discussion Paper & Journal of Political Economy*.
- [Montero, Eduardo](#), "Cooperative Property Rights and Development: Evidence from Land Reform in El Salvador," *Journal of Political Economy*, 2022, 130 (1), 48–93.

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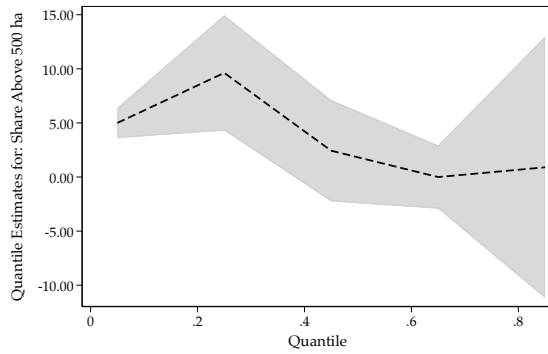
<sup>2</sup>Detailed replication files are available [here](#). Household survey data from DIGESYC is available here: <http://digestyc.microdatahub.com/>.

Table 1  
Effect on Earnings and Earnings Distributions

	<i>HH Earnings per capita (previous month)</i>			
	<i>Levels</i>		<i>Inter-Quartile Range</i>	
	(1)	(2)	(3)	(4)
<i>Panel A: All Properties</i>				
Share Above 500 ha	3.72 (25.72)	-10.65 (12.83)	-18.49** (8.60)	-24.70*** (8.96)
Survey-Year FEs	Yes	Yes	Yes	Yes
District FEs	No	Yes	No	Yes
Outcome Mean	226.11	226.11	165.34	165.34
Adjusted R2	0.019	0.055	0.074	0.084
Beta Coef.	0.007	-0.021	-0.092	-0.123
Observations	27,074	27,074	893	893
Cantons	137	137	137	137
Clusters	82	82	82	82
<i>Panel B: Properties within 300 ha of the Reform Threshold</i>				
Share Above 500 ha	12.13 (30.31)	-7.54 (13.75)	-18.04** (8.97)	-20.57** (9.87)
Survey-Year FEs	Yes	Yes	Yes	Yes
District FEs	No	Yes	No	Yes
Outcome Mean	227.30	227.30	166.22	166.22
Adjusted R2	0.019	0.055	0.067	0.068
Beta Coef.	0.023	-0.014	-0.083	-0.094
Observations	24,756	24,756	828	828
Cantons	128	128	128	128
Clusters	77	77	77	77

*Notes:* The unit of observation is an adult worker in columns 1 and 2, and a canton-survey-year in columns 3 and 4. *HH Earnings per capita* measures a household's monthly earnings per capita in dollars for agricultural workers in the 2008-2016 El Salvador Household Surveys (EHPM). *Inter-Quartile Range* measures the difference between the 75th and 25th percentile in reported household earnings per capita within each canton for each survey year. In Panel A, *Share Above 500* is the share of land in a canton where the former owner of the property had over 500 ha in cumulative landholdings in 1980. In Panel B, *Share Above 500* is the share of land in a canton where the former owner of the property had over 500 ha in cumulative landholdings in 1980, limiting to properties owned by individuals within 300 ha of the cumulative landholdings threshold. All regressions include survey-year fixed effects. Standard errors are clustered at the municipality level to account for spatial correlation across cantons and are reported in parenthesis. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Figure 1  
Quantile Estimates - Worker Earning Levels



Notes: The figure presents the estimated quantile coefficients where the independent variable of interest is *Share Above 500* – the share of land in a canton where the former owner of the property had over 500 ha in cumulative landholdings in 1980 – and the dependent variable is worker earnings in the previous month (in dollars per month) from the El Salvador household surveys (EHPM). Gray areas represent the 95% confidence intervals. The regression includes survey-year fixed effects.