Persistent Specialization and Growth

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Persistent Specialization and Growth: The Italian Land Reform

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Persistent Specialization and Growth: The Italian Land Reform*

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Abstract

Land distribution has ambiguous effects on structural transformation: large landowners can slow industrialization by limiting the provision of education, but larger scale and local market power might accelerate the mechanization of production. We examine the effects of redistribution following the Italian 1950 land reform and find that redistribution led to less industrialization. We explain this finding with a reduction in the scale of operations and a more intensive use of family labor. Agricultural specialization persisted for at least 50 years, consistent with models of occupational inheritance. Finally, we show that expropriated areas had lower growth during 1970-2000.

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1 Introduction

The structure of property affects economic outcomes through bargaining (Hart and Holmström, 1987), consumption patterns (Matsuyama, 1992), and other economic decisions (Besley and Ghatak, 2010). In the agricultural sector, redistribution policies are often created by governments as a tool to improve economic productivity and gain popular consensus.

However, evidence about the effects of land distribution on industrialization and overall development is mixed. Concentrated land ownership has found to be associated with a lower provision of education (Galor et al., 2009), slowing down structural change. However, recent research shows that larger landowners typically employ a lower amount of labor, either because of higher mechanization (Foster and Rosenzweig, 2022) or because of local monopsony power (Martinelli, 2014). Research on the long-run effects of changes in land ownership structure often focuses on outcomes within the agricultural sector (Besley et al., 2016; Smith, 2021), thus knowledge about effects on overall sectoral composition and development is still limited.

This paper examines the short-run and long-run impact of a large-scale land redistribution reform on local sectoral specialization and economic growth. In the 1950s, the Italian Government implemented a reform based on land redistribution and improvement with three main objectives: (i) redistributing wealth, (ii) increasing agricultural efficiency, and (iii) gaining political consensus.

We use a unique dataset based on newly digitized information about expropriations at the municipal level, as well as on pre-reform and post-reform socioeconomic variables, to show the effects on the sectoral composition of employment. To identify the causal impact of the reform on the structural transformation, we estimate a difference-in-differences model, tracking the share of individuals employed in agriculture and manufacturing at the municipal level through several census waves. This model controls for time-invariant characteristics of each municipality and shared time trends. Identification follows from a "parallel trends" assumption; the absence of pre-treatment differential trends validates our design.

Areas with a higher incidence of redistribution experienced a sizable and significant increase in the share of workers employed in agriculture; the converse happened for manufacturing. The effects of the reform are sizable and highly persistent: 50 years after the reform,

the share of agricultural workers in treated areas is 16% on average, 45% higher than the corresponding share in control areas. These results are not sensitive to several robustness exercises, including conditioning on the main predictors of the reform with a doubly robust approach.

What mechanisms explain these occupational patterns? While Galor et al. (2009) and Albertus et al. (2020) find opposing effects of redistribution on educational attainments, we do not find important effects on literacy and college attainment. We show, instead, that reformed areas become less densely populated and housing becomes more sparse, suggesting that lack of agglomeration might slow industrialization (Breinlich et al., 2014; Martin and Ottaviano, 2001). We also discuss other mechanisms that are potentially at play. Additionally, we argue that the persistent effects on the sectoral composition are partly due to an increased intergenerational transmission of occupation, and provide evidence of the relation between land property and occupational inheritance from Italian survey data.

Finally, we explore whether the reform led to more or less local economic prosperity, as agricultural specialization has ambiguous implications for average income in a municipality. We digitize historical estimates to measure income growth at the municipality level during 1970-2000 and match treated and control municipalities based on their pre-treatment land inequality, geography, and soil fertility. We show that municipalities affected by land redistribution experienced lower long-run growth. We find 20p.p. lower growth between 1970 and 2000 in treated areas, compared to a 183% baseline in the relevant sample. Linear specifications and propensity score methods confirm this finding.

Our first contribution relates to the empirical literature on structural change and economic growth and development (Bustos et al., 2016, 2020; Porzio et al., 2021). We leverage a specific historical event that represented a labor-increasing shock to productivity and find that it increased participation in agriculture. We also find remarkable persistence, and provide suggestive evidence of the driving mechanisms.

Historically, land reforms have included policies focused on different aspects, such as redistribution (Albertus et al., 2020), land titling formalization (De Janvry et al., 2015), land granting (Mattheis and Raz, 2021), or changes in the organization of production (Montero, 2020). Importantly, reforms vary in the thoroughness of implementation. For example, the case of India (Besley et al., 2016) and Colombia (Galán, 2018). The Italian land reform was

focused on land redistribution and, according to historical accounts, carefully implemented. Our paper is among the first to estimate the long-run effects of a reform with such characteristics.

Finally, we add to the growing literature on agricultural policies in Italian history – land reform (Marciani, 1966; King, 1973; Caprettini et al., 2021) and Mussolini's Battle of Grain (Carillo, 2021). Novel expropriation-level data allows for the estimation of the reform's causal impact on the sectoral composition and economic development of reformed areas.

2 Historical Framework

2.1 The Reform

After the end of World War II (WWII), poor agricultural workers were living in dire straits, especially in the rural areas of Southern Italy, where a feudal regime was essentially still in place. At the end of the 1940s, rural workers began striking and occupying plots of uncultivated land. Grievances were linked to the inaction and exploitation of absentee landowners.[1] The protest occupations led to repression by the police, which in several instances ended in blood.[2]

To avoid an even bloodier escalation of social unrest, the Christian Democrats (i.e., the ruling party since the 1948 elections) decided on a redistributive plan and, in the first semester of 1950, presented a land reform to the Parliament (N. 977). The proposed land reform was motivated by the differences in land distribution between Italy and most other European countries and the need to improve land productivity. Reformed areas were identified with the help of agrarian technicians. While the initial version of the land reform was not approved, a modified proposal was enacted in October: law n.841, called *Legge Stralcio*[3] (Bagnulo, 1976). Similar to the first version, the main declared goal of the land reform was to reduce land inequality with an eye toward productivity improvement.[4] An additional im-

[1] Martinelli (2014) suggests that large landowners enjoyed sizable market power over labor workers.

[2] The most notable case is probably the one of Melissa in 1949, which culminated with the killing of three occupants (Ginsborg, 2003).

[3] *Legge Stralcio* translated to "excerpt of law", alluded to the fact that more would be done to address the social and distributional issues of the affected areas.

[4] These goals were enacted in the expropriation rule (see Figure A1 in the Appendix) that combined measures of inequality with measures of productivity to determine the amount of land that would be expropriated from

plicit objective of the reform was to contrast the rhetoric of the Italian Communist Party, which led and fomented many of the revolts and land occupations (Ginsborg, 2003).

The enacted reform had comprehensive coverage; 8.5 million hectares were potentially interested: approximately one-third of the total national territory.[5] The reformed territories in the North of Italy resembled those of the first proposed reform.[6]

Eventually, approximately 700.000 hectares were expropriated. Two measures prevented landowners from eluding expropriation or taking advantage of them. First, decisions were based on the land distribution as of 1949, which prevented splitting of ownership within families or fake transfers of land; second, the value of the compensation was calculated using the tax returns of 1947 (Bandini, 1952). Expropriated landowners were compensated with 25-year fixed-rate government bonds at an average rate of 77.000 lire per hectare, approximately one-third of the market value, according to Marciani (1966). To avoid a rapid restoration of the pre-reform status quo, expropriated landlords were banned from purchasing new lands for 6 years after the expropriation.

Beneficiaries of the reform needed to be already working in agriculture, and preference was given to residents of the municipality where the land was located. Farmers who were assigned a plot could purchase it through advantageous long-term loans consisting of 30 annuities (later relaxed to allow for early repayment). Redistributed plots had different sizes: the smaller ones were called *quota* and meant to supplement existing household income; larger plots were called *podere* and meant to constitute independent farms.[7] To alleviate the potential concern that the reduction in the scale of operations following the expropriations would impair the investment ability and productivity of the new business units, assignees were required to affiliate with cooperatives (Bandini, 1952). Such cooperatives would make the high-cost investments in equipment and infrastructure to enable the processing and com-

each landowner.

[5] Figure A2 in the Appendix shows the areas that were affected by the reform.

[6] This is not true for the South of Italy, where the reformed areas were significantly different in some provinces. The suggestive evidence of strategic manipulation for political reasons supports our decision to exclude southern municipalities from the analysis. See Section 4 for more details.

[7] The *Enti di riforma* (reform bodies) were the institutions entitled to implement the reform at the local level. There was one local reform authority for each reform area, and these institutions were in charge of managing the applications and the reform process in general. The assignment procedure was not consistent across all areas. Several scholars, like Ginsborg (2003) and King (1973), remarked that political ideology played a role and that applicants with known communist sympathies were penalized. Caprettini et al. (2021) argues that this was less prevalent in the Center and North of Italy.

mercialization of agricultural products. Approximately 120,000 families received a part of the 700.000 expropriated hectares.

2.2 A Short-Term Assessment

The Italian land reform of the 1950s attracted considerable attention in the aftermath of its implementation. Prinzi (1956) and Rossi-Doria (1958) analyzed the implementation of the reform and its short-term effects. King (1973) and Angeli and INSOR (1979) provide an overall assessment of the success of the reform in attaining its main goals 20 years after the law was signed. According to Angeli and INSOR (1979), 83% of the original 120,000 firms were still operating in 1974. About 80,000 plots were still cultivated by the original assignees or their descendants. Rural workers grew their possessions: an additional 170,000 hectares of land not affected by the reform were cultivated in 1974.

As opposed to the mechanic effects on land distribution, the effects on productivity are ambiguous due to the countervailing effects of land improvement, agency realignment, and the reduction of scale. However, the available evidence suggests that the reform brought significant improvements to the affected areas. King (1973) shows that productivity growth in the reformed areas was higher than the national average between 1953 and 1963 (see Appendix Table A1). This was likely due to the change in ownership structure and land investments.

3 Data

To assess the impact of the Italian land reform on economic development and its effects on the structure of the local economies, we build a novel dataset that combines information on all recorded episodes of expropriation with a comprehensive set of historical information on Italian municipalities. In particular, the dataset combines publicly available information, mainly from decennial censuses, with newly digitized data on land reform and land distribution.[8]

Expropriation Data.

Our novel dataset includes each single land expropriation realized following the 1950 *Legge*

[8]The descriptive statistics are reported in Appendix Table A2

Stralcio extracting the first and last name of the expropriated landowner, municipality, and size of the expropriation from the original expropriation documents.[9] These documents were originally published in the *Gazzetta Ufficiale*, the official law gazzette of Italy, between 1950 and 1953. Prinzi (1956) was the first to list the municipalities within the reform areas that underwent land expropriations.

Our primary measure of expropriation for the municipality is built by aggregating the expropriation data at the municipality level (i.e., the sum of total expropriated lands in each municipality) and dividing it by the municipality's total area in 1951. This measure, called *percent expropriation*, is expressed in percentage points and constitutes our main treatment variable. We are the first to systematically collect and use precise information about the intensity of expropriation. We also create a dummy variable to analyze the extensive margin of expropriation.[10]

Land Distribution Data.

We also collected novel data about the land distribution in Italy in 1948 by digitizing Table 1 in Medici (1948)'s study. Giuseppe Medici, on behalf of INEA, the Italian Institute for Agricultural Economics, undertook the impressive task of measuring land distribution in each Italian municipality. While the size of a land plot was not a direct factor in determining the amount of land that would be expropriated, the reform areas were chosen based on their significantly unequal distribution.

Socioeconomic and Political Variables.

We rely on a broad set of socioeconomic indicators from decennial censuses in our analysis, such as sectorial employment, resident population, and share of college graduates. Specifically, we use the municipality-level data from the 1936-2001 Italian national censuses collected by the Italian Institute of National Statistics (ISTAT). We also digitize data on municipal-level income per capita in 1970 from the Historical Archive of Banco di Roma. We combine this measure with the same variable elaborated in 2000 by the Ministry of Economics and Finance to produce a measure of economic growth between 1970 and 2000.[11]

We calculate the average land suitability for each municipality based on the land suit-

[9] For an example of the original source, see Appendix Table C1.
[10] Appendix Table A3 reports descriptive statistics of the expropriation data for each treated region.
[11] More details on the construction and the sources of these variables are reported in Appendix C

ability for wheat measured by the Food and Agriculture Organization (FAO) with the Global Agro-Ecological Zoning (GAEZ) project. We also digitize and use data from the decennial Italian agrarian censuses of 1970, 1990, and 2000 collected by ISTAT to measure inequality in land distribution. We complete our dataset with electoral data collected by the Ministry of Interior on the national elections from 1946 to 1987.

4 Empirical Strategy

4.1 Model

The panel structure of the data allows us to follow treated and untreated municipalities over time and estimate a difference-in-differences model under the assumption of parallel trends. The chosen model is:

$$y_{it} = \delta_i + \gamma_t + \sum_{\tau \in \{1936, \mathcal{T}^{post}\}} \alpha_\tau \times d_\tau \times E_i + \varepsilon_{it} \tag{1}$$

where y_{it} is the economic outcome (e.g., agricultural employment) in municipality i in the year t; E_i represents either a treatment dummy or the percentage of expropriated lands; d_t are time dummies; δ_i and γ_t denote a full set of municipality and time fixed effects, respectively; $\mathcal{T}^{post}$ is the set of years after treatment. This model controls for common changes over time in the sectoral composition of employment through γ_t and for time-invariant, municipality-level characteristics through δ_i. We can now test for the presence of differential pre-trends (α_{1936}) and for dynamic effects over time (α_τ for $\tau \in \mathcal{T}^{post}$). All coefficients are relative to 1951, whose coefficient is normalized to 0.[12] To account for potential serial correlation at the municipal level and within census waves, our favorite specification uses two-way clustered standard errors at the municipality level and year level.

Our sample includes only municipalities in the Center and North of Italy, excluding southern regions. This choice is driven by the contemporaneous implementation of the

[12]Treatment is implemented as a consequence of the so called *stralcio* law, which was approved on 28 July 1950. This law pre-dates the 1951 census, set to represent a snapshot of the country as of 4 November 1951. The implementation of the 1950 law, however, required some time: only 13 out of 1,143 of the digitized expropriation decrees related to the areas of interest were issued prior to the census (the first of them was issued on 30 August 1951). Even for the land expropriated by these decrees, reallocation likely happened after the census date.

"Cassa del Mezzogiorno" policy, which determined massive public transfers to southern municipalities to boost industrialization in underdeveloped areas, (see Colussi et al., 2021 for more details) and that might bias our estimates. Additionally, we replicate our main specifications and show that parallel trends are unlikely to hold for the southern regions based on a pre-trend analysis (see Appendix Table A4).[13]

The top panels in Figure 1 show how land inequality and plot size changed in the treated and control areas after the land reform. We can observe partial convergence of the two areas, consistently with a successful reform implementation. Table A5 in the Appendix reports the corresponding difference-in-differences estimates. The bottom panels display the evolution of employment in agriculture and manufacturing for the two groups of municipalities in the raw data. Our approach compares the evolution of the variables in the two groups, and formally tests whether their trends diverged following the land reform.

4.2 Identification

Identification of our model follows from the "parallel trends" assumption underlying the chosen difference-in-differences approach (Angrist and Pischke, 2008). This requires that, absent the reform, the variables of interest would have evolved similarly in all municipalities. The bottom panels in Figure 1 allow a visual inspection of trends: both the level and the evolution of treatment and control areas were very similar prior to the reform. This is likely due to the similarity of the two groups: the control group only includes untreated municipalities belonging to provinces with at least one expropriation. A map of the expropriated municipalities in treated provinces is in Figure 2.

As discussed in Section 2, reform areas were chosen based on the recommendation of expert agronomists and the prevalence of large and inefficient land ownership. In Appendix Table A6, we show that land distribution is a strong predictor of treatment assignment, but also other socioeconomic and geographical variables have significant coefficients and explanatory power. Political support for the Italian Communist Party in the previous two elections, a potential driver of the reform, is also related to the reform.

While in our main specification, we rely on exogeneity conditional on municipal and year

[13]Our choice of using a restricted sample is consistent with Caprettini et al. (2021), who also exclude southern regions for identification reasons.

fixed effects, in robustness checks, we also condition on the main predictors of the reform using the doubly robust approach proposed by Sant'Anna and Zhao (2020) and implemented in Callaway and Sant'Anna (2021)'s study. Results are largely unaffected and discussed in more detail in Section 5.2. Additionally, in Table 1, we test for the presence of differential pre-trends under the first assumption, and cannot reject parallel trends before the reform. This further validates the chosen research design.

Finally, we show that, in our setting, alternative approaches based on border discontinuities for the study of the impact of land redistribution would suffer from low statistical power. While the land reform was implemented in well-defined areas, municipalities near the borders had small percentages of land expropriated. Thus, we could not identify a significant discontinuity in expropriations at the border (see Appendix Figure D1 and Appendix Table D1).

5 Results

In this section, we perform an analysis of the effects of the land reform on sectoral specialization. We first discuss our main results, and then prove that they are consistent across several robustness checks.

5.1 Main Results

Table 1 reports the results of estimating Equation (1) using the share of individuals employed in agriculture in the municipality as the dependent variable in columns (1) to (3) and those employed in manufacturing in columns (4) to (6).

We detect large, positive effects on agricultural employment: column (1) shows that areas treated with expropriation had as much as 5p.p. higher employment in agriculture in 1991 (average agricultural employment in control areas was 11% in 1991). While we find significant effects from the first years following the reform, we want to highlight that effects become larger over time: this means that, while the agricultural sector shrinks over time, treated areas retain more workers in agriculture. In column (2), we use the fraction of municipal area expropriated as a treatment variable, and identify very similar patterns as those estimated in the previous model using a treatment dummy. Finally, column (3) reports

the results of the model estimated using the fraction of municipal area expropriated on the sample, including only treated municipalities (i.e., expropriated lands >0). All the estimated models show that agricultural specialization in the municipalities increased proportionally to our measure of expropriation intensity.

Columns (4) - (6) of Table 1 use employment in manufacturing as an outcome variable. The effect appears to be negative and of similar magnitude to that on agriculture, but with somewhat lower persistence. Estimated effects are the largest in 1981 and decrease in the years following. The empirical evidence suggests that the land reform, precisely our measure of expropriation, is associated with a significant decline in employment in the manufacturing sector.

Overall, our findings show that treated areas reported a significant relative increase in agricultural employment in the short term and maintained higher levels in the following decades.[14] The increase is proportional to the intensity of expropriation, which is the central aspect of the land reform affecting the sectoral composition.[15] We find that this specialization in agriculture was compensated by a corresponding reduction in manufacturing employment. As previously discussed, small and statistically insignificant estimates for α_{1936} across all specifications support the research design.

5.2 Robustness

In this section, we perform a series of robustness checks to address potential threats to our identification strategy. In particular, we test for robustness using alternative model specifications, samples, and inference assumptions.

First, we show that using province fixed effects and including controls at the municipality level does not meaningfully affect magnitudes and significance patterns. Results are reported in Appendix Table A7.

We then show that our evidence is not driven by the inclusion in our sample of the administrative center of each province (see Appendix Table A8). Administrative centers are

[14] We obtain consistent results when splitting the sample around the median of the share of labor workers in agriculture in 1951. Results are available upon request.

[15] When implementing a Sobel-Goodman mediation analysis on the specification of column (1) by including also the percentage of expropriated lands, the estimated average coefficient drops from 3.92 to 1.04. This suggests that approximately 73% of the effect of land reform on employment in the agricultural sector is mediated by land expropriation.

often the most populated town in the province and might have different economic dynamics. Estimated coefficients are virtually unchanged with respect to the baseline models.

The geographical nature of our treatment suggests that the intensity of expropriation might be spatially correlated. Appendix Table A9 reports the baseline estimates with standard errors that account for spatial correlation using the procedure developed in Conley (1999)'s study. Specifically, columns (1) - (8) replicate columns (2) and (5) of Table 1, with different distance cutoffs. While standard errors are generally larger, overall significance patterns are unaffected.

To relax the assumption of unconditional parallel trends, we use the doubly robust estimator proposed by Sant'Anna and Zhao (2020) and condition on the main predictors of expropriation: land inequality and geographical coordinates (see Table A6). If the correct underlying model is a propensity score or an outcome regression model, this estimator is shown to be consistent. Results for average treatment effect on the treated are largely unaffected and very close to the main specification (see Appendix Table A10). Controlling for additional weaker predictors does not affect their robustness.

6 Mechanisms, Persistence Channels, and Long-Run Growth

In this section, we discuss and provide evidence on the mechanisms generating our results, the drivers behind the persistence of sectoral employment, and the consequences for the local economies in the medium to long run.

6.1 Mechanisms: Education

Many studies have documented a positive relationship between land distribution and human capital development. Galor et al. (2009) develop a model in which economies with more equal land distribution implement public education earlier than economies characterized by a more unequal distribution. Cinnirella and Hornung (2016) provide more evidence of a negative relationship between landownership concentration and education in 19th-century Prussia. Albertus et al. (2020) show that a land reform implemented in Peru had a negative effect on human capital accumulation as a result of "intergenerational rural stasis."

Using data on educational outcomes at the municipal level, we provide evidence that

there is no detectable effect of the Italian land reform on educational patterns. Columns (1) - (6) of Table 2 present the results of our baseline models using educational outcomes as dependent variables. In columns (1) - (3), we use the percentage of illiterate people at the municipal level as reported in the decennial censuses. The estimated coefficients are always negative and statistically significant, suggesting that the reform is associated with a decrease in the illiteracy rate. However, their magnitude is quite small, indicating that reformed areas had a decrease of 0.28 percentage points in illiteracy rates from a baseline of 12% in 1951. Additionally, columns (4) - (6) report the estimates for the reform's effects on the percentage of people with completed higher education at the municipal level. We find no detectable systematic impact of the expropriation on higher education attainment. Columns (3) and (6) show a very weak relationship between education outcomes and the intensity of expropriation.

6.2 Mechanisms: Scale

Another channel suggested by researchers relates to scale. Adamopoulos and Restuccia (2020) examine the effects of land reform in the Philippines, where, different from our context, a ceiling was imposed on landholdings. This reduced agricultural productivity. In the Italian case, the average land size was reduced by the reform (see Figure 1), but no ceiling on ownership was ever imposed. Moreover, existing evidence suggests that productivity rose rapidly in reformed areas (see discussion of King, 1973 in Section 2).

Foster and Rosenzweig (2022) propose and test a theory that features a U-shaped relationship between productivity and plot size, which can reconcile our findings and those of Adamopoulos and Restuccia (2020). This theory also suggests that smaller agricultural companies would employ relatively larger amounts of labor due to frictions in the labor market and economies of scale in agricultural machines. An additional reason why smaller companies might employ more labor is argued in Martinelli (2014) for pre-land reform in Italy: large landowners enjoy local monopsony power and might optimally hire fewer workers than if they were operating in a perfectly competitive environment.

6.3 Mechanisms: Agglomeration

Breinlich et al. (2014) point out that industrialization necessitates local agglomeration. In Table 2, columns (7) - (12) report the estimates of Model 1 using population density and rurality as an outcome.[16] Both measures show that the reform reduced density and agglomeration, which might explain our main results on industrialization. Indeed, the share of the population in urban areas might have significantly affected the local economic development and reinforced labor specialization between treated municipalities and untreated ones in the long run.

Interestingly, we can see from column (9) that the intensity of expropriation was *positively* related to population density until 1961, while the sign flipped for each decade thereafter. This suggests that the redistribution might have increased fertility or in-migration in its first years before reducing them. Data limitations make it impossible to distinguish fertility from migration changes.

6.4 Mechanisms: Land Productivity

One last explanation for the observed divergence relates to the land improvement initiative carried out by the Italian Government alongside the land redistribution. Ginsborg (2003) highlights how the largest component of expenditures for land improvement (which represented 55% of the total, see Figure A3) was devoted to housing construction, while efforts to implement irrigation plans in some regions were largely unsuccessful. We also find that, while time-invariant soil suitability was lower in reformed areas, employment was similar to control areas prior to the land reform. Coefficients from regressions that control for soil characteristics are very similar to those without the control (see Table A10).

6.5 Persistence

Not all the above-discussed mechanisms have the potential to explain the observed persistence in agricultural specialization. For example, economies of scale are unlikely to deliver

[16] Population density is the ratio between the decennial population reported in the relative census and the area of the municipality reported in 1951, winsorized at 1%. Rurality is computed as the percentage of the total municipal population living in *case sparse* (i.e. houses spread over the territory of the municipality but without forming a residential nucleus).

persistence alone, given that an optimal scale could be achieved through land markets. However, they are likely to interact with a new channel: occupational inheritance.[17]

The Italian land reform might have affected the extent of intergenerational transmission of sectoral occupations through the creation of many self-employed, land-owning, agricultural workers. As discussed in Section 2, beneficiaries of the reform were required to already be employed in agriculture: in order for the reform to change sectoral specialization over the decades, we need *ownership* of the land to affect intergenerational transmission. In Table 3, columns (1) and (2), we show that ownership of land is positively related to higher occupational transmission in the Italian Survey on Household Income and Wealth. This survey allows us to identify whether young adults are employed in agriculture.

The outcome is a binary indicator of whether an individual's father ever worked in agriculture as a business-owner; we build and include the same variable for other sectors. Finally, we control for the sector in which the father was last employed, the year of the survey, and the respondent's age. We include males aged 20 or older and estimate the linear probability model as follows:

$$agr_{it} = \beta_1 agr\_owner_i + \beta_2 other\_owner_i + \sum_s \theta_s \{father\_sector_i = s\} + \theta_t + \rho age_i + e_i \quad (2)$$

Male children of agricultural workers have about a 50% higher probability of staying in agriculture when their parents own the land they are working on. On the contrary, we find that parental business ownership in other sectors is linked to a lower probability of employment in agriculture.[18]

Agglomeration is another mechanism that has been shown to induce strong persistence (for a very long-run example, see Bleakley and Lin, 2012). The Italian land reform might have induced a reduction in agglomeration, which led to slower industrialization, further reducing agglomeration forces.

[17] Dunn and Holtz-Eakin (2000), among others, shows the transmission of self-employment. Corak and Piraino (2011) show that intergenerational transmission of employers is positively related to the presence of self-employment income. Lo Bello and Morchio (2021) highlights parental professional networks' role in occupational choices. Fernando (2022) shows that Indian firstborns that inherit agricultural land display reduced migration and entry into non-agricultural sectors.

[18] Results are very similar when extending the analysis to include female respondents.

6.6 Long-Run Local Economic Effects

Both scale reduction and occupational inheritance mechanisms have been found to be related to inefficient outcomes. Foster and Rosenzweig (2022) argue that if all Indian farms were at the minimum scale required to maximize the return on land, farmworkers' income would rise by 68%. Caselli and Gennaioli (2013) argue that dynastic management, i.e., the practice of passing ownership and control of a firm from one generation to the other within a family, is a substantial driver of cross-country TFP differences. Thus, we examine the economic growth consequences for the local economies in the medium to long run.

To estimate the impact of the reform on growth, we examine income per capita at the municipality level. Due to the unavailability of income data at the municipal level before the reform, we resort to a matching approach to study the effects of the reform on 1970 income and income growth between 1970 and 2000. We use Coarsened Exact Matching (Blackwell et al., 2009) and identify strata in the data where units are comparable based on their belonging to the same region, their soil suitability for wheat, and their Gini Index of land ownership in 1948 calculated using Medici (1948). Belonging to the same region allows for comparability of regional policies and increases precision. The second and third variables capture the factors determining expropriation intensity for municipalities included in the reformed area: this is meant to fulfill the "backdoor criterion" and provide identification. While Exact Matching only compares treated and control units that have the *same* covariates, Coarsened Exact Matching compares municipalities in the same region that have *similar* soil suitability and ownership distribution, which facilitates the inclusion of continuous variables.

The estimates of the effects of the land reform on income in 1970 and income growth during 1970-2000 are reported in Table 3, columns (3)-(6). Columns (3) and (4) show small and statistically insignificant estimates of 1970 income. Effects on growth in columns (5) and (6) appear to be negative and statistically significant, around 20p.p. lower growth over 30 years, compared to an average of 183% growth in the studied sample.[19] These results indicate that any positive effects on economic development early on were likely more than offset by the negative ones on income growth in the long run.

[19] Linear specifications and propensity score methods also yield negative and statistically significant effects on growth. Results available upon request.

7 Conclusions

This study analyzes the outcomes of a land reform implemented in Italy in the post-WWII period. It was a large-scale redistribution effort with different (i.e., social, economic, and political) goals. We use administrative sources and construct a novel dataset to measure redistribution intensity at the municipal level.

First, we exploit this measure to evaluate the impact of the reform on the sectoral composition. Estimating a difference-in-differences model, we find robust evidence that the land reform increases the number of workers employed in the agricultural sector and a drop in the number of workers employed in manufacturing. The Italian land reform did not have significant effects on human capital accumulation, but had a negative effect on agglomeration: treated municipalities are characterized by persistently lower levels of population density compared to untreated ones. A reduction in average farm scale might have further increased employment in the agricultural sector. The persistent effects on structural change motivate an investigation of transmission mechanisms. Our findings indicate that the new ownership structure and intergenerational transmission of occupation played a relevant role.

Lastly, we investigate the impact of this structural change on economic development. We use a matching estimator and provide evidence of a negative relation between the land reform and income growth during 1970-2000. These results support the hypothesis that the reform might have had some positive effects in the short run, both in terms of economic development and wealth redistribution, but had negative effects over the following decades.

In a broader perspective, our results contribute to the existing debate on the effects of large-scale redistribution programs. We highlight how long-term effects may conflict with the initial goals of development. The short-term reduction in inequality and poverty caused by this land reform was followed by lower levels of industrialization and economic growth in the long run. Despite the usual limits to the generalizability of analyses of specific historical events, our findings support the idea that land redistribution can exacerbate pre-existing distortions and frictions in labor markets that are detrimental to long-term economic growth.

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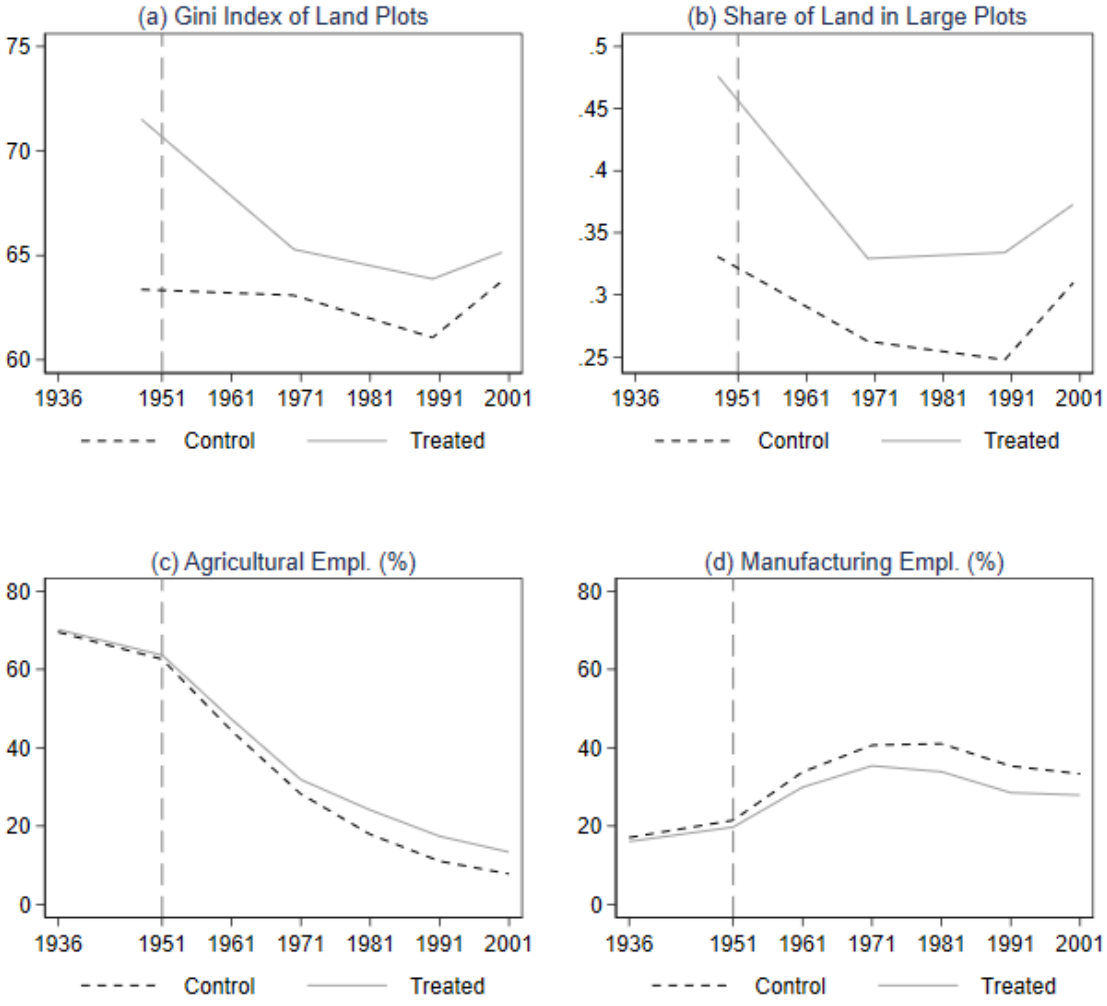
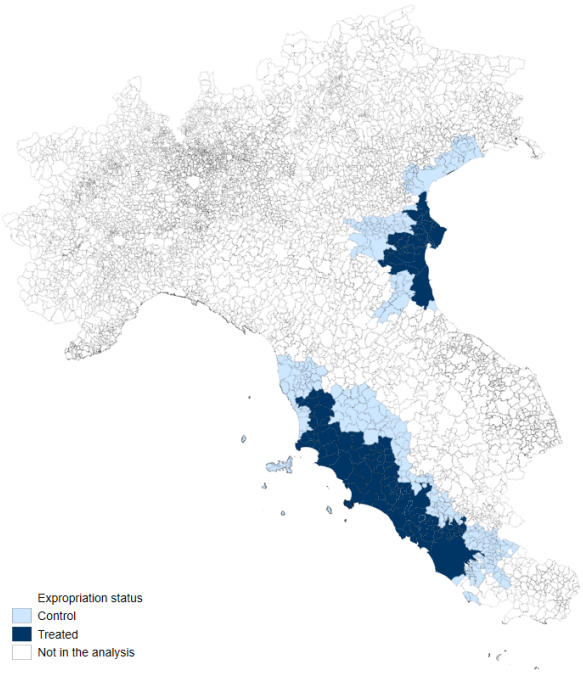
Paper Figures and Tables

Figure 1: Time series averages for treated and control areas



Panels (a) and (b) display the average Gini Index and share of land belonging to plots larger than 10 hectares, respectively, calculated using data from Medici (1948) and the Agricultural Censuses of 1970, 1990, and 2000. Panels (c) and (d) display the average employment share of agriculture and manufacturing, respectively, as measured by the Population Census for the period 1936-2001.

Figure 2: Expropriated municipalities in treated provinces



Note: In dark blue, municipalities that were included in the land reform; in light blue, municipalities in provinces where at least one municipality was expropriated. Light blue municipalities will comprise the main control group in our difference-in-differences analysis. *Source: Legge Stralcio.*

Table 1: Difference-in-Differences, Agriculture, and Manufacturing Employment

	Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat. margin:	Extensive	Both	Intensive	Extensive	Both	Intensive
1936	-0.299	-4.597	-9.110	0.692	4.957	5.797
	(0.627)	(2.755)	(5.531)	(0.534)	(2.626)	(4.706)
1961	1.917***	15.11***	19.67***	-2.177***	-13.14***	-11.49***
	(0.365)	(1.423)	(2.613)	(0.354)	(0.741)	(2.539)
1971	2.627**	17.51**	18.34*	-3.543***	-16.93***	-6.700
	(0.928)	(4.932)	(7.571)	(0.737)	(3.402)	(5.193)
1981	5.190***	31.01***	26.58**	-5.433***	-20.04**	5.726
	(1.292)	(5.881)	(9.452)	(1.131)	(6.065)	(9.663)
1991	5.328**	28.04***	17.02	-5.079***	-14.73*	16.16
	(1.523)	(7.335)	(11.96)	(1.299)	(7.080)	(12.02)
2001	4.544**	22.85**	11.64	-3.695**	-8.655	17.32
	(1.531)	(7.639)	(12.55)	(1.302)	(7.423)	(12.49)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	35.34	35.34	38.27	30.79	30.79	27.35
SD Dep. Var.	26.94	26.94	25.66	14.91	14.91	12.68
Avg. Effect	3.92***	22.90***	18.65**	-3.99***	-14.70**	4.20
	(1.04)	(5.14)	(8.04)	(0.83)	(4.63)	(7.29)
Observations	2867	2867	672	2867	2867	672

Notes. Column (1) estimates Model (1) exploiting the treatment dummy; Column (2) estimates Model (1) exploiting the percentage of expropriated lands; Column (3) estimates Model (1) exploiting the percentage of expropriated lands in the sample including only municipalities where lands have been expropriated. Year and municipality fixed effects are always included. The mean and the standard deviation of the dependent variable are reported. The average of the estimated coefficients in years 1961, 1971, 1981, 1991 and 2001 and the standard errors (in parentheses) are reported. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Mechanisms

	Education						Agglomeration					
	Illiteracy %			Higher Educ. %			Pop. Density			Rurality		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treat. margin:	Ext.	Both	Intensive	Ext.	Both	Intensive	Ext.	Both	Intensive	Ext.	Both	Intensive
1936							-0.325	2.288	9.909			
							(4.643)	(22.26)	(39.44)			
1961	-0.00281***	-0.0131***	-0.00451	0.0762	0.344	0.0888	-6.362***	-18.09***	21.24***	1.691***	10.96***	10.98***
	(0.000481)	(0.00159)	(0.00541)	(0.148)	(0.747)	(1.392)	(0.147)	(0.811)	(3.890)	(0.411)	(1.548)	(2.074)
1971	-0.00383***	-0.0194***	-0.0101*	0.290***	0.627	-1.505	-19.69***	-84.03**	-9.989	4.907***	22.95***	7.927
	(0.000732)	(0.00329)	(0.00478)	(0.0527)	(0.330)	(0.921)	(5.309)	(26.71)	(42.34)	(0.396)	(1.985)	(3.952)
1981	-0.00471	-0.0278*	-0.0232	-0.187	-1.956	-3.216	-27.83**	-119.8**	-16.87	8.029***	32.97***	0.592
	(0.00238)	(0.0120)	(0.0195)	(0.237)	(1.214)	(1.721)	(8.107)	(39.50)	(60.51)	(1.318)	(5.936)	(9.250)
1991	-0.00518	-0.0374*	-0.0439	0.0980	-2.425	-7.625	-29.64**	-129.5**	-23.11	8.954***	34.33***	-5.930
	(0.00325)	(0.0174)	(0.0289)	(0.548)	(2.925)	(4.792)	(9.521)	(47.54)	(72.59)	(1.620)	(7.144)	(10.25)
2001	-0.00679	-0.0465*	-0.0509	-0.702	-6.788*	-10.60*	-34.38**	-152.7**	-33.39	10.57***	39.20***	-10.57
	(0.00359)	(0.0193)	(0.0318)	(0.619)	(3.271)	(5.220)	(10.20)	(50.60)	(76.38)	(1.697)	(7.447)	(11.18)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.0537	0.0537	0.0574	11.05	11.05	11.00	168.1	168.1	99.62	25.24	25.24	23.98
SD Dep. Var.	0.0467	0.0467	0.0471	10.36	10.36	10.52	185.9	185.9	134.9	19.47	19.47	16.77
Observations	2466	2466	576	2460	2460	576	2874	2874	672	2460	2460	576

Notes. Columns (1), (4), (7), and (10) estimate Model 1 with a binary treatment; Columns (2), (5), (8), and (11) estimate Model 1 with the percentage of expropriated lands as treatment; Columns (3), (6), (9), and (12) estimate Model 1 with the percentage of expropriated lands as treatment in the sample including only municipalities where lands have been expropriated. Year and municipality fixed effects are always included. The dependent variables are reported in the column headings. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Probability of Agricultural Employment and Long-Run Income and Growth Effects

	Persistence		Long-Run Outcomes			
Dep. Var.	Agr. Employment		1970 Income		1970-2000 Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Owner (Agriculture)	0.0783***	0.0719***				
	(0.0143)	(0.0140)				
Owner (Other Sector)	-0.0183*	-0.0168*				
	(0.0098)	(0.0094)				
Reform Dummy			6.802	12.25	-0.203**	-0.211**
			(159.7)	(154.7)	(0.0841)	(0.0815)
Region FE	No	Yes				
Other Controls	Yes	Yes				
Coarsened Var.			No	Yes	No	Yes
Mean Dep. Var. (Father in Agr.)	0.185	0.185				
Mean Dep. Var. (Father in Oth. Sect.)	0.0630	0.0630				
Mean Dep. Var.			4821	4821	1.832	1.832
SD Dep. Var.			1113.9	1113.9	0.603	0.603
Observations	4433	4433	341	341	331	331

Notes for columns (1)-(2). Data from the Bank of Italy's Survey on Household Income and Wealth (SHIW). Our sample consists of males older than 19 surveyed 1977-2016. Standard errors clustered at the household level in parentheses. Other controls: age, survey year, father's last sector of employment (6 categories). *Notes for columns (3)-(6).* Coarsened Exact Matching estimates for the effect of the land reform on income levels in 1970 and on growth in the period 1970-2000. Observations matched based on the administrative region (exact matching), Gini of landownership, and soil suitability to wheat. Columns (4) and (6) control for the coarsened variables used in matching. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Online Appendix for *Persistent Specialization and Growth: The Italian Land Reform*

by Riccardo Bianchi-Vimercati, Giampaolo Lecce, and Matteo Magnaricotte

A Additional Figures

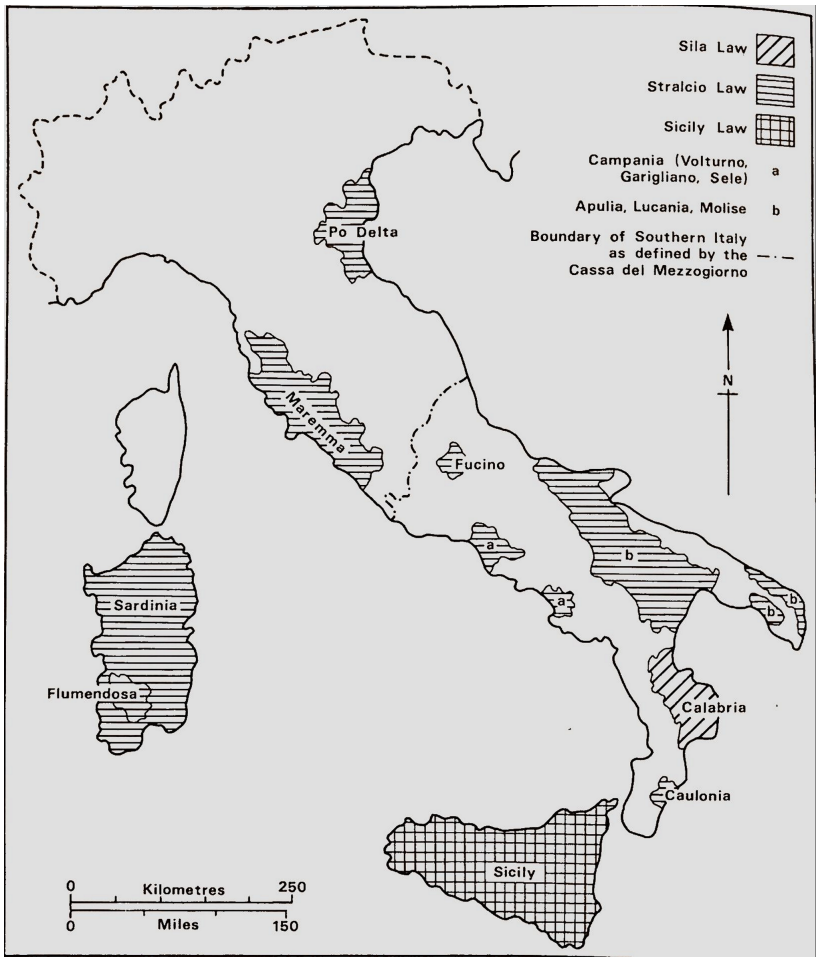
Figure A1: Expropriation Rule for the *Legge Stralcio*

Percentuali di scorporo riferite agli scaglioni di reddito imponibile

Scaglioni di reddito imponibile totale — Lire	Imponibile medio per Ha. Lire: 1000 e oltre	900	800	700	600	500	400	300	200	100 e meno
Fino a 30.000	—	—	—	—	—	—	—	—	—	—
Da oltre 30.000 a 60.000	—	—	—	—	—	0	15	30	55	70
» 60.000 a 100.000	—	—	—	—	0	10	30	60	70	85
» 100.000 a 200.000	35	40	47	55	60	65	70	75	84	90
» 200.000 a 300.000	45	50	55	60	65	70	75	80	87	95
» 300.000 a 400.000	52	57	60	65	70	75	80	85	90	95
» 400.000 a 500.000	60	64	66	71	76	80	85	90	95	95
» 500.000 a 600.000	64	70	76	78	80	85	90	95	95	95
» 600.000 a 700.000	68	74	79	82	85	90	95	95	95	95
» 700.000 a 800.000	72	78	82	85	90	95	95	95	95	95
» 800.000 a 900.000	76	82	86	90	93	95	95	95	95	95
» 900.000 a 1.000.000	82	86	90	93	95	95	95	95	95	95
» 1.000.000 a 1.200.000	90	92	95	95	95	95	95	95	95	95
Oltre 1.200.000	95	95	95	95	95	95	95	95	95	95

Notes. Percentage of land to be expropriated depending on total taxable income (vertical dimension) and average income per hectare (horizontal dimension). Landowners with higher income and lower productivity per hectare were expropriated higher shares of their land.

Figure A2: Areas interested by the land reform



Source: King (1973)

Figure A3: Breakdown of the expenses of the *Enti di riforma* in the 1950s

Tab. 41 - **Risultanze finanziarie per l'insieme degli Enti di riforma (*a*) a fine del decennio 1950-51 / 1959-60.**

Categorie di entrata	Importi milioni di lire	Importi %	Categorie di uscita	Importi milioni di lire	Importi %
Assegnazioni per compiti istituzionali	512.760	84,2	Trasformazione fondiaria	340.006	55,8
			Assistenza e cooperazione	41.903	6,9
Redditi patrimoniali e entrate diverse	51.571	8,5	Acquisizione di macchine e scorte	38.661	6,3
Debiti verso banche	33.856	5,5	Anticipazioni per opere di bonifica eseguite in concessione	2.281	0,4
Totale entrate	**598.187**	*98,2*	Crediti verso assegnatari e cooperative	26.395	4,3
Disavanzo	10.867	1,8	Spese generali, di amministrazione e per oneri patrimoniali	138.101	22,7
			Interessi passivi	21.707	3,6
Totale a pareggio	**609.054**	*100,0*	**Totale uscite**	**609.054**	*100,0*

(*a*) Eclusa la Sezione speciale per la riforma fondiaria dell'Ente autonomo del Flumendosa.

FONTE: Nostra elaborazione dei dati tratti dalle Relazioni della Corte dei conti al Parlamento (ATTI PARLAMENTARI, *cit.*).

Notes. Left column reports revenues; right column reports expenses. Among expenses, 55.8% is attributed to land transformation: historical reports (Ginsborg, 2003) report that most of the resources for land transformation were used to build new housing on the redistributed plots. General administrative costs of the reform accounted for 22.7% of the total. Source: Parliamentary Acts.

B Additional Tables

Table A1: Gross Saleable Production per Hectare

Year	Po Delta	Maremma	Fucino	Campania	A-L-M	Calabria	Sardinia	Total	Average (Italy)
1953	189	83	345	156	66	57	10	71	134
1954	182	81	275	133	55	60	15	73	129
1955	245	92	288	216	61	65	18	86	136
1956	226	97	292	242	63	80	20	90	133
I957	195	87	287	284	78	86	33	94	136
1958	247	110	379	280	89	98	48	114	151
1959	266	114	362	308	113	95	53	124	156
1960	246	107	375	330	92	98	56	116	151
1961	264	115	381	315	124	118	55	132	164
1962	265	135	414	411	138	129	59	148	165
1963	293	123	370	554	146	135	56	153	161
% yearly growth	**4**	**4.9**	**3.2**	**13.4**	**11.5**	**9.5**	**19.9**	**8.5**	**2.6**

Notes. Gross saleable production per ha. on assigned reformed lands (figures in '000 lire, constant prices). *Source*: King (1973).

Table A2: Descriptive Statistics

	Mean	Min	Max	Std. Dev.	Observations
Expropriation					
Expropriation Dummy	0.23	0.00	1.00	0.42	411
Land Expropriated (%)	0.04	0.00	0.4	0.08	411
Census					
Empl. Agriculture (% - 1951)	62.87	2.96	91.65	19.56	410
Empl. Manufacturing (% - 1951)	21.07	1.32	79.48	13.60	410
Illiteracy Rate (1951)	0.12	0.03	0.25	0.04	411
Higher Education Rate (1951)	1.99	0.39	12.47	1.24	410
Population (Thousands - 1951)	12.83	0.24	1651.75	83.50	411
Population Density (1951))	159.16	17.99	1140.80	139.65	411
Rurality Measure (% - 1951)	36.29	0	87.15	24.87	410
Geography					
Gini Index - Land Dist. (1948)	76.95	47.80	93.42	9.29	411
Land Suitability (Wheat)	3193.89	249.93	7752.41	2054.71	411
Municipality Area (1951)	68.21	3.50	1285.30	96.31	411

Notes. Percentage of land to be expropriated depending on total taxable income (vertical dimension) and average income per hectare (horizontal dimension). Landowners with higher income and lower productivity per hectare were expropriated higher shares of their land.

Table A3: Expropriation Data Statistic

Region	**Number of municipalities**	**Number of expropriations**	**Expropriated area (hectares)** Total	Average
Main sample regions				
EMILIA-ROMAGNA	13 (44)	200	36,339.38	2,795.34
LAZIO	40 (180)	341	68,647.16	1,716.18
TOSCANA	38 (123)	540	127,102.97	3,344.81
VENETO	9 (93)	71	9,490.20	1,054.47
Other regions				
ABRUZZO	8 (108)	18	19,331.85	2,416.48
BASILICATA	45 (131)	353	64,000.12	1,422.22
CALABRIA*	81 (262)	279	43,795.82	-
CAMPANIA	18 (262)	132	9,046.44	502.58
MOLISE	12 (84)	55	5,416.46	451.37
PUGLIA	60 (258)	1,107	129,158.08	2,152.63
SARDEGNA	113 (377)	240	45,554.93	403.14
Total	**437**	**3,336**	**557,883.41**	**-**

Notes: Values in parenthesis report the overall number of municipalities in the treated provinces (i.e. provinces with at least one expropriation in their territory).

Table A4: Replication of Table 1 with Municipalities in the South of Italy

	Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat. margin:	Ext.	Both	Intensive	Ext.	Both	Intensive
1936	-1.282***	-13.19***	-12.26**	1.137***	10.69***	9.321**
	(0.341)	(2.652)	(3.763)	(0.261)	(2.006)	(2.962)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9794	9738	2193	9794	9738	2193

Notes. The analyzed sample includes only treated provinces in the south of Italy and replicates the models in Table 1. Column (1) estimates Model (1) exploiting the treatment dummy; Column (2) estimates Model (1) exploiting the percentage of expropriated lands; Column (3) estimates Model (1) exploiting the percentage of expropriated lands in the sample including only municipalities where lands have been expropriated. Year and municipality fixed effects are always included. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Effect of Land Redistribution on Land Inequality

	Gini Index			Share of Large Plots		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat. margin:	Ext.	Both	Intensive	Ext.	Both	Intensive
1970	-5.950***	-37.18***	-36.46***	-0.0790***	-0.484***	-0.463**
	(0.881)	(3.706)	(6.241)	(0.0123)	(0.0600)	(0.0884)
1990	-5.347**	-35.39***	-37.17***	-0.0593**	-0.392**	-0.411**
	(1.021)	(3.587)	(5.690)	(0.0145)	(0.0742)	(0.113)
2000	-6.781***	-40.45***	-37.27***	-0.0826**	-0.466**	-0.395**
	(1.126)	(3.854)	(4.187)	(0.0151)	(0.0810)	(0.116)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1580	1580	360	1580	1580	360

Notes. Column (1) estimates Model 1 exploiting the treatment dummy; Column (2) estimates Model 1 exploiting the percentage of expropriated lands; Column (3) estimates Model 1 exploiting the percentage of expropriated lands in the sample including only municipalities where lands have been expropriated. Baseline period is 1948. Data for 1948 obtained from Medici (1948); data for later years from the General Italian Census of Agriculture. Year and municipality fixed effects are always included. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A6: Predicting Land Reform Intensity

	(1) Expr.	(2) Expr.	(3) Expr.	(4) Expr.	(5) Expr.	(6) Expr.	(7) Expr.	(8) Expr.	(9) Expr.	(10) Expr.	(11) Expr.	(12) Expr.	(13) Expr.	(14) Expr.	(15) Expr.	(16) Expr.
Political Variables																
$\Delta PCI\%$	0.096**															0.033
	(0.042)															(0.042)
$\Delta DC\%$		0.017														0.007
		(0.045)														(0.040)
$\Delta Turnout$			0.288*													0.196
			(0.154)													(0.162)
				Socioeconomic Variables												
$\Delta Agr.\%$				0.001												0.000
				(0.000)												(0.001)
$\Delta Man.\%$					-0.001*											0.000
					(0.000)											(0.002)
Employm. %						14.709*										10.460
						(8.495)										(11.089)
$\Delta Pop.Dens.$							-0.000									-0.000
							(0.000)									(0.000)
Illiterate %								0.203**								0.198
								(0.099)								(0.140)
Education									-0.003							-0.008**
									(0.003)							(0.004)
Land Gini										0.214***						0.203***
										(0.038)						(0.057)
											Geographical Variables					
Wheat											-0.019					-0.097
											(0.019)					(0.093)
Maize												-0.027				0.097
												(0.029)				(0.153)
Elevation													-0.016			-0.066**
													(0.015)			(0.032)
Latitude														-0.005*		-0.015**
														(0.003)		(0.006)
Longitude															-0.016***	-0.008
															(0.004)	(0.006)
N	411	411	407	407	407	410	408	411	411	410	411	411	411	411	411	403
Within R2	0.012	0.000	0.004	0.003	0.004	0.009	0.000	0.012	0.058	0.002	0.002	0.002	0.002	0.005	0.021	0.125

Notes. The outcome is the percentage of total land expropriated in the municipality. Whenever information is available for more than one pre-treatment observation, we use the change as a predictor, as indicated by the use of Δ. Predictors in columns (1)-(3) are from the Ministry of Interior for the national elections of 1946 and 1948; those in columns (4), (5), and (7) come from the national censuses of 1936 and 1951; those in columns (6), (8), and (9) come from the national census of 1951. The land Gini Index in column (10) comes from Medici (1948). Predictors in columns (11) and (12) come from FAO GAEZ. In column (16), we include all available predictors. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7: Replication of Table 1 with a Different Set of Controls

	Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat. margin:	Ext.	Both	Intensive	Ext.	Both	Intensive
1961	0.876	13.89**	19.25*	-1.319	-14.46**	-14.74**
	(1.100)	(5.219)	(7.857)	(1.034)	(4.305)	(5.476)
1971	1.373	15.67**	18.06*	-2.252	-17.29**	-11.93
	(1.200)	(5.508)	(8.668)	(1.122)	(4.614)	(6.222)
1981	3.233**	27.33***	28.81**	-4.199**	-21.97***	-3.206
	(1.141)	(4.875)	(7.448)	(1.061)	(4.430)	(5.846)
1991	3.493**	25.58***	20.24**	-3.574**	-17.79***	1.287
	(1.015)	(4.493)	(7.809)	(0.916)	(4.170)	(5.574)
2001	2.180*	18.34***	14.15	-2.734**	-15.26**	-0.635
	(0.957)	(4.312)	(7.543)	(0.866)	(4.060)	(5.242)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Prov. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2460	2460	576	2460	2460	576

Notes. Column (1) estimates Model (1) exploiting the treatment dummy; Column (2) estimates Model (1) exploiting the percentage of expropriated lands; Column (3) estimates Model (1) exploiting the percentage of expropriated lands in the sample including only municipalities where lands have been expropriated. Year and province fixed effects are always included. Municipality latitude, longitude, wheat soil suitability, illiteracy rate, share of educated people and the percentage of the population living in *case spare* (scattered houses) are always included. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Robustness: Excluding Administrative Centers of Each Province

	Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat. margin:	Ext.	Both	Intensive	Ext.	Both	Intensive
1936	-0.345	-5.061	-9.873	0.567	4.840	6.911
	(0.620)	(2.761)	(5.462)	(0.511)	(2.566)	(4.621)
1961	1.860***	15.26***	20.91***	-2.153***	-13.28***	-12.38***
	(0.404)	(1.508)	(2.761)	(0.373)	(0.785)	(2.654)
1971	2.551**	17.87**	20.43**	-3.462***	-17.13***	-8.551
	(0.926)	(4.986)	(7.596)	(0.717)	(3.369)	(5.181)
1981	5.135***	31.54***	29.19**	-5.328***	-20.19**	3.450
	(1.267)	(5.834)	(9.396)	(1.114)	(6.014)	(9.671)
1991	5.225**	28.49***	20.01	-5.018***	-14.94*	14.22
	(1.485)	(7.251)	(11.88)	(1.305)	(7.077)	(12.10)
2001	4.381**	23.22**	14.96	-3.631**	-8.847	15.58
	(1.477)	(7.535)	(12.45)	(1.311)	(7.439)	(12.57)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2797	2797	644	2797	2797	644

Notes. The sample does not include the administrative centers of each province. Year and municipality fixed effects are always included. For more details, see footnote of Table 1. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Robustness: Using Conley Standard Errors

	Agriculture				Manufacturing			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1936	-4.597	-4.597	-4.597	-4.597	4.957*	4.957	4.957	4.957
	(3.782)	(4.353)	(4.806)	(4.365)	(2.735)	(3.278)	(3.692)	(3.743)
1961	15.11***	15.11**	15.11**	15.11*	-13.14***	-13.14***	-13.14**	-13.14*
	(5.275)	(6.356)	(7.632)	(9.025)	(3.989)	(4.861)	(5.829)	(6.732)
1971	17.51**	17.51*	17.51	17.51	-16.93***	-16.93**	-16.93**	-16.93**
	(8.135)	(9.467)	(11.07)	(12.68)	(5.912)	(6.918)	(7.677)	(8.541)
1981	31.01***	31.01***	31.01**	31.01**	-20.04***	-20.04**	-20.04*	-20.04*
	(8.857)	(10.64)	(12.63)	(13.60)	(7.771)	(9.342)	(10.36)	(11.19)
1991	28.04***	28.04**	28.04**	28.04*	-14.73*	-14.73	-14.73	-14.73
	(9.702)	(11.80)	(13.82)	(15.26)	(8.896)	(11.01)	(12.05)	(12.78)
2001	22.85**	22.85*	22.85	22.85	-8.655	-8.655	-8.655	-8.655
	(10.51)	(12.55)	(14.43)	(15.68)	(9.549)	(11.71)	(13.11)	(14.35)
Bandwidth	5	10	15	20	5	10	15	20

Notes. Estimation of Model 1 using a treatment dummy using Conley standard errors with different bandwidths. Comparable estimates with clustered standard errors are available in columns (2) and (5) of Table 1 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: Replication of Columns (1) and (4) of Table 1 Controlling for Expropriation Predictors

	(1)	(2)	(3)	(4)	(5)	(6)
ATT Agr. %	3.921***	3.454**	3.017**	3.259*	3.583***	2.709*
	(1.480)	(1.635)	(1.488)	(1.800)	(1.359)	(1.457)
ATT Man. %	-3.985***	-4.650***	-2.719**	-3.543**	-3.904***	-3.241***
	(1.175)	(1.334)	(1.179)	(1.438)	(0.964)	(0.924)
Observations	407	407	401	401	402	402
Gini	No	Yes	No	Yes	Yes	Yes
Geolocation	No	No	Yes	Yes	Yes	Yes
Others	No	No	No	No	Yes	Yes
Soil Quality	No	No	No	No	No	Yes

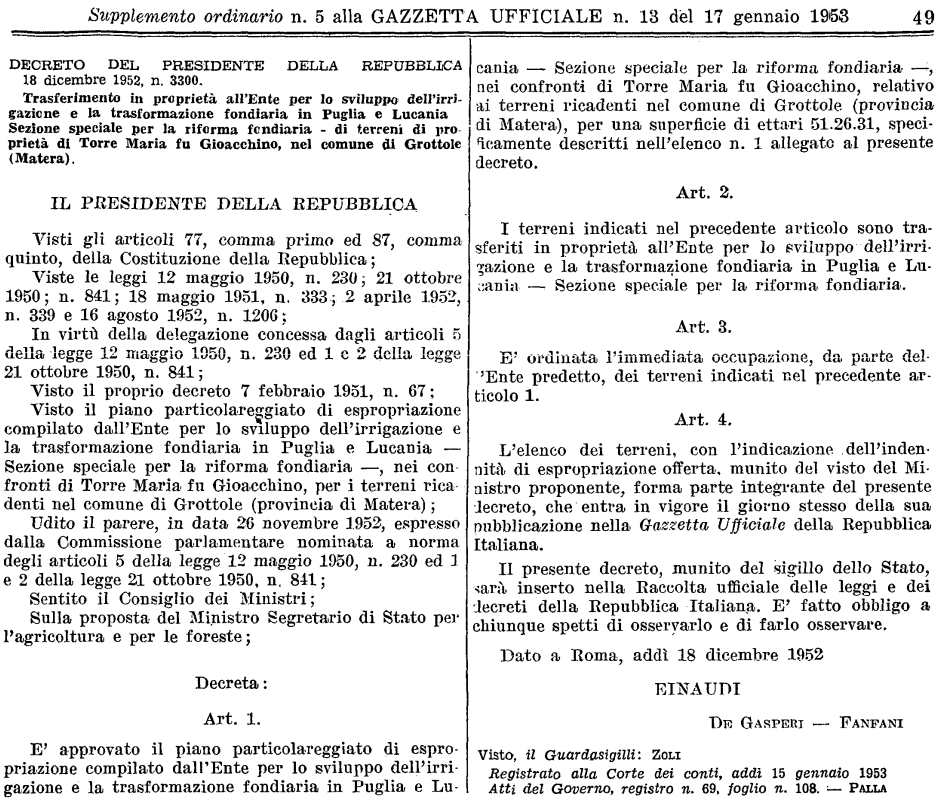
Notes. Estimates of Model 1 using binary treatment using the doubly-robust difference-in-differences estimator proposed by Sant'Anna and Zhao (2020) and implemented in the `did` package by Callaway and Sant'Anna (2021). Reported coefficients are the average of treatment effects estimated post-reform. Columns control for different combinations of reform predictors, as shown in Table A6. *Geolocation* controls include latitude and longitude; *Others* include 1951 employment, 1951 literacy rate, share of college-graduated residents in 1951, PCI vote share change, electoral turnout change, and municipal elevation. Soil quality controls include suitability for wheat and maize, according to FAO GAEZ. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

C Data: Description and Sources

Expropriation Data

Treatment variables have been digitized from original expropriation documents (i.e., *Gazzetta Ufficiale*). In each expropriation, we collected information on the first name and the last name of the beneficiary, municipality and size of the expropriation. Figure C1 reports an example.

Figure C1: Example of reported expropriation in *Gazzetta Ufficiale*



Supplemento ordinario n. 5 alla GAZZETTA UFFICIALE n. 13 del 17 gennaio 1953 49

DECRETO DEL PRESIDENTE DELLA REPUBBLICA 18 dicembre 1952, n. 3300.

Trasferimento in proprietà all'Ente per lo sviluppo dell'irrigazione e la trasformazione fondiaria in Puglia e Lucania - Sezione speciale per la riforma fondiaria - di terreni di proprietà di Torre Maria fu Gioacchino, nel comune di Grottole (Matera).

IL PRESIDENTE DELLA REPUBBLICA

Visti gli articoli 77, comma primo ed 87, comma quinto, della Costituzione della Repubblica;

Viste le leggi 12 maggio 1950, n. 230; 21 ottobre 1950; n. 841; 18 maggio 1951, n. 333; 2 aprile 1952, n. 339 e 16 agosto 1952, n. 1206;

In virtù della delegazione concessa dagli articoli 5 della legge 12 maggio 1950, n. 230 ed 1 e 2 della legge 21 ottobre 1950, n. 841;

Visto il proprio decreto 7 febbraio 1951, n. 67;

Visto il piano particolareggiato di espropriazione compilato dall'Ente per lo sviluppo dell'irrigazione e la trasformazione fondiaria in Puglia e Lucania — Sezione speciale per la riforma fondiaria —, nei confronti di Torre Maria fu Gioacchino, per i terreni ricadenti nel comune di Grottole (provincia di Matera);

Udito il parere, in data 26 novembre 1952, espresso dalla Commissione parlamentare nominata a norma degli articoli 5 della legge 12 maggio 1950, n. 230 ed 1 e 2 della legge 21 ottobre 1950, n. 841;

Sentito il Consiglio dei Ministri;

Sulla proposta del Ministro Segretario di Stato per l'agricoltura e per le foreste;

Decreta:

Art. 1.

E' approvato il piano particolareggiato di espropriazione compilato dall'Ente per lo sviluppo dell'irrigazione e la trasformazione fondiaria in Puglia e Lucania — Sezione speciale per la riforma fondiaria —, nei confronti di Torre Maria fu Gioacchino, relativo ai terreni ricadenti nel comune di Grottole (provincia di Matera), per una superficie di ettari 51.26.31, specificamente descritti nell'elenco n. 1 allegato al presente decreto.

Art. 2.

I terreni indicati nel precedente articolo sono trasferiti in proprietà all'Ente per lo sviluppo dell'irrigazione e la trasformazione fondiaria in Puglia e Lucania — Sezione speciale per la riforma fondiaria.

Art. 3.

E' ordinata l'immediata occupazione, da parte dell'Ente predetto, dei terreni indicati nel precedente articolo 1.

Art. 4.

L'elenco dei terreni, con l'indicazione dell'indennità di espropriazione offerta, munito del visto del Ministro proponente, forma parte integrante del presente decreto, che entra in vigore il giorno stesso della sua pubblicazione nella *Gazzetta Ufficiale* della Repubblica Italiana.

Il presente decreto, munito del sigillo dello Stato, sarà inserto nella Raccolta ufficiale delle leggi e dei decreti della Repubblica Italiana. E' fatto obbligo a chiunque spetti di osservarlo e di farlo osservare.

Dato a Roma, addì 18 dicembre 1952

EINAUDI

DE GASPERI — FANFANI

Visto, *il Guardasigilli*: ZOLI

Registrato alla Corte dei conti, addì 15 *gennaio* 1953
Atti del Governo, registro n. 69, *foglio n.* 108. — PALLA

Income Data

Income 1970 is an estimation of the average net income at the municipal level in 1970. Incomes are expressed in 2000 euros. The data are from Bocca and Scott (1974).

Income 2000 is an estimation of the average net income at the municipal level in 2000. It has been computed as the ratio between the overall taxable income over the number of taxpayers in each municipality. Incomes are expressed in 2000 euros. The data were downloaded from the Ministry of Economy and Finance.

Other Control Variables

Rurality is the percentage of the population living in *nucleo abitato* (i.e., a tiny nucleus of houses in the territory of the municipality) or in *case sparse* (i.e., houses spread over the territory of the municipality but without forming a residential nucleus) over the total population at municipal level. The data are from "ottomilacensus.istat.it".

Share of People with Completed Higher Education is the share of people in the population (aged 6 and above) that completed at least high school. The data are from "ottomilacensus.istat.it".

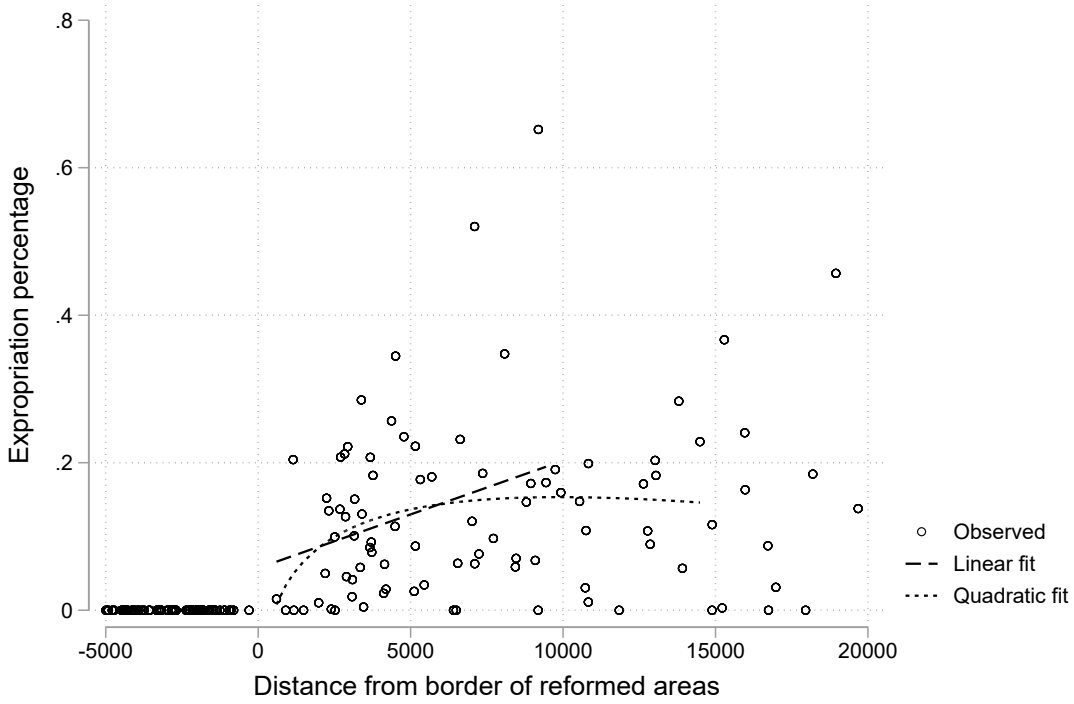
Illiteracy Rate is the share of people in the population (aged 6 and above) that is illiterate. The data are from "ottomilacensus.istat.it".

D Additional Results: Regression Discontinuity

In this section, we provide evidence that justifies excluding a regression discontinuity design for our empirical strategy. Our main treatment variable is the percentage of expropriated land of each municipality. Looking at the spatial distribution of expropriated land can inform us on the magnitude of the discontinuity at the border of municipalities that were part of reformed areas. Figure D1 shows the scatter plot of the expropriation data, ranked

by distance from the closest border of the reformed areas. The figure also displays a linear and quadratic fit within the bandwidths chosen by the procedure described in Calonico et al. (2017), which are shown in Table D1. A visual inspection of the plot reveals the absence of a sharp discontinuity at the border for our main treatment variable. Therefore, employing a regression discontinuity design based on the distance from reformed areas would not capture well the underlying variation that we want to capture.

Figure D1: Expropriation percentage and distance from the border of reform areas



Notes. The y-axis represents the percentage of land in the municipality that was expropriated by the reform; the x-axis reports distance from the reform border, where negative values mean that municipalities were not treated. The positive slope of the linear and quadratic fits of the data and the small discontinuity around 0 suggest that a Regression Discontinuity Design would be statistically underpowered to identify the effects of land redistribution.

In Table D1, we formally test the discontinuity in the percentage of expropriated land using distance from the border of reformed areas as our running variable. We do so for a linear and a quadratic specification, which correspond to the two fitted lines displayed in Figure D1. In line with state-of-the-art techniques on regression discontinuity designs

(Cattaneo et al. (2019)), the Table reports the conventional estimate of the local treatment effect at the discontinuity, with the corresponding optimal choice for the bandwidth. The Table also shows conventional and robust standard errors, where the latter accounts for bias. The expropriation percentage does not display a significant discontinuity at the threshold (except for the case of a linear fit with conventional standard errors, which is significant at the 10% level).

Table D1: Regression Discontinuity

	Expropriation %	
	Linear	Quadratic
Treatment	0.049	0.016
Conventional s.e.	(0.029)	(0.042)
Robust s.e.	(0.037)	(0.049)
Bandwidth (m)	9539	14549
Observations	1449	1449

Notes. Treatment is a binary variable taking value of 1 for municipalities within the reform borders. Outcome is the percentage of land expropriated by the reform. The two columns control for linear or quadratic effects of distance from the reform border. Estimates of the change in outcome at the discontinuity are not significant at standard thresholds when using the bias-robust standard errors implemented by the `rdrobust` package by Calonico et al. (2014). This suggests that a Regression Discontinuity Design would be statistically underpowered to identify the effects of land redistribution.

List of research reports

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