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 education provision, but larger scale and local market power might accelerate the mechanization of production. We examine the effects of redistribution from large to smaller landowners following the Italian 1950 land reform by exploiting novel fine-grained data and find that it reduced industrialization. Agglomeration forces emerge as a key driver, while education doesn't appear as a likely channel. We show that agricultural specialization persisted for at least 50 years, and expropriated areas had lower income 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. Evidence about the effects of land distribution on industrialization and overall development is mixed. Concentrated land ownership is 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). Knowledge about the effects on overall sectoral composition and growth 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 and 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; 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 manu-

facturing. The reform's effects are sizable and highly persistent: 50 years after the reform, the average share of agricultural workers in treated areas is 16%, 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 relatively 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 persistency of the effects on the sectoral composition is partly due to 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 income estimates to measure 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 areas affected by land redistribution experienced lower long-run growth. We find 20p.p. lower growth between 1970 and 2000 in treated municipalities, 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); implementation quality has also shown meaningful variation (Besley et al., 2016; Galán, 2018). According to historical accounts, the Italian land reform was focused on land redistribution and 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). Most recently, Albertus (2023) studies one of the affected regions and compares 2011 well-being measures on the two sides of the land reform boundaries. Using two different research designs and newly-digitized expropriation and income data, we estimate the reform's short- and long-run causal impact on the sectoral composition and income growth of a much larger set of municipalities. These results and additional survey evidence suggest that intergenerational transmission of occupation hindered the transition out of agriculture in these reformed areas and led to lower growth.

The rest of the paper is organized as follows. Section 2 reviews the historical background, mainly discussing the land reform after WWII. Section 3 illustrates our data and section 4 presents our identification strategy. Section 5 illustrates the main results, discusses their robustness and analyzes the potential mechanisms. Section 6 investigates the relationships between the land reform and economic growth in the long-run. Finally, Section 7 contains some concluding remarks.

2 Historical Framework

2.1 The Reform

After World War II (WWII) ended, many Italian agricultural workers began striking and occupying plots of uncultivated land, motivated by high inequality and almost feudal working

conditions. Grievances were linked to the inaction and exploitation of absentee landowners.[1] The occupations led to violent repression by the police (Ginsborg, 2003).

To avoid further 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). Reformed areas were identified with the help of agrarian technicians. A modified proposal was enacted in October: law n.841, called *Legge Stralcio*[2] (Bagnulo, 1976). The expropriation rule (see Appendix Figure A1) combined measures of inequality and productivity to determine the amount of land that would be expropriated from each landowner, matching the reform's declared goals of redistribution and economic development. An implicit 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, as shown in Appendix Figure A2.[3]

Eventually, nearly 700,000 hectares were redistributed to approximately 120,000 families. 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 ownership within families or fake land transfers; second, the compensation value was calculated using the 1947 tax returns (Bandini, 1952). Expropriated landowners were compensated with 25-year fixed-rate government bonds at 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 priority was

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

[2] *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.

[3] The evidence of politically-motivated manipulation of the reform borders in the South supports our decision to exclude southern municipalities from the analysis. See Section 4 for more details.

given to residents of the municipality where the land was located. Farmers assigned a plot could purchase it through advantageous long-term loans 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.[4] 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 high-cost investments in equipment and infrastructure to enable the processing and commercialization of agricultural products.

2.2 A Short-Term Assessment

The implementation of the Italian land reform of the 1950s attracted considerable attention. Prinzi (1956) and Rossi-Doria (1958) described the implementation process 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 operating in 1974, and 80% of them 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 scale reduction. However, the available evidence suggests that the reform significantly improved 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), likely

[4]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.

due to the change in ownership structure and land investments.

3 Data

Our newly built dataset combines information on all recorded episodes of expropriation with a comprehensive set of historical information on Italian municipalities, described below. Descriptive statistics are reported in Appendix Table A2; additional details on the construction and sources of several variables are in Appendix Section C.

Expropriation

Our novel dataset includes each single land expropriation realized following the 1950 *Legge Stralcio* extracting the first and last name of the expropriated landowner, municipality, and size of the expropriation from the original expropriation documents.[5] The official Italian government gazette published these documents between 1950 and 1953.

Our primary measure of expropriation 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 collect and use precise information about the intensity of expropriation for all reformed areas. We also create a dummy variable to analyze the extensive margin of expropriation. Appendix Table A3 reports descriptive statistics of the expropriation data for each treated region.

Land Distribution and Agricultural Income

We also digitized data about the land distribution and agricultural income in Italy in 1948 from Tables 1 and 2 in Medici (1948)'s study. Giuseppe Medici collected this data at the municipal level for the Italian Institute for Agricultural Economics.

Socioeconomic and Political Variables

In our analysis, we rely on a broad set of socioeconomic indicators from decennial censuses, such as sectorial employment, resident population, and share of college graduates. We use

[5] For an example, see Appendix Figure C1.

municipality-level data from the 1936-2001 Italian national censuses collected by the Italian Institute of National Statistics (ISTAT). We also digitized data on municipal-level income per capita in 1970 from the Historical Archive of Banco di Roma. We combined it with the same variable produced in 2000 by the Ministry of Economics and Finance to build a measure of economic growth between 1970 and 2000.

We calculate each municipality's average land suitability based on the wheat land suitability 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.[6] Our favorite specification uses two-way clustered standard errors at the municipality and year levels to account for potential serial correlation at the municipal level and within census waves.

Our main analysis focuses on central and northern Italy municipalities, excluding the southern regions. This choice is driven by the contemporaneous implementation of the "Cassa del Mezzogiorno" policy, which determined massive public transfers to southern municipalities to boost industrialization in underdeveloped areas between 1952 and 1992 (see Colussi et al., 2021 for more details), and that might bias our estimates. In the Appendix, we replicate our main specifications using southern municipalities and show that parallel trends are unlikely to hold based on a pre-trend analysis (see Appendix Table A4). Differential trends predate the discussed industrial policy and are consistent with strategic inclusion or exclusion of southern municipalities from the reform, as evidenced by the archival work in Caprettini et al. (2021). Results on the intensive and extensive margin in the southern sample also show inconsistent patterns, suggesting that factors other than the land reform influenced sectoral composition (see Appendix Table A4).

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. Appendix Table A5 reports the corresponding difference-in-differences estimates. The bottom panels display the evolution of agriculture and manufacturing employment for the two municipality groups 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 difference-in-differences approach (Angrist and Pischke, 2008). This requires that, absent

[6]The reform law was approved on 28 July 1950 and pre-dates the 1951 census, set to represent a snapshot of the country as of November 4th, 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 before the census, and the first was issued on August 30th, 1951. The actual reallocation likely took several months.

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 before 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. In Table 1, we test for differential pre-trends under the first assumption. We cannot reject parallel trends before the reform, validating the chosen research design.

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. As expected, Appendix Table A6 shows that land inequality is the strongest predictor of expropriation, while the second strongest is average land productivity. In Section 5.1 we also exploit 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.

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 Reform Effects on Sectoral Composition

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 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 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.[7] The increase is proportional to the intensity of expropriation, which is the central aspect of the land reform affecting the sectoral composition.[8] We find that a corresponding reduction in manufacturing employment compensated for this specialization in agriculture. As previously discussed, small and statistically insignificant estimates for α_{1936} across all specifications support the research design.

5.1 Robustness

In this section, we perform robustness checks to address potential threats to our identification strategy. We test for robustness using alternative model specifications, samples, and

[7] 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.

[8] When implementing a Sobel-Goodman mediation analysis on the specification of column (1) by also including 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.

inference assumptions.

First, 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 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.

Our treatment's geographical nature suggests that the expropriation intensity 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 several predictors of expropriation, including land inequality and productivity (see Table A6). This estimator is consistent if the correct underlying model is a propensity score or an outcome regression model. Results for average treatment effect on the treated are largely unaffected and very close to the main specification (see Appendix Table A10).

Finally, we address the differences in average distance to the sea between treated and untreated municipalities. To rule out that this might drive the main results, we show their robustness to excluding municipalities near the coast. Appendix Table A11 replicates our main specification for samples where a progressively larger number of municipalities is excluded. Point estimates remain within the initial confidence intervals, and significance is only marginally lowered, as expected following the decrease in the number of included municipalities.

5.2 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 more unequal distribution. Cinnirella and Hornung (2016) provides 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 hindered human capital accumulation through "intergenerational rural stasis."

Using data on educational outcomes at the municipal level, we provide evidence that the Italian land reform had small, short-lived effects 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.

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.[9] Both measures show that the reform reduced density and agglomeration,

[9]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 what the Italian Census classifies as *case sparse* (i.e., houses spread over the municipality's territory without forming a residential nucleus).

which might explain our main results on industrialization. Differences in the shares of the population living in urban areas might have significantly affected the local economic growth by preventing industrial development in reformed municipalities.

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. Angeli and INSOR (1979) argues that both treated and rural untreated areas showed a very strong population decrease in the period 1951-1971. Although data limitations make it impossible to distinguish fertility from migration changes,[10] Angeli and INSOR (1979) also reports anecdotal evidence suggesting that the land reform did not significantly modify the migration patterns that characterized rural areas in that period.

Agglomeration can induce strong persistence (for a very long-run example, see Bleakley and Lin, 2012). The Italian land reform might have reduced agglomeration, which led to slower industrialization, further reducing agglomeration forces.

Scale

Another channel suggested by researchers relates to scale. Adamopoulos and Restuccia (2020) examine the effects of land reform in the Philippines, where, unlike in our context, a ceiling was imposed on landholdings. This reduced agricultural productivity. In the Italian case, the reform reduced the average land size (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 firms would employ relatively larger amounts of labor – often within the household – due to frictions in the labor market and economies of

[10]Census data reports the age category (below 15 years old, 15-64, 65 and above) of surveyed people but not their birth municipality. Analysis of these categories does not yield meaningful results, and is available upon request. To the best of our knowledge, there is no available information on within-country migration at the municipality level for the period we are analyzing.

scale in agricultural machines. An additional reason why smaller firms 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.

While we are not able to test the scale hypothesis in our historical context, we provided suggestive evidence that the Italian reform reduced the average land size (see Figure 1) and this might have affected the sectorial composition consistently with the previous results in the literature. Results on intergenerational transmission of occupations, shown later in this section, also suggest that labor market frictions might have increased the use of family labor, as theorized in the literature linking scale and productivity.

Land Productivity

One 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 Appendix 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 before the land reform. Matching treated and control municipalities based on soil characteristics or pre-reform land productivity does not meaningfully affect estimates (see Table A10).

Additional evidence of increased land productivity comes from the different uses of the lands after the reform. According to Marciani (1966), in treated areas, arable land increased from 53.4% before the reform to 67.5% in 1963, while pasture and uncultivated decreased from 35.4% to 16%. This change in distribution favored the expansion of cereal cultivation, paired with a significant increase in reared cattle quantity and quality, two higher-return land uses.

Occupational Inheritance

Occupational inheritance is a channel supported by anecdotal evidence (Angeli and INSOR, 1979)[11] and by studies in different contexts[12] that can explain the persistence of sectoral specialization beyond the first few years.[13] If children of agricultural workers are more likely to work in the same sector when their parents are landowners, land redistribution might have affected their occupational choices: a crucial aspect of the reform was to create many self-employed, land-owning, agricultural workers whose land could be inherited by their children.

To show that occupational inheritance is affected by landownership in our context, we analyze data from the Italian Survey on Household Income and Wealth, which sampled Italian citizens in both treated and untreated areas in the period 1977-2016. This survey not only allows us to identify the occupational sector of young adults and their parents but also reports whether each person owns the land they are working.

The outcome of interest of our analysis is a binary indicator for employment in agriculture, while the main independent variable 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 where 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 following linear probability model:

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

Columns (1) and (2) of Table 3 show that ownership of land is positively related to occu-

[11] Angeli and INSOR (1979) also argues that the land reform affected the age structure of landowners: according to a nationwide 1976 investigation, expropriated municipalities had more young male workers. Specifically, in municipalities without expropriations, men aged 14-49 working in agriculture were 37.9%, compared to 47.9% in municipalities with more than 20% of the entire territory expropriated.

[12] 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.

[13] Indeed, 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 persistence independently, given that an optimal scale could be achieved through land markets.

pational transmission in the agricultural sector. Male children of agricultural workers have almost 40% 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.[14]

6 Reform Effects on Long-Run Economic Growth

Both scale reduction and occupational inheritance mechanisms are 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, farm workers' income would rise by 68%. Caselli and Gennaioli (2013) argue that dynastic management, i.e., 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. On the other hand, evidence of monopsony pre-reform (Martinelli, 2014), faster agricultural productivity growth in reformed areas (King, 1973), and the reduction of agency problems might lead to faster economic growth in reformed areas. The effects of the land reform on medium- to long-term income growth remain an empirical question.

To estimate the impact of the reform on growth, we examine income per capita at the municipality level. Due to the unavailability of pre-reform data, we resort to a matching approach to study the effects of the reform on 1970 income and its 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 and their Gini Index of land ownership in 1948 calculated using Medici (1948). We further match municipalities based on a measure of productivity: pre-reform agrarian income from Medici (1948) best proxies productivity but is unavailable for a large share of municipalities. On the other hand, soil suitability for wheat has broader coverage but is a more indirect proxy. Belonging to the same region allows for comparability of regional policies and increases precision. Land distribution and productivity are the key factors determining expropriation intensity

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

for municipalities included in the reformed area: matching on these variables is meant to fulfill the "backdoor criterion" and provide identification. While Exact Matching only compares treated and control units with the *same* covariate values, Coarsened Exact Matching compares municipalities in the same region with *similar* productivity and ownership distribution. This 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 columns (3)-(6) of Table 3. Columns (3) and (4) show small and statistically insignificant estimates of 1970 income, regardless of the chosen matching variable. Effects on growth in column (5) appear negative and statistically significant, implying around 20p.p. lower growth over 30 years, compared to an average of 183% growth in the studied sample. Matching on pre-reform productivity instead of wheat suitability in column (6) halves the number of available observations but leaves the effect's magnitude unaffected and only reduces significance to 10%.[15] 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.

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 increased the number of workers employed in the agricultural sector and reduced the number of workers employed in manufacturing. The Italian land reform did not have meaningful effects on human capital accumulation but had a negative effect on agglom-

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

eration: treated municipalities are characterized by persistently lower levels of population density compared to untreated ones. A reduction in the average farm scale might have further increased employment in the agricultural sector. The persistent effects on structural change motivate an investigation of transmission mechanisms. Analysis of survey evidence supports the idea that the new ownership structure and intergenerational transmission of occupation played a relevant role.

Lastly, we investigate the reform's impact on economic development. We use a matching estimator and provide evidence of a negative relation between land reform exposure and income growth in the period 1970-2000. These results support the hypothesis that, while the reform might have had some positive effects in the short run in terms of economic development and wealth redistribution, its negative effects dominated over the following decades.

From 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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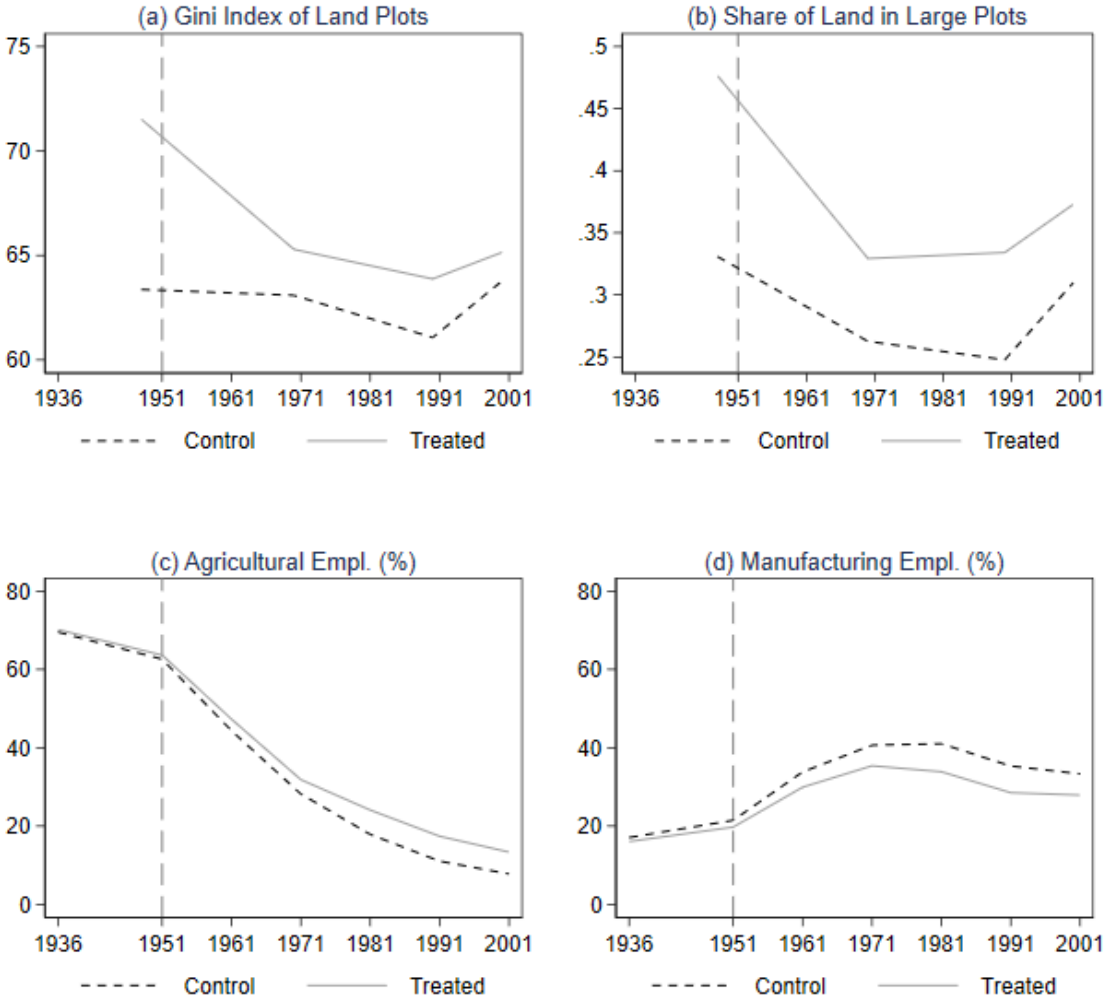
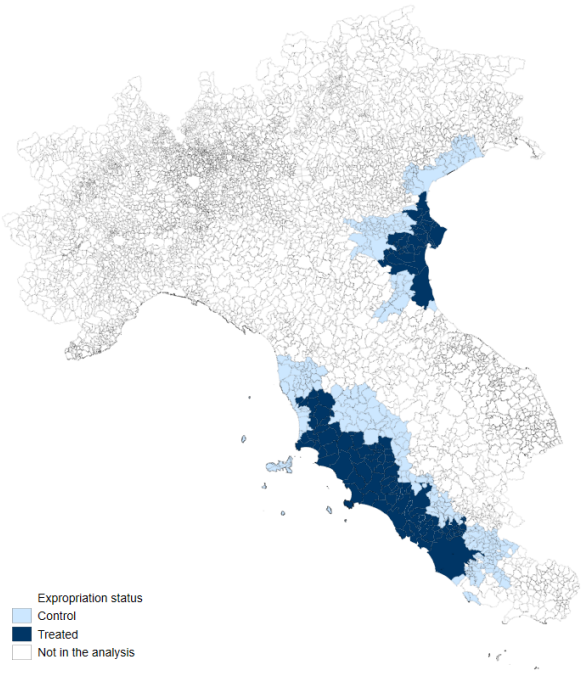
Paper Figures and Tables

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 1936-2001.

Figure 2: Expropriated municipalities in treated provinces



Note: In dark blue, municipalities 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			12.25	8.922	-0.211**	-0.193*
			(154.7)	(195.5)	(0.0815)	(0.101)
Region FE	No	Yes				
Matching Var.			Region, Gini, & Wheat	Region, Gini, & Productivity	Region, Gini, & Wheat	Region, Gini, & Productivity
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	4791.2	1.832	1.688
SD Dep. Var.			1113.9	1077.6	0.603	0.490
Observations	4433	4433	341	150	331	149

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. Both columns include controls for age, survey year, and father's last employment sector (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 1970-2000. Observations matched based on the administrative region (exact matching), Gini of landownership, and either soil suitability to wheat or pre-treatment productivity proxied by the ratio of total taxable agricultural income in the municipality to its cultivated surface obtained from Medici (1948). Columns (3)-(6) always include controls for the matching variables. 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

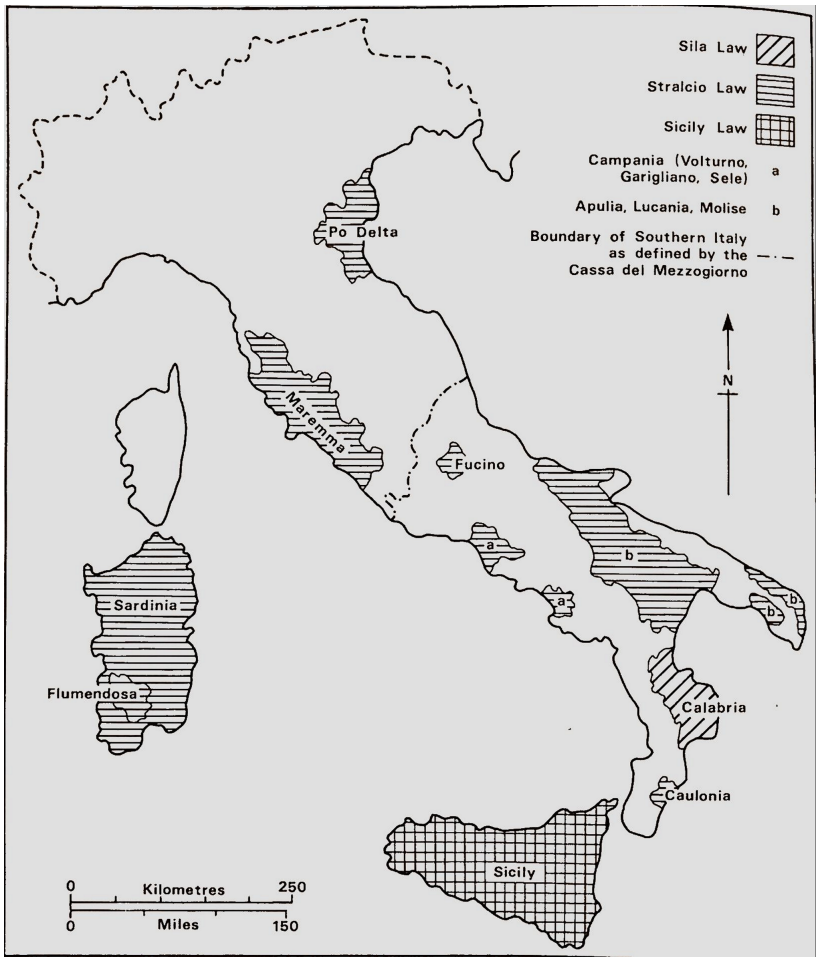
Figure A1: Expropriation Rule for the *Legge Stralcio*

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 land shares.

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 land shares.

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 for 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)
1961	-0.0922	6.528***	12.63***	0.763**	0.108	-7.472***
	(0.256)	(1.412)	(1.249)	(0.249)	(1.570)	(1.835)
1971	-1.485**	4.293	23.02***	1.420**	1.549	-11.59**
	(0.475)	(3.386)	(4.461)	(0.423)	(3.569)	(4.467)
1981	-1.045	3.303	16.35*	2.687***	8.822	-11.19
	(0.683)	(6.076)	(8.251)	(0.660)	(5.544)	(7.309)
1991	1.383	14.50*	11.07	0.922	0.426	-8.537
	(0.721)	(6.218)	(8.609)	(0.645)	(5.434)	(7.217)
2001	3.294***	23.28***	9.190	0.458	-0.0260	-4.262
	(0.695)	(5.811)	(8.137)	(0.634)	(5.363)	(7.114)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9794	9738	2193	9794	9738	2193
ATT	0.41	10.38**	14.45**	1.25**	2.18	-8.61
s.e.	(0.46)	(4.17)	(5.64)	(0.42)	(3.66)	(4.81)

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)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.	Expr.
Political Variables																		
Δ*PCI%*	0.096**																0.033	0.047
	(0.042)																(0.042)	(0.045)
Δ*DC%*		0.017															0.007	0.014
		(0.045)															(0.040)	(0.048)
Δ*Turnout*			0.288*														0.196	0.282*
			(0.154)														(0.162)	(0.163)
				Socioeconomic Variables														
Δ*Agr.%*				0.001													0.000	0.002
				(0.000)													(0.001)	(0.001)
Δ*Man.%*					-0.001*												0.000	0.001
					(0.000)												(0.002)	(0.002)
Employm. %						14.709*											10.460	14.486
						(8.495)											(11.089)	(10.784)
Δ*Pop.Density*							-0.000										-0.000	0.000
							(0.000)										(0.000)	(0.000)
Illiterate %								0.203**									0.198	0.152
								(0.099)									(0.140)	(0.139)
Land Gini									0.214***								0.203***	0.042
									(0.038)								(0.057)	(0.066)
Education										-0.003							-0.008**	-0.006
										(0.003)							(0.004)	(0.004)
											Geographical and Land Variables							
Wheat											-0.019						-0.097	-0.070
											(0.019)						(0.093)	(0.102)
Maize												-0.027					0.097	0.206
												(0.029)					(0.153)	(0.156)
Elevation													-0.016				-0.066**	-0.051
													(0.015)				(0.032)	(0.038)
Latitude														-0.005*			-0.015**	-0.007
														(0.003)			(0.006)	(0.006)
Longitude															-0.016***		-0.008	-0.013*
															(0.004)		(0.006)	(0.007)
Productivity																-0.006***		-0.010***
																(0.001)		(0.003)
N	411	411	407	407	407	410	408	411	411	410	411	411	411	411	411	334	403	329
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	0.052	0.125	0.181

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. Productivity is proxied by the ratio of total taxable agricultural income in the municipality to its cultivated surface in 1936 obtained from Medici (1948). In column (18), 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)	(7)
ATT Agr. %	3.921***	3.454**	3.017**	3.259*	3.583***	2.709*	5.055***
	(1.480)	(1.635)	(1.488)	(1.800)	(1.359)	(1.457)	(1.731)
ATT Man. %	-3.985***	-4.650***	-2.719**	-3.543**	-3.904***	-3.241***	-3.543***
	(1.175)	(1.334)	(1.179)	(1.438)	(0.964)	(0.924)	(1.329)
Observations	2460	2460	2460	2460	2430	2430	1980
Gini	No	Yes	No	Yes	Yes	Yes	Yes
Geolocation	No	No	Yes	Yes	Yes	Yes	Yes
Others	No	No	No	No	Yes	Yes	Yes
Soil Quality	No	No	No	No	No	Yes	Yes
Productivity	No	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. Productivity is proxied by the ratio of total taxable agricultural income in the municipality to its cultivated surface in 1936 obtained from Medici (1948). Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A11: Robustness: Excluding Coastal Municipalities

	Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)
ATT	3.921**	3.114**	2.744*	-3.985***	-4.088***	-4.445**
	(1.216)	(1.246)	(1.280)	(0.974)	(1.077)	(1.207)
Pre-Trends	-0.299	-0.0146	0.138	0.692	0.593	0.526
	(0.646)	(0.656)	(0.734)	(0.564)	(0.515)	(0.489)
Distance	0	10000	15000	0	10000	15000
N Observations	2867	2539	2378	2867	2539	2378
N Treated Municipalities	96	78	67	96	78	67
N Treated Provinces	10	9	8	10	9	8

Notes. Each column excludes municipalities whose centroid is within the chosen distance (reported in meters at the bottom) from the coastline. The first (fourth) column with distance equal zero corresponds to the first (fourth) column of Table 1. Year and municipality fixed effects are always included. For more details, see footnote of Table 1. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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*

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".

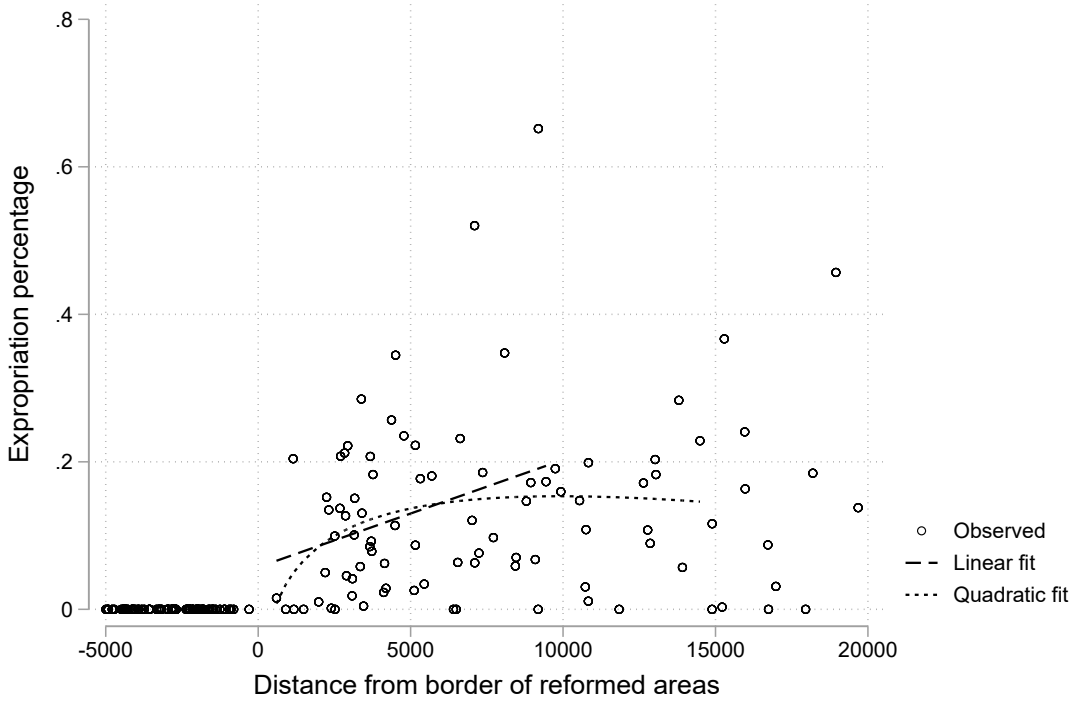
Illiteracy Rate is the share of people in the population (aged 6 and above) that is illiterate. The data are from "ottomilacensus.istat.it".

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 in-

form 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), 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 the underlying variation we want to capture well.

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



Notes. The y-axis represents the percentage of land in the municipality expropriated by the reform; the x-axis reports distance from the reform border, where negative values mean 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.