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 reducing the local provision of education, but larger scale and local market power in labor markets might accelerate mechanization of production and reduce agricultural employment. Using a difference-in-differences design and novel data on expropriations, we study the effects of redistribution following the Italian 1950 land reform. We find that redistribution led to less industrialization, and explain this finding with a reduction in scale of operations and a more intensive use of family labor. We also show that this effect persisted for at least 50 years, consistently with models of intergenerational transmission, which are also supported by survey evidence on father-son occupations. Finally, using newly digitized municipal-level income data, we find that expropriated areas had lower growth in the period 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 meant 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 been associated with lower provision of education (Galor et al., 2009), slowing down structural change. At the same time, other work has shown 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). Additionally, research studying long-run effects of changes in land ownership structure often focuses on outcomes within the agricultural sector (Besley et al., 2016; Smith, 2021), so that knowledge about effects on overall sectoral composition and development is still limited.

This paper studies the short- 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- and post-reform socioeconomic variables, to show the effects on 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 in manufacturing at the municipal level through several census waves. Areas with higher incidence of redistribution experienced a sizable and significant increase in the share of workers employed in agriculture; correspondingly, the share of workers employed in the manufacturing sector decreased. 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 an array of robustness exercises, addressing

potential issues coming from sample and specification choices. In particular, we find that the identified relationship between expropriations and agricultural specialization holds when focusing only on treated municipalities.

What mechanisms explain these occupational patterns? We first test the effects on educational attainments, a channel highlighted by the previous literature where some studies suggest positive effects of redistribution (Galor et al., 2009), and others find negative ones (Albertus et al., 2020). We do not find important effects on literacy and college attainment, consistent with a context where education is publicly provided and easily accessed by the population. We show, instead, that reformed areas become less densely populated and housing becomes more sparse. This suggests that lack of agglomeration might be a cause of the slower industrialization (Breinlich et al., 2014; Martin and Ottaviano, 2001). We also discuss how changes in the scale of operations might explain the observed patterns, as suggested by Foster and Rosenzweig (2022).

Additionally, we argue that the persistent effects on the sectoral composition are partly due to an increased intergenerational transmission of occupation. Children of agricultural workers become more likely to be agricultural workers themselves when their parents own the land they work on, as Fernando (2022) documents for India. The land reform increased the number of landowners and affected occupational choices of their descendants. We provide evidence of the effects of property on occupational inheritance in Italian survey data.

Finally, we ask whether the reform led to more or less local economic prosperity, as agricultural specialization has ambiguous implications for average income in a municipality. To answer this question, we develop a new measure of income growth at the municipality level for the period 1970-2000 and use it to estimate the impact on long-run growth. Matching 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.

The first contribution of this paper relates to the empirical literature on structural change and economic growth (see Bustos et al., 2016 and Bustos et al., 2020 for recent examples). We leverage a specific historical event that represented a labor-increasing shock to productivity

and show that it increased participation to agriculture. We also provide long-run estimates, showing remarkable persistence, and provide suggestive evidence of the mechanisms driving it. Similar to Mattheis and Raz (2021), our findings suggest the the land redistribution policy implemented in Italy generated distortions that had persistent impacts on the industrial structure.

Second, we speak to the large body of evidence documenting the effects of land reforms. Historically, these reforms have included policies focused on different aspects, such as redistribution (Albertus et al., 2020), land titling formalization (De Janvry et al., 2015), or changes in the organization of production (Montero, 2020). Importantly, reforms vary in the thoroughness of implementation (see the case of India in Besley et al., 2016). We analyze a reform that was focused on land redistribution, and that according to historical accounts was carefully implemented. Our paper is among the first to estimate long-run effects of a reform with such characteristics.

Finally, we speak to a growing literature on agricultural policies in Italian history (Marciani, 1966, King, 1973, and Caprettini et al., 2021 on the land reform; Carillo, 2021 on Mussolini's Battle of Grain). We use novel data to provide evidence on consequences beyond political gain from the reform, and we offer causal estimates of their impact on sectoral composition and economic development of reformed areas.

The remainder of the paper is organized as follows. Section 2 reviews the historical background, describing the socioeconomic context before the land reform, its characteristics, and the consequences documented in historical accounts. Section 3 illustrates our data and provides descriptive statistics. Section 4 presents our empirical strategy. Section 5 displays our main results on sectoral specialization and the related robustness checks. Section 6 investigates the channels through which the reform operated, and provides evidence of the long-run effects of the reform on economic development. Section 7 concludes the paper. The Appendix contains additional figures, tables and robustness checks.

2 Historical Framework

2.1 The Reform

After the end of 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 started striking and occupying plots of uncultivated land. Grievances were linked to the inaction and exploitation of absentee landowners.[1] The 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 by 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). As in the former version, the main declared goal of the land reform was to reduce land inequality with an eye for productivity improvement.[4] An additional 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 a wide coverage, eight and a half million hectares were potentially interested: approximately one third of the total national territory.[5] The reformed territories in the North of Italy were closely resembling those of the first proposed reform.[6]

Eventually, a total of about 700.000 hectares was expropriated. Two measures prevented landowners from eluding expropriation or taking advantage of them. First, decisions were

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

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-years 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 imposed a ban on the purchase of new lands for 6 years after the expropriation.

Beneficiaries of the reform needed to already be 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 an already 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 to cooperatives (Bandini, 1952). Such cooperatives would make the high-cost investments in equipment and infrastructure to enable the processing and commercialization of the agricultural products. Approximately 120.000 families received a part of the 700.000 expropriated hectares.

The *Enti di riforma* 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. *Enti di riforma* were also in charge of the improvement of expropriated land. Figure A3 in the Appendix shows that more than 50% of the implementation expenditure of the reform was devoted to investment in land reclamation and productivity improvement.

[7]The assignment procedure was not consistent across all areas covered by the reform. 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.

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) analyze 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 twenty years after the law was signed. According to Angeli and INSOR (1979), about 83% of the original 120,000 firms were still operating in 1974. About 80,000 plots were still cultivated by the original assignees or by 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. Table 1 from King (1973) shows that productivity growth in the reformed areas was higher than the national average between 1953 and 1963. This was likely due to the change in ownership structure and to land investments.

However, the economic situation of the different treated areas remained very heterogeneous. For example, Campania started with productivity levels similar to the national average and grew to much higher productivity, while Sardinia, starting from extremely low levels, only reached one third of the national average in 1963.

Table 1: 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).

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 wide set of historical information on Italian municipalities. In particular, the dataset combines publicly available information, mainly from decennial censuses, with newly digitized data on the land reform and land distribution.[8]

Expropriation data. Our novel dataset includes each single land expropriation realized following the 1950 *legge stralcio* extracting first name (of the beneficiary), last name (of the beneficiary), 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. We are the first to systematically collect and use precise information about the intensity of expropriation in all the areas affected by the 1950 *legge stralcio*.

Our main 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 total area of the municipality in 1951. This measure, called *Percent expropriation*, is expressed in percentage points and constitutes our main treatment variable. We also build a dummy variable and we use if for the analysis of the extensive margin of expropriation. Table 2 reports descriptive statistics of the expropriation data for each treated region.

Land distribution data. We also collect novel data about the land distribution in Italy in 1948, by digitizing Table 1 of the study by Medici (1948). 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 on the basis of their significantly unequal distribution.

[8] The descriptive statistics are reported in Table A1 in Appendix B

[9] For an example of the original source, see Appendix C.

Table 2: 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).

Socioeconomic and political variables. We rely on a wide set of socioeconomic indicators from decennial censuses in our analysis such as sectorial employment, resident population, share of high school graduates. Specifically, we use the municipality level data from the Italian national censuses 1936-2001 collected by ISTAT (Italian Institute of National Statistics). 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.[10]

We calculate average land suitability for each municipality based on the land suitability for wheat measured by FAO with the 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 of land distribution.

Finally, we complete our dataset with electoral data collected by the Ministry of Interior on the national elections from 1946 to 1987.

[10]More details on the construction and the sources of these variables are reported in the Appendix C

4 Empirical strategy

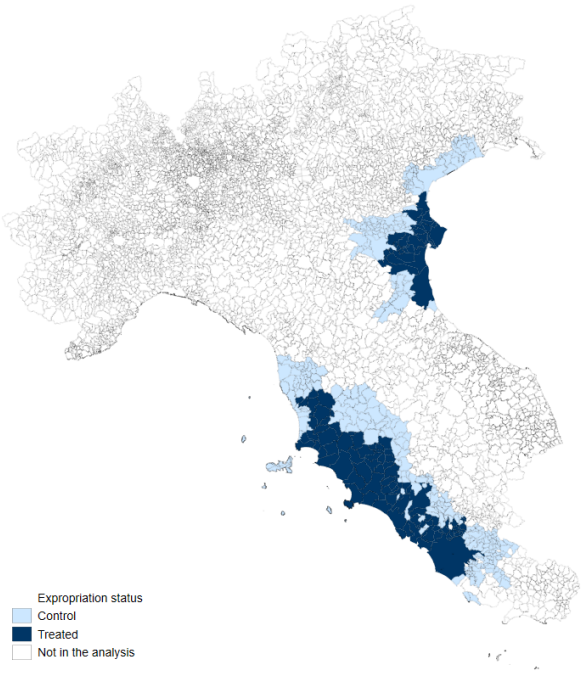
4.1 Model

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:

$$y_{it} = \gamma_t + \delta_i + \alpha_{36} \times d_{36} \times E_i + \sum_{\tau \in \mathcal{T}^{post}} \alpha_\tau \times d_\tau \times E_i + \varepsilon_{it} \tag{1}$$

where y_{it} is the economic outcome (e.g. agricultural employment) in municipality i in the decade t; E_i represents either a treatment dummy or the percentage of expropriated lands; d_t are time dummies; γ_t and δ_i denote a full set of time and municipality 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 d_t and for time-invariant, municipality-level characteristics through δ_i. We can, finally, test for the presence of differential pre-trends (α_{36}) and for dynamic effects over time (α_τ). 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 at the year level.

Figure 1: Expropriated municipalities in treated provinces

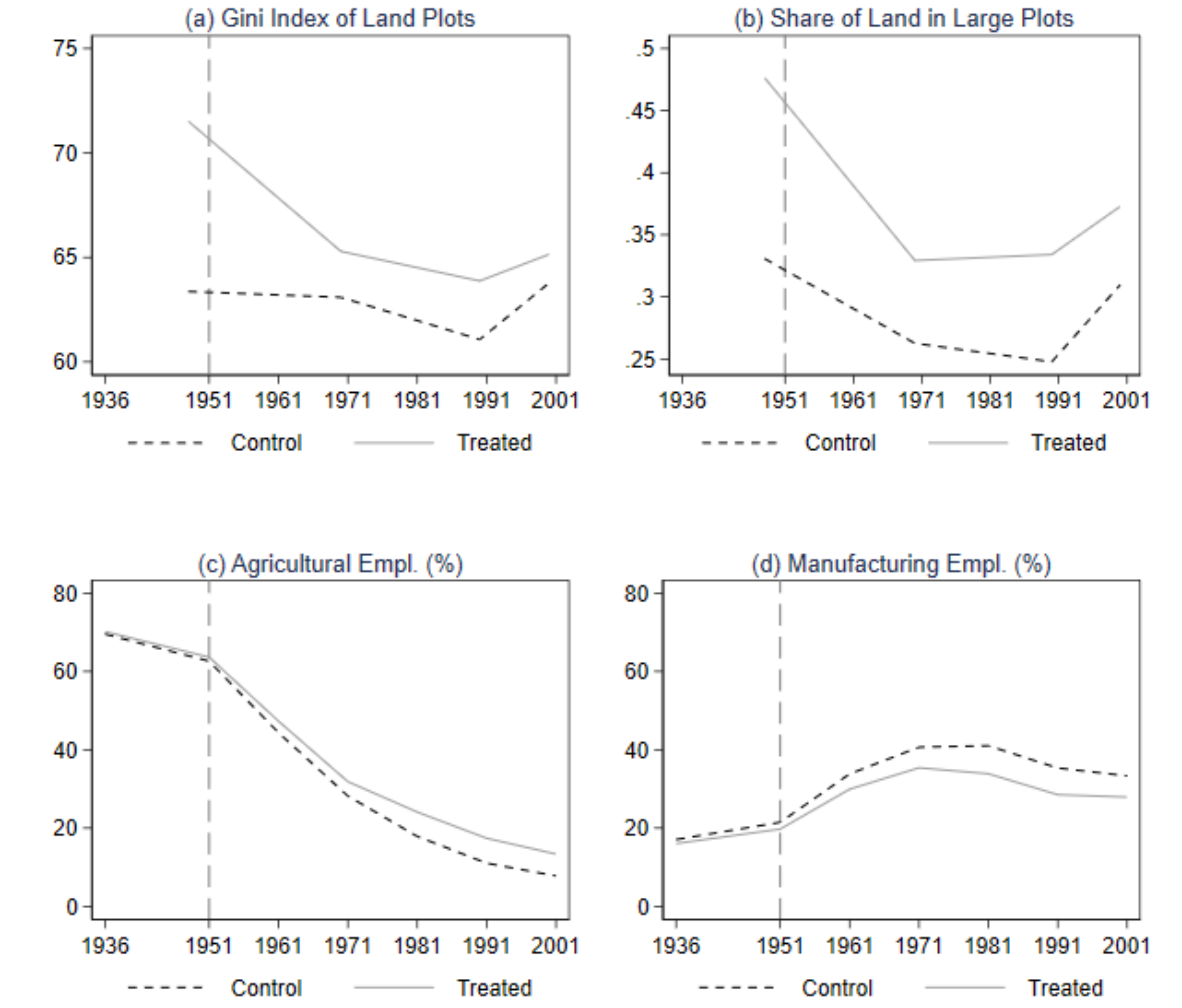


Note: In dark blue, municipalities that were included in the land reform; in light blue, municipalities in provinces where at least one municipality was expropriated. Light blue municipalities will compose the main control group in our difference-in-differences analysis. *Source: Legge Stralcio*.

Our sample, represented in Figure 1, includes only municipalities in the Center and North of Italy, excluding southern Italian regions. This choice is driven by the contemporaneous implementation of "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, in Table A8 in the Appendix we replicate our main specifications and show that parallel trends are unlikely to hold for the southern regions based on a pre-trend analysis.[11]

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

Figure 2: 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.

The top panels in Figure 2 show how land inequality and plot size changed in the treated and control areas after the reform. We can observe partial convergence of the two areas, consistently with a successful implementation of the reform. 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 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 2 allow a visual inspection of trends: both the level and the evolution of treatment and control areas are 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.

As discussed in Section 2, reform areas were chosen based on the recommendation of expert agronomists and on the prevalence of large and inefficient land ownership. In Appendix Table A4, we show that land distribution and productivity are the strongest predictors of treatment assignment, while changes in agricultural or manufacturing employment have insignificant coefficients and explanatory power. Political support for the Italian Communist Party in the previous two elections, a potential driver of the reform, is also weakly related to the reform.

While in our main specification we rely on exogeneity conditional on municipal and year 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). Results are largely unaffected and discussed in more detail in Section 5.2. Additionally, in Table 3 we test for the presence of differential pre-trends under the first assumption, and cannot reject parallel trends prior to 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 reform was implemented in well-defined areas, municipalities near the borders had small percentages of land expropriated. We are therefore unable to identify a significant discontinuity in expropriations at the border, as shown in Appendix Figure A5 and Table A10.

5 Results

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

5.1 Main Results

Table 3 report 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 treatment variable, and identify very similar patterns to the ones 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 3 use employment in manufacturing as 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, specifically our measure of expropriation, is associated with a significant decline of the employment in manufacturing sector.[12]

[12]Results are very similar when we replace municipality fixed effects with municipal controls and province fixed effects. Results are reported in Table A9 in the Appendix.

Table 3: 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
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. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Overall, our findings provide evidence that treated areas reported a significant relative increase in the agricultural employment in the short term, and maintained higher levels in the following decades. The increase is proportional to the intensity of expropriation. 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_{36} 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 to using alternative samples, inference assumptions, and changes in model specifications.

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 A9.

We then show that our evidence is not driven by the exclusion from our sample of the administrative center of each province in Appendix Table A6. 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.

The geographical nature of our treatment suggests that the intensity of expropriation might be spatially correlated. Appendix Table A7 reports the baseline estimates with standard errors that account for spatial correlation using the procedure developed in Conley (1999). Specifically, columns (1) - (8) replicate columns (2) and (5) of Table 3, 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 the reform: population, land inequality, and soil fertility. 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. The results are reported in Table A5 in the Appendix.

6 Mechanisms, Persistence Channels and Long Run Growth

In this section, we discuss and provide evidence on the mechanisms generating our results, on the drivers behind the persistence of the sectoral employment, and on 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. Similarly, Cinnirella and Hornung (2016) provide empirical evidence of a negative relationship between landownership concentration and education in nineteenth century Prussia. In a recent article, 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". Hence, we investigate the relationship between land expropriation and educational attainments in Italy. We collect data on educational outcomes at the municipal level and provide evidence that there is no detectable effect of the land reform on educational patterns. Columns (1) - (6) of Table 4 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 to a decrease in illiteracy rate. However, their magnitude is quite small, indicating that reformed areas had a decrease of 0.28 percentage points in illiteracy rates.[13] Additionally, columns (4) - (6) report the estimated coefficients of the baseline model on the percentage of people with completed higher education at municipal level. We find no detectable systematic effect of the expropriation on higher education attainment. We can also see in columns (3) and (6) that the estimated effects do not appear to be strongly related to the intensity of expropriation.

Scale

Another channel suggested by the literature relates to scale. An example is Adamopoulos and Restuccia (2020), who study the effects of a land reform in the Philippines. Differently from our context, a ceiling was imposed on landholdings and agricultural productivity fell as a consequence. In the Italian case, average land size was reduced by the reform (Figure 2),

[13] In 1951 the estimated Italian illiteracy rate in was approximately 12% according to the Census.

but no ceiling on ownership was ever imposed. Moreover, existing evidence (see discussion of King, 1973 in Section 2) suggests that productivity rose rapidly in reformed areas. Foster and Rosenzweig (2022) propose and test a theory that features a U-shaped relationship between productivity and plot size, which reconciles our findings and those of Adamopoulos and Restuccia (2020). This theory also suggests that smaller agricultural firms 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 firms might employ more labor is argued in Martinelli (2014) for pre-land reform Italy: large landowners enjoy local monopsony power and might optimally hire fewer workers than if they were operating in a perfectly competitive environment.

Agglomeration

A well-developed literature, recently summarized by Breinlich et al. (2014), argues that industrialization necessitates local agglomeration. To explore this channel, columns (7)-(12) of Table 4 report the estimates of model (1) using population density and rurality as outcome. While the first measure is simply obtained by dividing population by the municipality's area, the second is a measure of *sparsity* of housing in the municipality.[14] 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 intensity of expropriation was *positively* related to population density until 1961, while the signed flipped for each decade thereafter. This suggests that the redistribution might have increased fertility or in-migration in its first years, before reducing them. Unfortunately, data limitations make it very hard to distinguish fertility changes from migration changes.

[14]The former measure is computed as the ratio between the decennial population reported in the relative census and the area of the municipality reported in 1951, winsorized at 1%. The latter 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).

Table 4: 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
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; Column (2), (5), (8), and (11) estimate model (1) with the percentage of expropriated lands as treatment; Column (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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Land Productivity

One last explanation for the observed divergence relates to the land improvement that was carried out by the Italian government alongside the land redistribution. Ginsborg (2003) highlights how the largest component of expenditure for land improvement was devoted to housing construction, while efforts to implement irrigation plans in some regions were largely unsuccessful.

In addition, we find that, while time-invariant soil suitability was lower in reformed

areas, employment was similar to control areas prior to the reform: if land improvement was available elsewhere it should have been carried out by privates and would have led to convergence. Finally, coefficients from regressions that control for soil characteristics are virtually identical to those without the control (see Table A5).

6.2 Persistence

Not all the above-discussed mechanisms have the potential to explain the observed persistence in agricultural specialization. For example, while educational attainment can be transmitted by parents, this channel does not appear to play a meaningful role in our setting.

Economies of scale are unlikely to deliver persistence alone, given that optimal scale could be achieved through land markets. However, they are likely to interact with a new channel: occupational inheritance. Dunn and Holtz-Eakin (2000), among others, shows the positive relation between parental self-employment experience and self-employment. In addition, 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) uses data linking different generations to estimate a search and matching model, highlighting the potential that professional networks have to determine occupational choices. Most related, Fernando (2022) shows that Indian firstborns that inherit agricultural land display reduced migration and entry into non-agricultural sectors.

The Italian land reform might have affected the extent of intergenerational transmission of sectoral occupation through the creation of many self-employed, land-owning, agricultural workers. As discussed in Section 2, the 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 5 we show that ownership of land is indeed positively related to higher occupational transmission in the Italian Survey on Household Income and Wealth (SHIW), which was collected between 1977 and 2016 by the Bank of Italy. This survey allows us to identify whether young adults are employed in agriculture. The main explanatory variable is a dummy indicating whether an individual's father ever worked in agriculture as the business-owner; we build and include the same variable for other sectors. Finally, we control for the sec-

tor in which the father was last employed, the year of the survey, and age and gender of the respondent. We include individuals aged 20 or older and estimate the linear probability model:

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

Male children of agricultural workers have about 50% higher probability to stay 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.

Table 5: Probability of Being Employed in Agriculture

	Men only		Men and Women	
	(1)	(2)	(3)	(4)
Business Owner (Agriculture)	0.0783***	0.0719***	0.0579***	0.0512***
	(0.0143)	(0.0140)	(0.0105)	(0.0104)
Business Owner (Other Sector)	-0.0183*	-0.0168*	-0.0130*	-0.0134*
	(0.00983)	(0.00943)	(0.00715)	(0.00698)
Region FE	No	Yes	No	Yes
Mean (Father in Agriculture)	0.185	0.185	0.139	0.139
Mean (Father in Other Sector)	0.0630	0.0630	0.0523	0.0523
Observations	4433	4433	7161	7161

Notes. Data from the Survey on Household Income and Wealth (SHIW). The survey was run by the Bank of Italy between 1977 and 2016 and collects individual-level information on occupation, income, and educational attainment, among others. Our sample consists of family members classified as sons or daughters older than 19. Standard errors clustered at the family level in parentheses. Controls included: age of interviewee, year of survey, last sector of employment reported by the father, gender (in columns 3 and 4). Sectors are classified in 6 categories. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finally, 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, that led to slower industrialization, which further reduced agglomeration forces.

6.3 Long-run local economic effects

Both scale reduction and occupational transmission mechanisms have been 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. We then turn to 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 study income per capita at the municipality level. Because of 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 on income growth between 1970 and 2000. We use Coarsened Exact Matching (implemented following Blackwell et al., 2009) and identify strata in the data where units are comparable based on their belonging to the same region, on their soil suitability for wheat, and on their Gini index of land ownership in 1948.[15] The second and third variables are meant to capture the factors determining expropriation intensity for municipalities included in the reformed area and the potential development of their agricultural sector; belonging to the same region allows for comparability of regional policies.[16] 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* fertility and ownership distribution, which facilitates the inclusion of continuous variables.

Table 6 reports estimates of the effects of the reform on income in 1970 and income growth in the period 1970-2000.[17] We can see in columns (1) and (2) that the estimated effects on 1970 income are very small and statistically insignificant. Effects on growth in columns (3)

[15] We calculate the Gini index for each municipality based on the distribution of land recorded in Medici (1948).

[16] Restricting matching to the municipalities within provinces with at least one expropriation drastically reduces the matched sample, thus decreasing statistical power of our model. Point estimates are consistent with those found in the tables shown.

[17] We provide estimates with and without including the matching variables: the estimates of interest are unaffected by this inclusion.

and (4) appear to be negative and statistically significant, averaging around 20p.p. lower growth over 30 years, compared to an average of 183% growth in the studied sample.[18] These results suggest that even though the reform might have had some positive effects on economic development in the first years from implementation, it had negative effects on income growth in the long run.

Table 6: CEM estimates for long-run growth effects

	1970 Income		1970-2000 Growth	
	(1)	(2)	(3)	(4)
Dummy Expropriation	6.802	12.25	-0.203**	-0.211**
	(159.7)	(154.7)	(0.0841)	(0.0815)
Soil Suitability		24.56***		-0.00917***
		(5.651)		(0.00196)
Gini Index		10.78		-0.00317
		(10.43)		(0.00450)
Constant	4836.9***	3358.5***	1.878***	2.363***
	(121.3)	(801.2)	(0.0584)	(0.348)
N	341	341	331	331
R-squared	0.000007	0.145	0.0219	0.0928

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7 Conclusions

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

First, we exploit this measure to evaluate the impact of the reform on the sectoral composition. Using a difference-in-differences model, we find robust evidence that the reform generates an increase in the number of workers employed in the agricultural sector and a drop

[18] Linear specifications and propensity score methods yield similar estimates for these effects. In all cases, estimates are negative and statistically significant for the impact on growth. Results are available upon request.

in the number of workers employed in the manufacturing one. We studied the mechanisms that can explain the effect on the structural change. Our findings suggest that the Italian land reform did not have significant effects on the human capital accumulation, while treated municipalities are characterized by persistently low levels of population density compared to untreated ones, suggesting a negative effect on agglomeration. Another potential mechanism consistent with the evidence on the Italian land reform is the reduction of scale that might have determined higher employment in agricultural sector.

We detect a strong persistence of the structural change in the treated areas, hence we investigate whether the new structure of ownership determined by the reforms affect future generations. Indeed, our findings suggest that intergenerational transmission of occupation played a relevant role. Finally, we investigate the impact of this structural change on economic development. We use a matching estimator and provide evidence of a negative correlation between the reform and income growth in the period 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 diverge from the initial motivation that led to such policies. Even though a redistribution policy might achieve not only greater equality but also faster growth and poverty reduction in the short term, such reforms may lead to lower levels of 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 reforms can exacerbate distortions and frictions in labor markets that are detrimental for economic growth.

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Online Appendix: Persistent Specialization and Growth

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

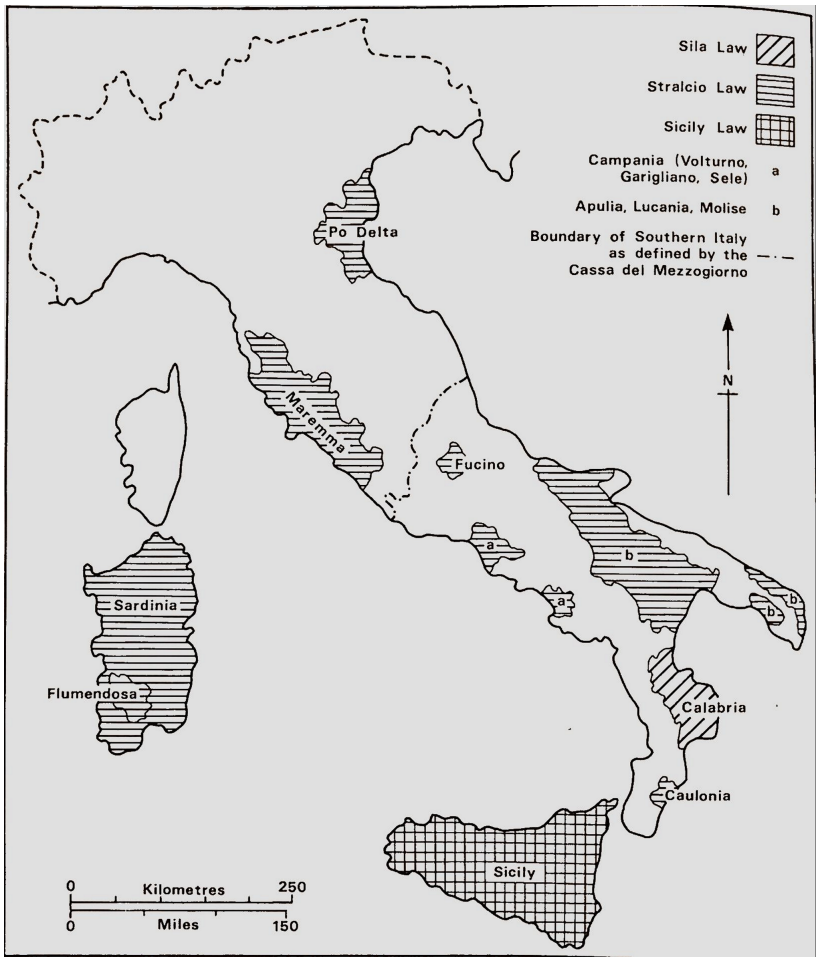
A Additional Figures

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

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		Categorie di uscita	Importi	
	milioni di lire	%		milioni di lire	%
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.*).

B Additional Tables

Table A1: 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

Table A2: 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

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Predicting land reform exposure

	(1) Expr.	(2) Expr.	(3) Expr.	(4) Expr.	(5) Expr.	(6) Expr.	(7) Expr.	(8) Expr.
PCI %	0.322							0.166
	(0.218)							(0.229)
DC %		0.0661						0.0524
		(0.269)						(0.244)
Agr. %			0.00113					0.0000422
			(0.00279)					(0.00642)
Man. %				-0.00315				0.00166
				(0.00317)				(0.00783)
Fertility					-0.255**			-0.530***
					(0.0994)			(0.114)
Gini						1.201***		1.504***
						(0.208)		(0.255)
Log Population							0.463***	0.407**
							(0.173)	(0.183)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	822	822	814	814	822	822	816	814
Within R2	0.00521	0.000135	0.000391	0.00222	0.0153	0.0695	0.0239	0.143

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Predicting land reform intensity

	(1) Expr.	(2) Expr.	(3) Expr.	(4) Expr.	(5) Expr.	(6) Expr.	(7) Expr.	(8) Expr.
PCI %	0.0960**							0.0668
	(0.0418)							(0.0437)
DC %		0.0167						0.0295
		(0.0449)						(0.0418)
Agr. %			0.000595					0.000840
			(0.000460)					(0.00120)
Man. %				-0.000852*				0.000537
				(0.000450)				(0.00132)
Fertility					-0.0187			-0.0622***
					(0.0191)			(0.0230)
Gini						0.214***		0.225***
						(0.0375)		(0.0503)
Log Population							0.104**	0.101**
							(0.0403)	(0.0422)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	822	822	814	814	822	822	816	814
Within R2	0.0123	0.000228	0.00285	0.00427	0.00217	0.0581	0.0318	0.110

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Replication of Table 3 controlling for reform predictors

	(1)	(2)	(3)	(4)	(5)
ATT Agr. %	3.921***	2.462	3.194**	4.661***	3.160*
	(0.008)	(0.103)	(0.041)	(0.002)	(0.070)
ATT Man. %	-3.985***	-2.885**	-4.695***	-3.355***	-2.305*
	(0.001)	(0.015)	(0.000)	(0.003)	(0.070)
Observations					
Log Pop.	No	Yes	No	No	Yes
Gini	No	No	Yes	No	Yes
Fertility	No	No	No	Yes	Yes

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A6: 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 3. Clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7: 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 (1) and (4) of Table 3 * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Replication of Table 3 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 3. 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 A9: Replication of Table 3 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

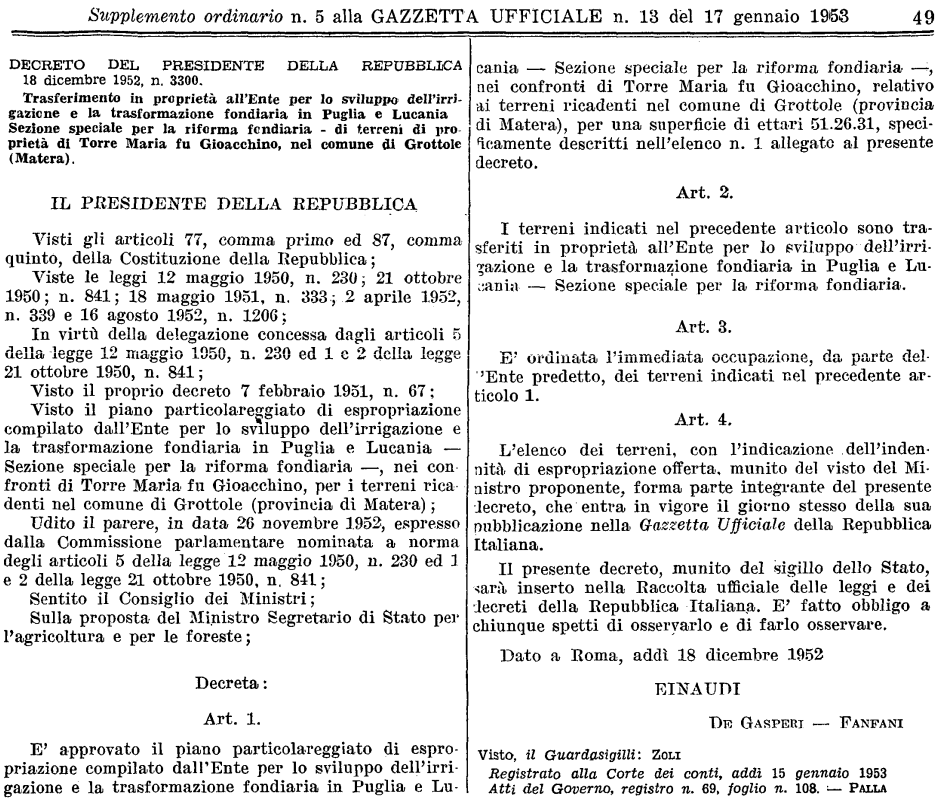
Notes. Column (1) estimates model (1) exploiting the treatment dummy; Column (2) estimates model (1) exploiting the percentage of expropriated lands; Column (3) estimates model (1) exploiting the percentage of expropriated lands in the sample including only municipalities where lands have been expropriated. 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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 A4 reports an example.

Figure A4: 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 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 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 have been 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 or more) that completed at least high school. The data are from "ottomilacensus.istat.it".

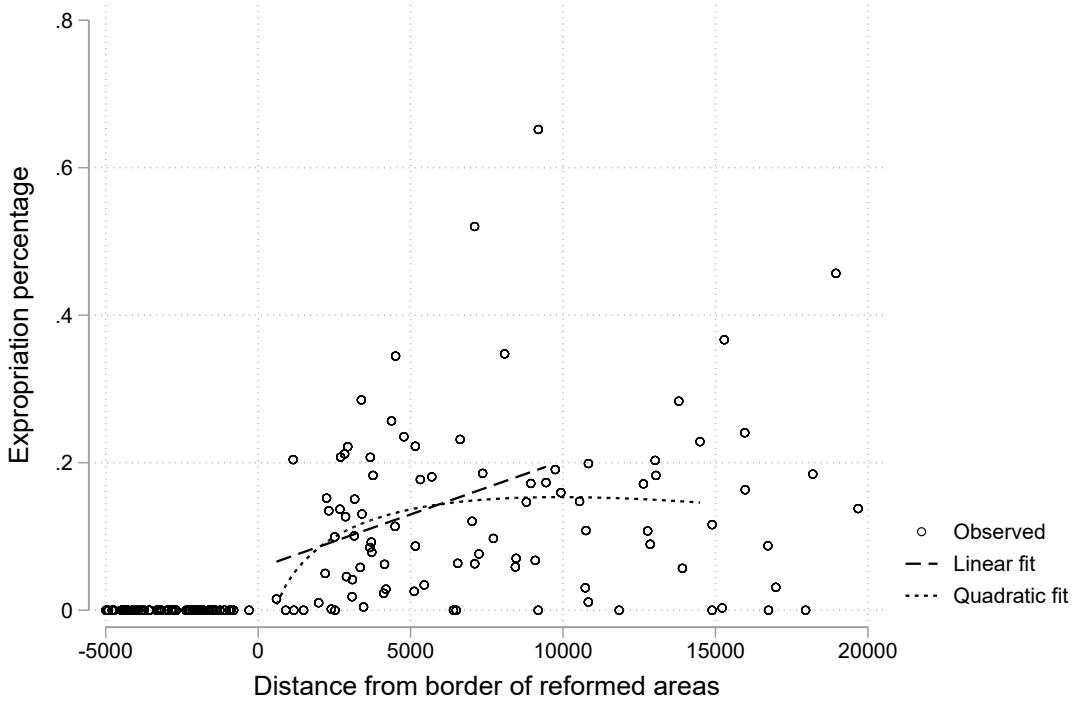
Illiteracy Rate is the share of people in the population (aged 6 or more) that is illiterate. The data are from "ottomilacensus.istat.it".

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 where part of reformed areas. Figure A5 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 **XXX**, which are shown in Table A10. 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 A5: Expropriation percentage and distance from the border of reform areas



In Table A10 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 A5. In line with state-of-the-art techniques on regression discontinuity designs **(XXX)**, 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 (expect for the case of a linear fit with

conventional standard errors, which is significant at the 10% level).

Table A10: Regression discontinuity

	Expropriation %	
	Linear	Quadratic
Distance	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.