Latifundia to Liberation: Land Reform as a Path to Female Emancipation in 1950s Italy*

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Abstract

This work explores an unexpected byproduct of land reform in 1950s Italy, a rise in female labor force participation (FLFP). Using difference-in-differences methods I show that areas experiencing land reform saw a rise in the share of women working outside the home. To control for potential endogeneity, the location of Imperial Roman colonies is introduced as a new instrument for pre-reform landholding inequalities. The work shows how the land reform affected agricultural knowledge, land property rights, and rural infrastructure, changing the agricultural sector. The work then details the mechanisms through which these changes in the agricultural sector increased FLFP.

Keywords: Female labor force participation, land inequality, land reform, Italy

JEL codes: J2, N34, N44, N54, Q15

Competing interests: The author declares none.

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1 Introduction

"To confess the truth, the latifundia (large estates) have ruined Italy"

Pliny the Elder (Naturalis Historia, about 77 AD)

When traveling throughout Southern Italy at the time of the Roman Empire, Pliny the Elder noticed how the territory was characterized by vast fields owned by rich absentee landowners. Eventually, the Roman Empire would fall, but what persisted all the way up to the 20^{th} century were the large estates known as the *latifundia* (Russo, 1999). In 1950s Italy, political unrest brought about a series of land reforms that were targeted around increasing employment opportunities for men in the agricultural sector together with new investments in agricultural infrastructure. Land was redistributed from the *Latifundia* estates to underemployed landholders to improve working conditions and keep them in employment all year. However, the present work shows that a significant byproduct of the land reforms was a rise in female labor force participation.

The finding of an effect on female labor force participation (FLFP) has important political implications for economic growth since they are interconnected. It has for example been shown that there is a larger share of women joining the labor force in countries experiencing higher growth (Tasseven, 2017). On the other hand, it might also be that a higher level of FLFP can foster growth. Furthermore, a low level of FLFP is also a significant source of income differences between countries. A vast literature studies the effects of land inequality on economic growth. However, the effect on FLFP is little studied, and the present work sheds light on this connection by asking: what effect does a change in land inequality have on FLFP?

Since land reforms can be implemented politically, it is important to understand the link between land reform, land inequality and FLFP. The specific characteristics of the Italian 1950s land reform make this case of particular interest. The reform only aimed at specific areas, resulting in local variations in the changes in land inequality throughout Italy. This variation allows me to investigate the impact of a change in land inequality on FLFP in a difference-in-differences setting including a series of control variables and fixed effects.

Furthermore, Italy is known for the "*Questione Meridionale*", an expression coined after the Italian unification in 1861 to define the differences in growth and prosperity between Northern and Southern Italy. The important implication is that, even though the reforms were implemented

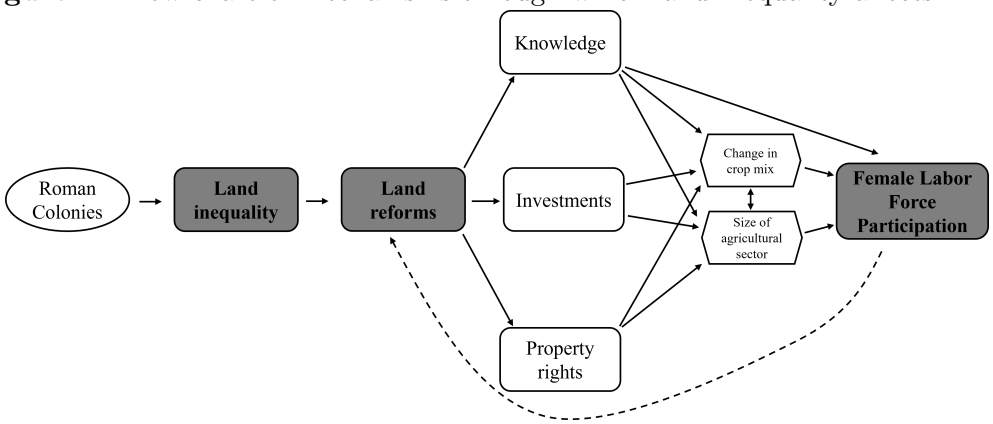
using the same criteria in all affected areas, the outcomes might differ based on the specific location. From a political perspective the results of the present paper are important since they show how a reform should be adapted to the specific social and economic context to obtain the desired effects.

By introducing a new instrument, the location of Roman colonies, this work presents a way to overcome concerns about reverse causality and estimate the causal relationship between land inequality and FLFP. I find that municipalities affected by the reform had a larger growth in FLFP rates than other municipalities, and this effect increases in the long run. The results are robust to including a series of controls such as geographic and economic variables and time and municipality fixed effects. When using the IV approach the results remain significant, and, in fact, larger in magnitude. This is consistent with prior expectations about a negative bias. The instrument is introduced to control for reverse causality, since FLFP might indirectly have had an impact on where the land reforms were enacted. One might expect that the land reform is more necessary in more backward areas, and these areas would likely also have lower FLFP. Not taking this into account would result in a negative bias. As a robustness check, I also examine the effects of the reform on male labor force participation (MLFP) and find that, even though a small effect does exist in the first decades after the reform, the effect is not long lasting.

Figure 1 illustrates the various mechanisms underlying the relationship between the land reform and FLFP rates. The high land inequality, which is explained by the location of Roman colonies, determined which areas were affected by the reform. The reform might have had an impact on knowledge and schooling. This increase could affect FLFP by increasing women's possibilities to participate on the labor market. The reform also introduced new investments in agriculture to construct new infrastructures such as irrigation systems. Finally, the reform directly affected the distribution of land, creating a new group of smaller landholders, and hence influenced property rights. All three channels could also affect FLFP indirectly through a change in the agricultural sector and a change in the crop mix. As suggested in Bianchi-Vimercati et al. (2022), the reforms increased the agricultural sector in the affected areas which could be expected to affect FLFP. Furthermore, agricultural production before the reform was considered backward and mainly focused on the production of wheat in many of the reform areas, even in locations less suited for wheat (Bonanno, 1988). A change in property rights, investments and knowledge could impact the crop mix after the reform. This could be expected since, as the owner, the new landholder could decide which crops to cultivate based on factors such as suitability, knowledge and existing markets.

Moving away from the production of wheat towards more female neutral or intensive crops would allow more women to participate on the labor market. Even if wheat or other male intensive crops were suitable, the reform increased investment in infrastructure and technology and hence modernizing the production process also allowing more women to participate.

Figure 1: Flow chart of mechanisms through which land inequality affects FLFP



Notes: This figure shows the mechanisms through which the instrument affects land inequality and the mechanisms through which the Italian land reform could affect FLFP.

In a cross-section study for the years after the reform, I find that the increase in FLFP is mainly due to an increase in the agricultural sector employing more women. The level of education also increases but the effect is not specific to women and therefore, cannot account for the increase in FLFP. It is also found that there are differences in the crop mix across different areas affected by the reform which points towards the crop mix as an additional explanation.

The remainder of the paper is organized as follows: Section 2 gives an overview of the related literature, Section 3 presents the historical background, Section 4 describes the data and the instrument, Section 5 presents the main findings, Section 6 illustrates possible mechanisms and Section 7 concludes.

2 Literature Review

The present work contribute to the literature regarding women's participation on the labor market. Throughout the last centuries, the share of women participating has increased. However, regional differences exist, and the literature has suggested explanations such as cultural beliefs regarding the role of women in society (Alesina et al., 2013; Goldin and Olivetti, 2013; Grosjean and Khattar, 2018). The origins of such cultural differences in gender norms have been attributed

to geography, in terms of women's ability to actively participate in agriculture in prehistoric times (Alesina et al., 2013) or to demographic shocks affecting the composition of sex ratios (Angrist, 2002; Fernández et al., 2004; Francis, 2011; Fernández, 2013; Carranza, 2014; Grosjean and Khattar, 2018; Boehnke and Gay, 2022). Specifically for Italy, it has been suggested that the share of women in the labor force in the agricultural sector depends on the agricultural product mix of a location (Federico and Martinelli, 2015). Other suggested factors affecting the participation of women in the labor force are the level of unemployment, female life expectancy, and their level of education (Tasseven, 2017).

For the stages of industrialization, Sinha (1967) proposed the feminization U hypothesis which has become a stylized fact in development economics (Gaddis and Klasen, 2014). During the period of structural change from a predominantly agrarian to a more industrialized economy, the evolution of the participation of women in the labor force is U-shaped. Since a large share of women were working in agriculture before industrialization, their participation in the labor force will fall once the economy transitions to the industrial sector. This process will continue until the level of education of women increases, allowing them to participate in other sectors of the economy such as the service and commercial sectors which have emerged in the meantime. Empirical evidence of the feminization U hypothesis is mixed. While some studies find that the hypothesis holds (Goldin, 1994; Durand, 1975; Mammen and Paxson, 2000; Lincove, 2008) others find more mixed results (e.g. Gaddis and Klasen, 2014; Altuzarra et al., 2019). I show that the effect also works in the opposite direction, when the agricultural sector increases due to an external chock, in this case a change in land inequality. This paper adds to the existing literature by showing that a change in land inequality has an impact on FLFP.

Second, I contribute to the vast literature about the adverse effects of inequality on economic growth. In their seminal paper, Engerman and Sokoloff (1997) argue that factor endowments of soil and climate as well as the presence of native populations, is associated with different degrees of inequality in terms of both wealth, human capital and political power. Ever since, more studies have followed trying to estimate the causal relationship between inequality and different elements of growth from levels in GDP to investments in human capital and financial development (e.g. Easterly, 2007; Vollrath, 2013b; Martinelli, 2014a; Jaremski and Fishback, 2018).

Other studies find land inequality to have a negative impact on human capital measured by spending on human capital promoting institutions (Galor et al., 2009; Vollrath, 2013a; Goñi, 2023),

school enrollment rates (Cinnirella and Hornung, 2016b), numeracy (Baten and Hippe, 2018), and math skills (Baten and Juif, 2014). These studies have in common that they find evidence that initial endowments are important. In Gray and Clark (2014) they find that the cultural rather than the physical endowments connected to land inequality are important for human capital. More recently the effect of inheritance laws has been highlighted as an explanation for the determination of land inequality (Bartels et al., 2024; Huning and Wahl, 2013; Wegge, 2021).

The present work contributes to this literature by looking at the effect on FLFP. To the best of my knowledge, this is the first to estimate the causal effect of a change in the distribution of land on FLFP. Cinnirella and Hornung (2016a) take one step in a similar direction by looking at the effect of land inequality on marriage rates in nineteenth-century Prussia. They find no evidence that marriage rates were directly affected by the landowners, however they find a significant negative effect of education on marriage rates.

Finally, this work also contributes to the literature regarding the effects of land reforms and particularly the more recent, though small, literature analyzing the Italian land reform. Land reforms often share two common goals: 1) to obtain a more equal distribution of land and 2) a higher productivity of the land (Darling, 1956). Apart from these direct effects other impacts are also possible, among others a change in the level of schooling, and they will often also be connected to economic growth. Whether the effects are as intended, depends on how the reform is defined and implemented. Banerjee and Iyer (2005) find that Indian states with higher initial land inequality had lower productivity also after land reform took place. On the other hand, Besley and Burgess (2000) find that Indian land reforms were associated with lower poverty and higher agricultural wages, even though the effect was not directly associated with the distribution of land but rather through a change in production relationships. Evidence from Korean land reform suggests a significant increase in productivity (Jeon and Y., 2000) while a land reform implemented in Peru had a negative impact on human capital accumulation (Albertus et al., 2020). In Boberg-Fazlic et al. (2022) it is found that a land reform implemented in the late 1700s in Denmark, resulted in more inequality afterwards combined with an increase in productivity in areas with a better soil quality.

About the Italian 1950s land reform, Percoco (2021) finds that the land invasions prior to the reform, were driven by both the high concentration of land ownership and the strength of the Communist party. Among the effects studied are the impact on electoral outcomes (Caprettini et al., 2021), education (Percoco, 2018), and industrialization (Bianchi-Vimercati et al., 2022). I

contribute by identifying another impact of the reform, namely on FLFP. All the studies regarding Italy have one feature in common, they only look at specific areas affected by the reform. One reason for this, is the issue about endogeneity in the treatment. Apart from having available data from both before and after the reform, to study the impact, it is necessary to have a control group and exogenous treatment. Given the motives behind the land reforms there is reason to believe that the affected areas were not entirely exogenous, which means that simple OLS might give biased results. Particularly in Southern Italy, the exogeneity of the treated areas is questionable Caprettini et al. (2021). They suggest that in the South, the reform borders were manipulated by the influential landlords who lobbied to keep their own municipality out of the reform. Therefore, another contribution of this paper is the introduction of an instrument to identify the impact of the reforms. I show that places with a larger concentration of Roman colonies are more likely to be affected by the land reform in the 1950s.

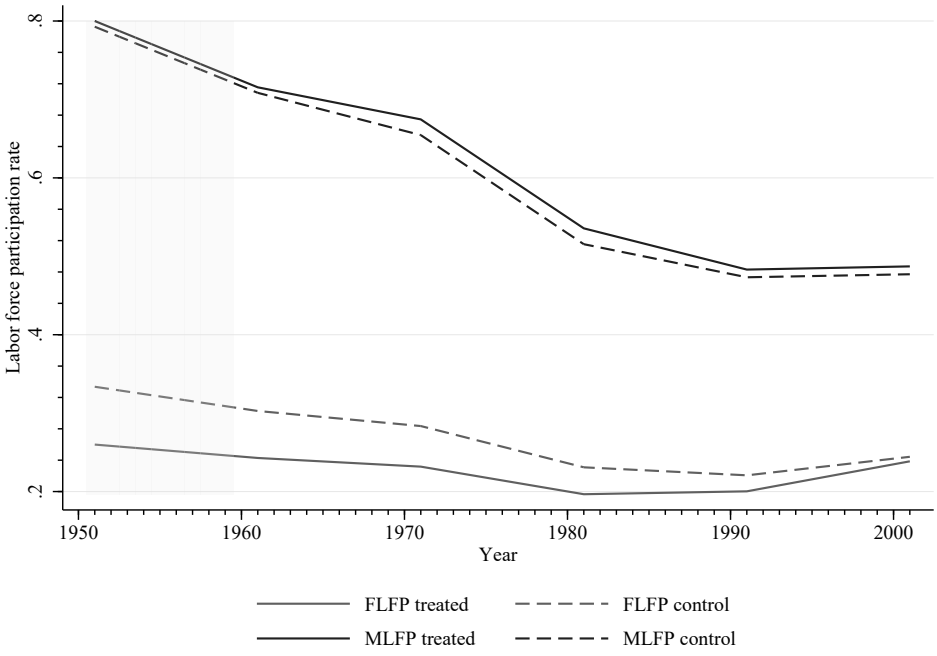
3 Historical Background

3.1 Italian Women on the Labor Market

To understand the changes in FLFP it is important to get an understanding of Italian women's participation on the labor market. Figure 2 shows the evolution of both FLFP and MLFP for the period 1951-2001. From Figure 2, it clearly appears how FLFP is substantially lower than MLFP. Indeed, labor force participation rates of Italian women are among the lowest in OECD countries and the participation gap between men and women is among the highest in high-income countries (Mancini, 2018). Furthermore, there are some clear differences between the areas included in the land reform and the rest of Italy. From Figure 2 the FLFP rates also exhibit a U-shape, consistent with the feminization U hypothesis with a decrease from around 1950 to 1980 representing the initial phases of industrialization in Italy. The subsequent increase can be explained in part by the later stages of industrialization where women return to the labor market. Furthermore, there are several important legislative milestones in the 1960s and 1970s which could also have contributed. Among the most important are the divorce and abortion laws, but also others such as the reform of family law, the abolition of protective employment legislation and the introduction of public childcare (Mancini, 2018). Cultural norms, social policies and family formation patterns have also been highlighted as being fundamental in shaping Italian women's participation on the labor market

(see e.g. Mancini, 2018; Saraceno, 2003; Del Boca and Giraldo, 2013; Alesina and Ichino, 2010).

Figure 2: Labor force participation rates in Italy 1951-2001



Notes: This figure shows the evolution of the average labor force participation rates for men and women and for treated and control areas. The shaded area indicates the timing when the land reform was being implemented. *Source:* ISTAT population censuses.

Finally, there is a discussion in the literature regarding the possible underestimation of FLFP rates both in Italy and elsewhere. This could potentially affect my results and hence deserves a discussion. FLFP rates depend crucially on how women are classified as working, and a well-defined set of productive activities are required to obtain reliable estimates (Vitali, 1970). This can especially be an issue if women work from home, which is common in Italy. Vitali (1970) presents revised estimates of FLFP rates in Italy from unification in 1861 to 1961, while Mancini (2018) extends the work to cover later years. Both authors find that census estimates tend to underestimate actual participation of women on the labor market. The underestimation could bias my results if specific to some places or years, even though this is hard to verify. In case under-reporting is more pronounced in treated areas my results could overestimate the true effect. However, given the magnitude of my results, it is likely that there would still be a significant effect. If instead underestimation is random in my sample, my findings will be valid. Importantly the underestimation is also less pronounced from 1951 and onward, indicating that the period covered in the present analysis is less affected by this issue (see Mancini, 2018).

3.2 Agrarian Italy and the Origins of the Latifundia

In this subsection I explore the historical origins of the *latifundia* to understand the link between these and the areas affected by the 1950s land reform. Up until the 1950s, Italy was still predominantly a rural economy with, on average, more than half of the labor force engaged in agriculture (Felice, 2018). Broadly, three different tenure systems were in use (Mariella, 2022). In the Po Valley in Northern Italy agriculture was characterized by being intensive with tenants producing systematically for the market and often relying on wage laborers. Landowner and wage workers lived together close to the land they were cultivating. In central and northeastern Italy sharecropping dominated, with medium-small farms located on hills and mountains. In Southern Italy, the *latifundia* dominated and the event of the land reform in the 1950s in Italy is closely connected to their existence even though the reform also affected the other tenure systems. Latifundium can be defined as land held by absentee owners, cultivated by seasonal workers on large estates or by sharecroppers on small strips characterized by lack of investment and low productivity (Russo, 1999).

The origins of the Italian *latifundia* goes back to ancient Rome during the period of colonization (Russo, 1999, see. e.g.). The Roman expansion happened through the establishment of colonies which were created by expropriating land from the conquered peoples and sending Roman citizens to establish a new settlement. Originally, the expropriated land belonged to the Roman people and was intended to be cultivated by the Roman farmer-soldiers. Continuous warfare brought the Roman state into debt and land was sold out to wealthy individuals. The resulting estate owners did not actually live on the *latifundia* estate, but instead delegated the work to stewards with labor mainly provided by enslaved or alternatively by peasants or colonists (Roudart and Mazoyer, 2015). One purpose of the large estates was to cultivate grain, needed to feed the Romans. Hence, in some cases, the location of the colony is closely connected to wheat suitability even though a more recent literature shows that the motives behind the location of a colony cannot be standardized, but depend on many different factors (Stek, 2018).

By taking refuge in their villas, many of the large estate owners managed to escape during the troubled times at the end of the Roman Empire and a new social order was created around them, the agrotown (Russo, 1999). In an agrotown the majority of the inhabitants work the land and it lacks many of the urban functions and the industrial or commercial character. The only houses located outside the town would be the large estates (masserie) belonging to the landed elite, i.e.

the *latifundia*. Archaeological evidence suggests that the locations of these masserie were the same as the locations of the Roman villas around which the colonies were built (Curtis, 2012, 2013). This illustrates 1) the connection between colonies and *latifundia* and 2) the persistence of the location of the *latifundia* estates throughout many centuries characterized by huge political and institutional changes and several invasions. Another characteristic feature of the agrotown was the long distances the laborers living in the town would have to cover to reach the countryside where they worked. This created an aversion for the land among the workers who preferred urban life (Curtis, 2012; Blok, 1969). Finally, evidence suggests that inequality in areas characterized by the presence of agrotowns was larger than that of rural communities already in 1753 and likely earlier (Curtis, 2012).

One can ask, how did the institution of the *latifundia* last for more than two millennia? It has been suggested that since Southern Italy has a hot and dry climate which lacks the principal sources of energy for medieval and early modern times, they were a technically rational solution (Russo, 1999).

Furthermore, the *latifondisti* managed to stay competitive on the international market since they could convert production in a very short time according to market prices of grain and pastoral products (Russo, 1999). Keeping the unskilled work force in the agrotowns at their total disposal and with no other opportunities they obtained market power which was still significant right before the land reform (Martinelli, 2014a).Martinelli (2014a) also concludes that the *latifundia* may have had an impact on the Italian regional disparities.

3.3 The 1950s Land Reform

Land reform in Italy had been on the agenda for several decades before the reform of the 1950s but most attempts did not lead to the necessary redistribution. At the end of World War II, the inefficient production and the poor conditions of the peasants culminated in a series of demonstrations and occupations of uncultivated land owned by the large landowners. In the north and center the peasants asked for higher wages, renegotiation of the share-cropping contracts and more investments in the land. In the south the struggle was more intense, and the peasants saw the large landowners as their main enemy and responsible for their precarious conditions and deprivation of land.

In large part, the demonstrations were organized by the Italian Communist Party (PCI),

even though the peasants also supported other political forces, primarily the governing Christian Democracy party (DC). In 1944 the Legge Gullo (Gullo Law) was passed allowing peasants to acquire land belonging to uncultivated *latifundia*. A larger amount of land was assigned thanks to this law, even though in practice, most of the redistribution was a mere ratification. It was only during 1950 that the Christian Democracy really took action and presented a law regulating land ownership all over Italy (N. 977/1950). This proposal suggested which areas were in need of agricultural investment, a more equal distribution of land, and higher productivity. The areas were determined with the help of agricultural technical consultants who elaborated detailed reports on the exact needs. The proposal was not passed but already later the same year a new law (Legge Stralcio) was presented and passed (N. 841/1950). Two separate laws were passed for the expropriation in Calabria in Southern Italy and for Sicily. The final areas included in the reform differed slightly from the initial proposal, especially in Southern Italy. This is also one of the reasons why an instrumental variables approach is needed to investigate the effects of the reform. The criterion used for expropriation was based on a combination of taxable income and size to take into consideration the differences in quality of the expropriated land (Darling, 1956). Around 18% of agricultural land was expropriated in the North and around 13% in the south (Marciani, 1966). The beneficiaries of the expropriated land were chosen based on specific criteria such as being landless farmer/agricultural worker or sharecropper and priority was given to those living in the areas affected by the reform (Percoco, 2021).

The expropriated land had to be allocated to the beneficiaries within three years and repayment took place with a thirty-year loan and they could not sell the assigned plot of land before repayment. As a result of the reform, about 133,000 families had received a plot of land (Bonanno, 1988). The newly created farms varied greatly in size, due to the large number of applicants and the type of plot given, with the smallest being between 2-5 hectares and the larger between 8-15 hectares. The larger plots were intended to be large enough in size to support a family while the smaller were intended to give existing under-employed farmers more employment and better living conditions (Darling, 1956). To carry out the expropriation, reform agencies were created in different zones of the country. These agencies were also meant to help the new owners organize themselves in cooperatives providing the high-cost equipment and infrastructure (Bandini, 1952). Finally, to help the beneficiaries adapt to the new conditions numerous courses of education were provided. They spanned from general classes for reading and writing to more specialized courses in agricultural techniques. The latter two features of the reform are highly relevant to my analysis, as they both

can be considered to be channels through which the reform increased FLFP.

4 Data and Instrument

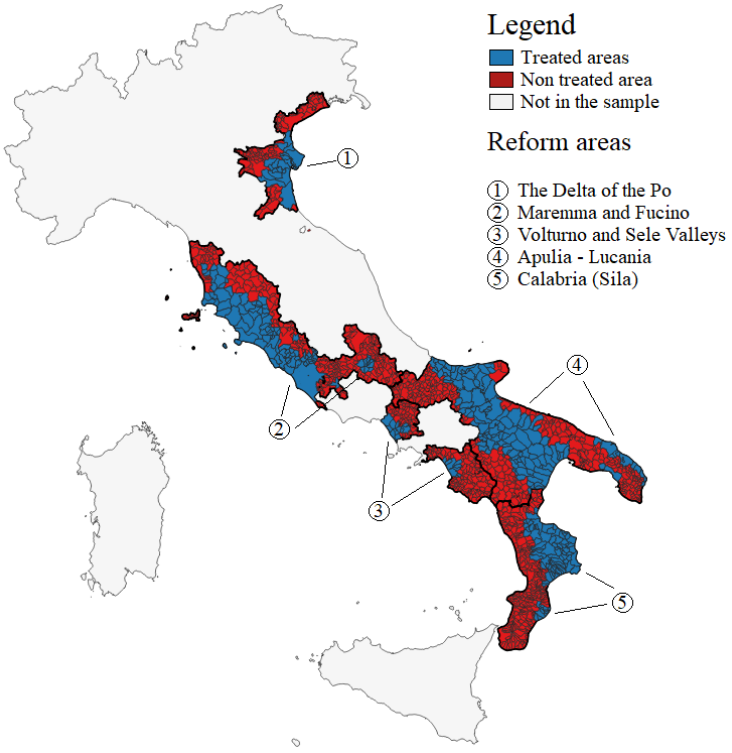
4.1 Data

To estimate the impact of the reform on FLFP, I collect data at the municipality level from various sources. A complete explanation of the variables included in the analysis can be found in Appendix B, while Table A1 in Appendix A shows summary statistics for the variables included. Given that I am using data for different years starting in the 1920s, the municipality borders have been harmonized to reflect the 1951 borders, representing the borders existing when the reform was implemented. In some cases, however, a municipality that existed in the 1920s was split into more municipalities before 1951. This means that in the 1951 data, two or more municipalities exist, while before only one. To avoid splitting the municipalities, with the risk of assigning misleading weights, the pre-1951 borders have been used in these cases. Figure 3 illustrates the sample used in the analysis together with an indication whether a municipality was included in the reform or not. Even though the reform also affected the two islands of Sardinia and Sicily they are not included in my sample, since all municipalities here were affected and hence no control group exists. The reform area is divided into five different zones: 1) Delta of the Po, 2) Maremma and Fucino, 3) Volturno and Sele Valleys, 4) Apulia-Lucania and 5) Sila. I will exploit the division into these zones, which were directly defined by the law, in the analysis to show the differential effects for different zones. Since the reform only took place in some areas of Italy, I only include municipalities belonging to provinces in which at least one municipality was included in the reform. Even though the empirical strategy would allow to include all municipalities in Italy, similarly to Bianchi-Vimercati et al. (2022) I constrain my sample in the analysis given regional differences. By restricting the sample, I assure to have a control group more similar to the treated municipalities.

Female labor force participation

My main outcome of interest is the FLFP rate which has been collected from the Italian statistics office ISTAT for the years 1951-2001 at each decadal population census for each municipality. This variable represents the number of women between 15 and 69 years actively participating in the labor force over the total number of women between 15 and 69 years of age living in a municipality.

Figure 3: Municipalities included in the analysis



Notes: The map shows the municipalities included in the sample. Blue municipalities were included in the reform, while the red ones were not. The bold black lines indicate to which zone the municipalities belong.

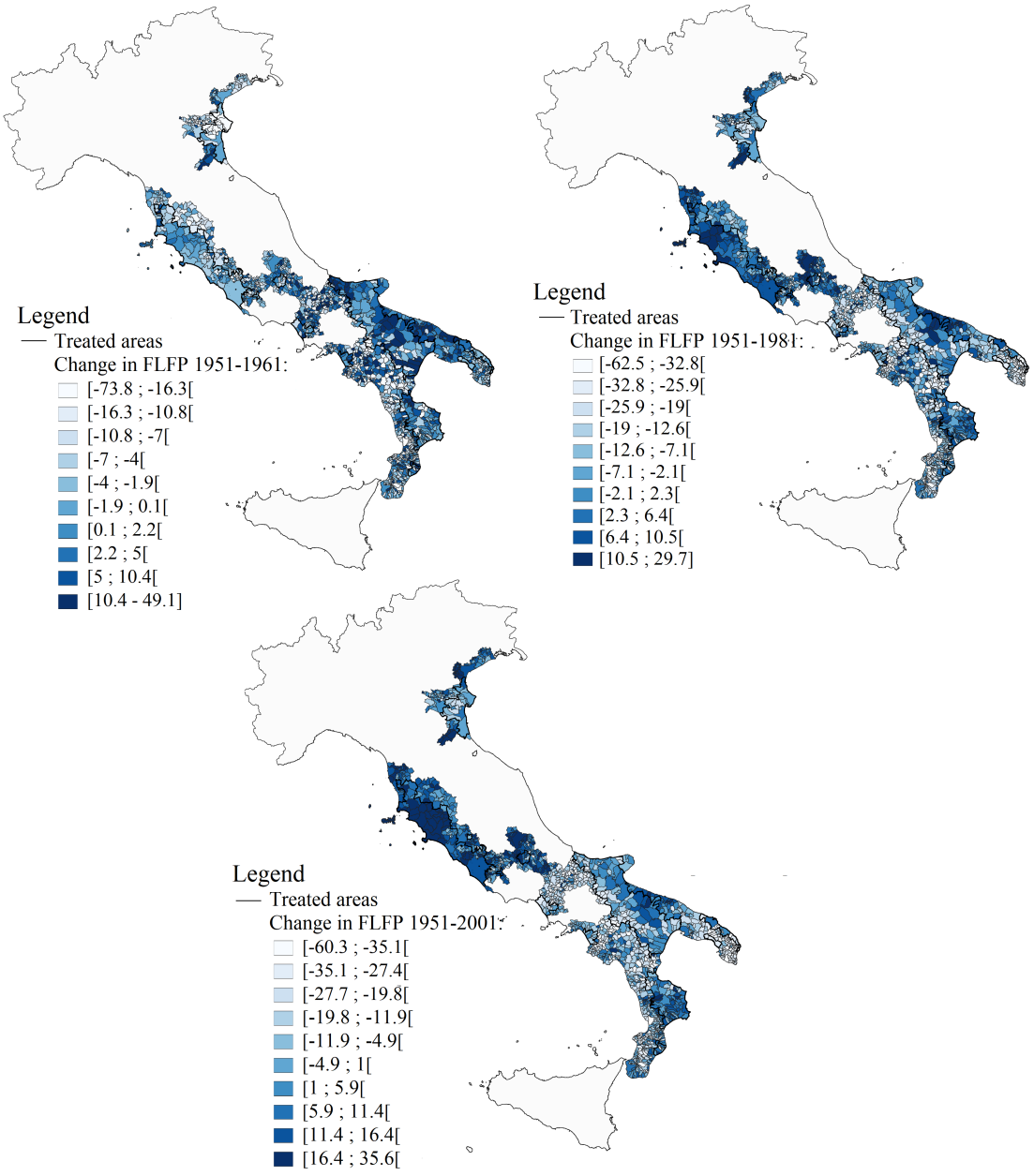
To perform a robustness check, I have also collected the same information for men for the same years.

Figure 4 shows three maps of the change in FLFP for three different periods: 1951-1961, 1951-1981 and 1951-2001. Especially for the later periods, Figure 4 reveals that the changes appear to be larger in the affected municipalities.

Treatment and measure of inequality

As explained in Section 3, not all municipalities were affected by the reform and I have therefore a dummy variable equal to one if a municipality was included in the reform. This variable has been collected by Caprettini et al. (2021) and is taken directly from the executive orders enacting the land reform. To obtain variation within the treated municipalities I combine this dummy with information about the distribution of land from before and after. With this information, I can compute the change in the land concentration and show not only the effect of being treated but also the intensity of treatment. Municipalities with a greater change in the concentration of land

Figure 4: Change in FLFP rates



Notes: The three maps show the change in the FLFP rates between 1951-1961, 1951-1981 and 1951-200. Darker blues indicate larger changes. The bold lines represent the borders of the treated areas. *Source:* Own calculations based on ISTAT population censuses.

can be said to be more affected by the reform.

Generally, two types of land inequality can be considered, namely owner inequality and operational inequality, each of which can be best suited for different purposes. The first type of inequality considers the distribution of property while the latter considers how the land is actually operated

and hence takes into account also tenants, sharecroppers and others. For the purpose of the analysis conducted in this paper, owner inequality would be best suited to take into account the redistribution. However, the available data only allows me to look at operational inequality, which can be seen as a lower limit estimate of the effect on FLFP.[1]

To measure operational land inequality, I compute the Theil index using data from the agricultural censuses of 1930 and 1971 conducted by ISTAT. In these two censuses the number and size of farms for different size categories at the municipality level is given and I use this information to compute the Theil index. Another agricultural census was conducted in 1961 which is closer to the timing of the reform, however, this census does not include information about the number and size of farms at the municipality level. Therefore, I digitize the 1971 agricultural census instead. As mentioned in Section 3, one of the criteria for obtaining a plot of land was that this could not be sold for the first 30 years and consequently, the distribution in 1971 should be representative of after. The Theil index as a measure of inequality exhibits two analytic desirable properties. The first is that it satisfies the strong principle of transfers, which means that redistributing from one individual to a poorer one leads to a decline in the Theil index proportional to the absolute distances between the individuals. Since I am concerned with a change in the Theil index, this property is especially important. The second property is that the Theil index ranks unambiguously, which is not the case with the more popular Gini index.

The Theil index is calculated using the following formula:

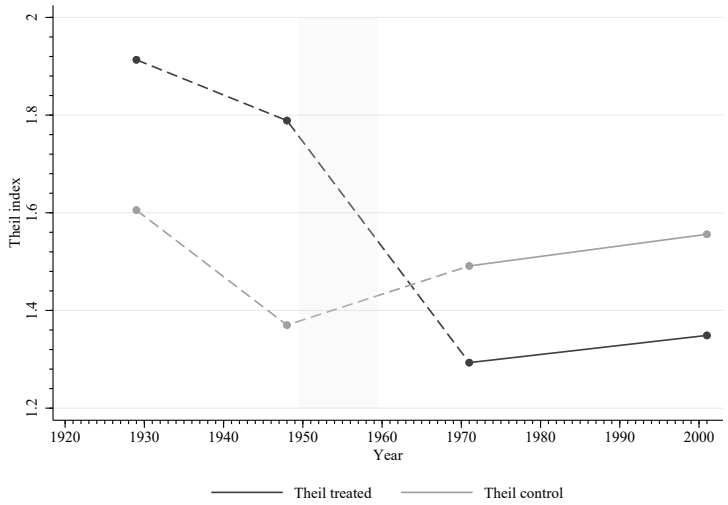
$$T_i = \frac{1}{N_i} \times \sum_{j=1}^{N_i} \left[N_{ij} \times \frac{x_{ij}}{\mu_i} \times ln\left(\frac{x_{ij}}{\mu_i}\right) \right] \tag{1}$$

for municipality i and size category of farms j. N_i is the total number of farms in municipality i, N_{ij} is the number of farms in size category j in parish i, x_{ij} is the average size of farms in hectare for size category j, and μ_i is the total average size of farms in municipality i. If all farms are of equal size, the Theil index equals zero while maximum inequality is given by $ln(N_i)$. Figure 5 shows the evolution of the Theil index over the period 1930-2000 for treated and control municipalities. The first part of the graph is dashed to indicate that the data used to compute the Theil index in 1948 come from Medici (1948) and, apart from representing owner inequality, it is computed using

[1] A larger investigation about property in Italy is available from Medici (1948). From this it would be possible to compute owner inequality of the land. However, this investigation only covers 1948 and it it therefore not possible to compute the change from before and after the reform.

the value of land instead of the size. This observation can therefore not be compared directly to the other points that have been computed using data from the agricultural censuses of 1930, 1971 and 2000 and consider operational inequality. The extra observation has been included to better illustrate that the land distribution followed similar trends before the reform although at different levels.

Figure 5: Theil index between 1930 and 2000



Notes: The evolution of the average Theil index for treated and control municipalities between 1930 and 2000. The shaded area indicates the timing when the reform being implemented. *Source:* For the years 1930, 1971 and 2000 data are from the Agricultural censuses conducted by ISTAT. For the year 1948 the data is from Medici (1948).

From Figure 5 it is clear that before the reform, the concentration of land was larger in the municipalities affected by the reform while it drastically decreased in the treated municipalities immediately after. Moreover, in both the years before and after, the evolution is similar in both treated and control municipalities.

Other variables

In most specifications I include a series of controls that can be correlated with my outcome of interest and most of which are used elsewhere in the literature regarding Italy (see e.g. Bianchi-Vimercati et al., 2022; Carillo, 2021; Caprettini et al., 2021). I include the Theil index of land inequality from 1930 to control for initial levels of inequality. I also include a series of geographic controls, which are closely connected with the location of the *latifundia*, agriculture and economic growth. I compute the average suitability for wheat using the soil suitability for growing wheat using low levels of input

as measured by the Food and Agriculture Organization FAO (2015). Other geographical variables included are the distance to waterways, the distance to the nearest big city and ruggedness. I also include the length of Roman roads present in each municipality. I also control for two other contemporary policies which could have impacted FLFP on their own. First, in Italy Malaria was eradicated only in the 1940s through an eradication program. Therefore, following the literature, I control for the presence of historical Malaria. Second, I include information about the *Piano Casa* which was another contemporary policy regarding housing projects, for which information has been collected by Caprettini et al. (2021). This represents the total number of houses built under this policy divided by 100000 inhabitants. Finally, the following economic variables are included: share of population working in agriculture in 1951, literacy rates in 1921 and the sex ratio in 1951. The share of population working in agriculture is included to control for the initial structure of the economy while the literacy rate in 1921 is included to capture initial levels of human capital. Finally, the sex ratio is considered important for FLFP rates, given that a smaller number of men with respect to women can cause more women to work.[2]

Pre-trends in the female labor force participation rate

The identification of an impact from the reform on FLFP rates relies on the common trends assumption. This implies that the growth of FLFP rates in treated and control municipalities should follow similar trends before the reform. Since I have only one observation from before the reform was implemented, I cannot test this assumption directly. Instead, I conduct a balance test on other variables to show that there were no other systematic differences in the means between the two groups of municipalities before the reform. Furthermore, given that FLFP is connected with the size of the agricultural sector and education, I also show that the pre-trends in the share of employed in agriculture and literacy rates are not statistically different from one another. Finally, I show that the pre-trend in the Theil index is also not statistically different in treated and control municipalities.

Table 1 shows the comparison of means for all the included control variables while Table 2 shows the balance in pre-trends for the Theil index, literacy rates and share of agricultural workers.

[2]Other regressions including the ratio "share in industry/share in agriculture" which should capture structural change have also been estimated, with very similar results.

Table 1: Balance before the reform for control variables

Variable	Treatment	Observations	Mean	Sd	z-statistic (p-values)
Literacy in 1921	Treated	316	0.543	0.143	0.715 (0.475)
	Control	1153	0.549	0.154	
Employed in agriculture in 1951	Treated	348	0.696	0.161	-1.000 (0.317)
	Control	1226	0.686	0.180	
Ruggedness	Treated	336	113.933	94.238	3.778 (0.001)
	Control	1188	136.999	113.604	
Distance to water	Treated	336	8.329	10.113	2.908 (0.003)
	Control	1188	10.406	15.623	
Theil index in 1930	Treated	348	1.913	0.810	-5.683 (0.000)
	Control	1223	1.605	1.133	
Wheat suitability	Treated	348	4.499	1.408	5.635 (0.000)
	Control	1227	5.008	1.745	
Piano Casa houses	Treated	348	12.198	105.114	-1.174 (0.240)
	Control	1226	5.100	76.589	
Malaria dummy	Treated	336	0.747	0.435	-8.951 (0.000)
	Control	1189	0.498	0.500	
Distance to nearest city	Treated	336	163.279	91.622	-0.925 (0.355)
	Control	1189	157.992	95.730	
Roman roads in meters	Treated	346	949.114	4419.401	0.899 (0.369)
	Control	1223	1232.965	7267.847	
Sex ratio in 1951	Treated	1226	1.001	4.359	-9.818 (0.000)
	Control	348	0.969	0.078	

Notes: z-statistics are computed assuming known variances. p-values in parentheses. H_0 is that the means are equal.

Table 2: Pre-trends in related variables

	Control mean	β
Pre-trends in Theil index 1930-1948	0.235	-0.115 (0.071)
Pre-trends in literacy rates 1921-1951	0.220	-0.006 (0.006)
Pre-trends in the share of agricultural workers 1936-1951	-0.018	0.007 (0.015)

Notes: β is the coefficient of an OLS of treatment on each of the three outcome variables. Pre-trends are computed as the difference between the two indicated years. Robust standard errors clustered at the municipality level in parentheses.

Even though some of the variables in Table 1 do exhibit statistically different means this is mainly the case for the geographical variables. This is not surprising, since the location of the *latifundia* has been shown to be correlated with geographical factors and they can therefore be said to be directly connected with the location of the treated areas. In my preferred specifications the

geographical variables are always controlled for. More importantly, I find no evidence of pre-trends in Table 2, which is reassuring. Furthermore, the difference in *Piano Casa* houses is also not statistically different from zero, which means that both treated and control municipalities were impacted similarly by this contemporary policy.

4.2 Roman Colonies and the Instrument

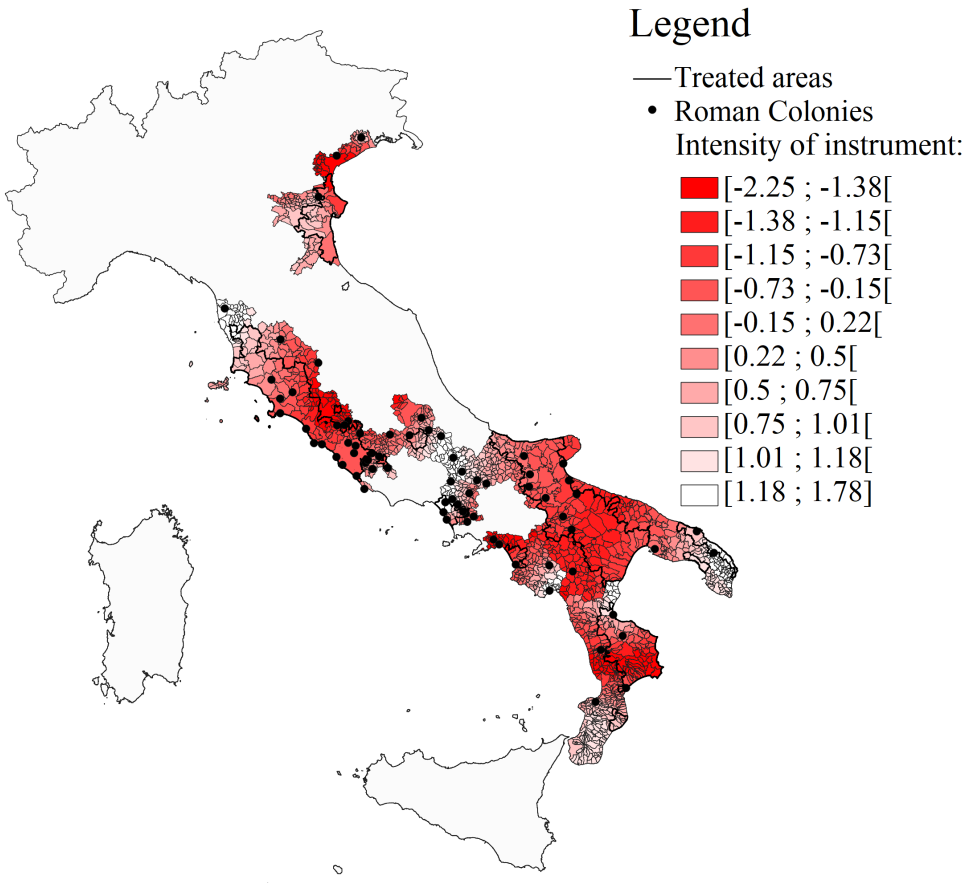
Given that the municipalities included in the reform are not randomly chosen but selected based on different characteristics from political to geographic, there is reason to believe that simple OLS estimates would give biased results. As stated in Caprettini et al. (2021) in Northern and Central Italy the inclusion of a municipality in the reform was based mainly on observable and technical characteristics. Originally this would also be the case for Southern Italy. However, there is evidence that more municipalities in the south were included for political reasons or excluded because of lobbying (Caprettini et al., 2021). Therefore, to be able also to include Southern Italy in the analysis, I introduce an instrument to identify the causal impact.

From the historical account presented in Section 3, the connection between the Roman colonies, the *latifundia* and the land reform in the 1950s should be clear (*latifundia* existed in areas of former Roman colonies and hence would be included in the reform). This gives me an instrument that is uncorrelated with my outcome of interest and should satisfy the exclusion restriction. I start from a map with the location of Roman colonies created by Hanson (2016a,b). The map includes all colonies from the Kingdom to the Empire and therefore covers a period from 773 BC to 106 AD. This is combined with my map of municipalities for which I identify the centroid using GIS software. For each zone, as showed in Figure 3, I compute the standard deviation of the distances to all colonies in that zone. The smaller the standard deviation the closer is a municipality to all colonies in the zone and hence the more likely it is that the municipality was included in the land reform. I do it separately for each zone, given differences in the size of the zones. Furthermore, geographical conditions make it reasonable to use the division of the zones since Italy is divided by mountains all the way from the south to the northern plains and the zones follow this division closely. This means that, even though some colonies right outside a zone are close to a municipality, it might not have had an influence since they are divided by mountains. As a robustness check I also create alternative instruments.[3] To have a comparable measure for each zone, I standardize

[3]The results using the alternative instruments can be seen in Figure A1 in Appendix A. The main results are largely unchanged.

the values to have zero mean and a standard deviation of one. Figure 6 shows a map with the location of the colonies together with the instrument *stddev_colony*.

Figure 6: Location of Roman colonies and the instrument



Notes: Each black dot represents the location of a Roman colony. The black lines represent the borders of the municipalities included in the reform. The Red colors show the intensity of the standard deviation of the distance from a municipality to all colonies within a zone. Darker reds indicate a higher concentration of colonies. *Source:* The location of Roman colonies is taken from Hanson (2016a,b).

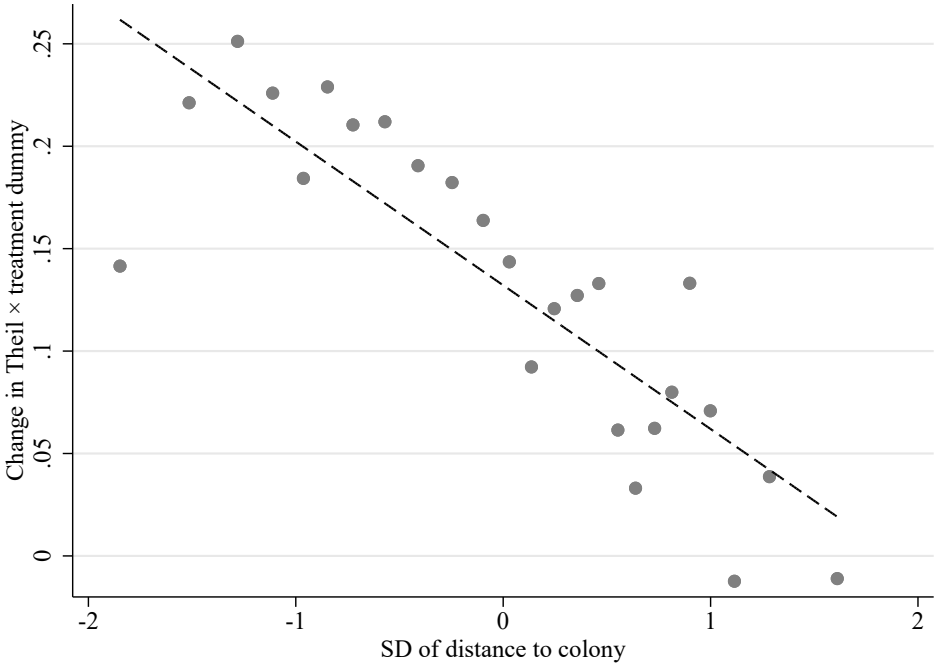
Figure 7 shows relationship between the instrument, *stddev_colony*, and the Theil index interacted with the treatment dummy.

5 Analysis

5.1 Regression Results

I investigate the effect of the reform on FLFP using a difference-in-differences approach. Here the identification comes from the relative change in FLFP across municipalities included or not

Figure 7: First stage relationship between a change in the Theil index interacted with treatment and the standard deviation of distance to Roman colonies



Notes: This figure (binned scatter plot) illustrates the first-stage relationship between a change in the Theil index interacted with the treatment dummy and the standardized values of the standard deviation of distance to Roman colonies. In the figure the following control variables are included: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters.

in the reform and with varying level of inequality measured by the Theil index. In the baseline specification the following is estimated:

$$FLFP_{it} = \beta treatment_i \times post_t + X'_{it}\Gamma + \gamma_i + \theta_z + \delta_t + \varepsilon_{it} \tag{2}$$

where $FLFP_{it}$ is the FLFP rate in municipality i in year t, $treatment_i$ is either a dummy equal to one for treated municipalities or the interaction between the treatment dummy and the change in the Theil index in municipality i and $post_t$ is a dummy equal to one for the years after the reform. γ_i are municipality fixed effects controlling for time invariant characteristics of a municipality, θ_z represent zone fixed effects and δ_t are year fixed effects controlling for time varying unobserved characteristics that are constant across municipalities. The specification also includes a set of controls X'_{it} and ε_{it} is the error term.

The coefficient of interest is β which can be interpreted as the change in percentage points of

the FLFP rate in areas affected by the reform and with a one-unit higher change in the Theil index.

Because of the issues with endogeneity in the treatment the following IV specification is also estimated:

First stage:

$$treatment_i = \alpha \times stddev\_colony_i + X'_{it}\Gamma + \gamma_i + \theta_z + \delta_t + \varepsilon_{it} \tag{3}$$

Second stage:

$$FLFP_{it} = \beta \left(\widehat{treatment_i} \right) \times post_t + X'_{it}\Gamma + \gamma_i + \theta_z + \delta_t + \varepsilon_{it} \tag{4}$$

where $stddev\_colony_i$ is the standard deviation of the distance to all colonies in the zone containing municipality i and the rest is defined as in equation 2.

I also use event study regressions to evaluate the effect. This approach has the advantage that the effect on the treated municipalities is allowed to differ each decade. If the common trends assumption holds, the effect should be insignificant before the reform and significant afterwards. In the flexible estimation 1961 is used as the omitted year of comparison. This has been chosen since it is the observation closest to full implementation of the reform. The event study regression takes the following form:

$$FLFP_{it} = \sum_{t=1951}^{2001} \beta_t treatment_i \times I_t + X'_{it}\Gamma + \gamma_i + \theta_z + \delta_t + \varepsilon_{it} \tag{5}$$

where $treatment_i$ is interacted with a full set of time fixed effects $\sum I_t$. Here β_t can be interpreted as the effect of treatment on the change in FLFP rates from 1961 to period t. For example, larger positive values of β_t after 1961 indicate that treated municipalities had larger positive changes in FLFP rates than the control municipalities. Equation 5 is also estimated using equation 3 in the first stage, and this represents the preferred specification.

The results when estimating equation 3 and using either the intensity measure or the treatment dummy can be seen in Table 3. Since the aim here is to understand the effect of a change in inequality on FLFP, in what follows, the preferred specification is the one using the intensity measure. This measure also has the advantage of exhibiting more variation within the treated

municipalities. When looking at the mechanisms, it is the treatment dummy which is used since I there only want to see if the treated municipalities are different after the reform. Therefore, as a comparison, the specification using the treatment dummy is also included in this section. Columns 1 and 3 in Table 3 show the results when no controls are included while columns 2 and 4 include a full set of controls. The instrument is quite strong and shows that a smaller standard deviation of the distances to colonies implies that it is more likely to be included in the reform and to have a bigger change in the distribution of land. For example, in column 2 a one standard deviation decrease in the instrument implies a 0.070 higher change in the Theil index or, in other words, a 14% higher change in the Theil index around the mean.

Table 3: Power of instrument (first stage regressions)

Dependent variable is:	(1) *theil* × *treat*	(2) *theil* × *treat*	(3) Treatment dummy	(4) Treatment dummy
stddev_colony	-0.077***	-0.070***	-0.097***	-0.074***
	(0.012)	(0.011)	(0.010)	(0.010)
Zone FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Adj R^2	0.032	0.233	0.073	0.204
K-P F-statistic	43.71	42.09	88.33	51.09
No. observations	1469	1469	1469	8814

Notes: Robust standard errors in parentheses. Columns 1-2 show the results when using the change in the Theil index as the outcome of interest and columns 3-4 when using the treatment dummy. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

The results when estimating equations 2-4, with and without controls included, can be seen in Table 4, where Panel A uses the preferred specification with the intensity measure and Panel B uses the treatment dummy as the explanatory variable. In all specifications the effect of the reform on FLFP is positive and highly significant. The results when using the two different measures for treatment are also very similar in magnitude. In the IV specifications the effect is bigger in magnitude but still highly significant. This is consistent with the expectations that the OLS estimates would be biased downwards due to reverse causality. Panel A column 4 indicates that a 10 percent increase in the change in the Theil index for a treated municipality implies approximately a 2 percentage points higher change in the FLFP rate. Using the treatment dummy yields similar results.

The results when estimating equations 2-4 separately for each zone can be seen in Tables A2

Table 4: Effect of the reform on FLFP for full sample using simple difference-in-differences

	(1) FE	(2) FE	(3) IV	(4) IV
		Panel A		
post × *theil_treat*	0.027***	0.020***	0.343***	0.261***
	(0.007)	(0.006)	(0.066)	(0.061)
Zone FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Within R^2	0.408	0.524	0.117	0.391
No. observations	8814	8814	8814	8814
No. clusters	1469	1469	1469	1469
		Panel B		
post × *dummy*	0.040***	0.028***	0.274***	0.245***
	(0.008)	(0.007)	(0.044)	(0.055)
Zone FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Within R^2	0.410	0.525	0.272	0.427
No. observations	8814	8814	8814	8814
No. clusters	1469	1469	1469	1469

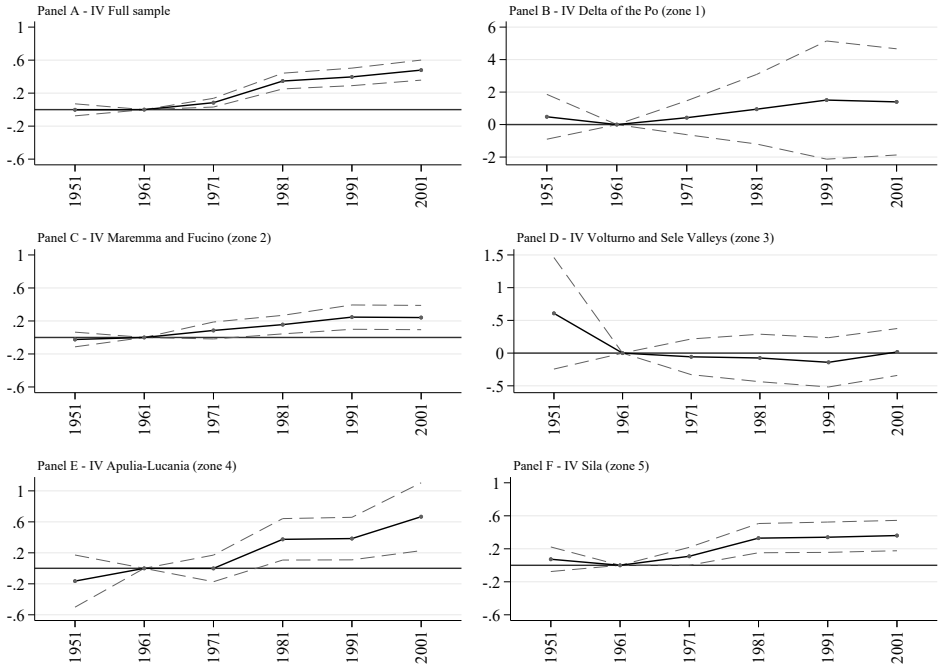
Notes: Robust standard errors clustered at the municipality level in parentheses. Panel A shows the results when using the change in the Theil index as explanatory variable and Panel B when using the treatment dummy. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, sex ratio in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. Columns 3-4 show results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone as instrument. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

and A3 in Appendix A and show that the effects differ between areas.

I next turn to the event study estimating equation 5. The detailed results can be seen in Tables A4-A6 in Appendix A. Figure 8 shows the preferred specification using the IV approach and the intensity of treatment as the explanatory variable.

Panel A in Figure 8 presents the results using the entire sample, while Panels B-F show the results for individual zones. From Panel A it clearly appears that there is a positive effect on FLFP after the reform in the affected areas. Reassuringly, the estimate for 1951 is not statistically different from zero in any of the panels, indicating that there are no pre-trends. For the full sample, the effect is statistically significant from 1971 and onwards and it is also increasing in magnitude. The estimates range from 0.104 in 1970 to 0.556 in 2001, indicating that the change in FLFP rates is between 1 and 3 percentage points higher in treated municipalities given a 10 percent change

Figure 8: IV estimates from event study of the effect of the reform on FLFP using treatment intensity



Notes: This figure shows the dynamic effects of the reform on FLFP rates using equation 5 and instrumenting treatment intensity with *stddev_colony*. Panel A shows the effects using the entire sample, while panels B to F show the results for each individual zone. The base year is 1961 and the error bars show $p < 0.10$ based on robust standard errors clustered at the municipality level. All regressions include year, municipality and zone fixed effects together with the following controls: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, piano casa 1957, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. Panels A, C, E and F share a common y-axis while Panels B and D due to very large standard errors do not follow the same.

in the Theil index. Turning to the individual zones, the effect of the reform is again not uniform throughout the zones. In Central Italy (zone 3) and two zones in Southern Italy (zones 4 and 5) the effect is similar to the overall effect both in significance and magnitude. For Northern Italy (zone 1) and zone 3 in Southern Italy the effect is not statistically different from zero and the standard errors are quite large. This indicates that the reform, even though implemented using the same rules, did not have uniform effects in all areas, which from a political point of view is interesting. I will return to this differential effect between zones in the discussion in Section 6.

5.2 Robustness Checks

I perform two different robustness checks. The first is to look at MLFP, to see if the effects are similar for men. If this is the case, the estimated effect on FLFP would simply reflect an overall

increase of the labor force participation and not be specific to women. I estimate equation 5 using MLFP as the outcome variable. The results can be seen in Tables A7 and A8 in Appendix A when using intensity of treatment as the explanatory variable. Reassuringly, the effect is hardly ever significantly different from zero, apart from 1971 when using the entire sample and furthermore, the magnitudes are also much smaller than for FLFP in Figure 8. Even though, in the short run, the reform likely had a smaller impact on males this is not long lasting, indicating that the main results are specific to women and do not reflect an overall change in employment.

The second robustness check is to use two different versions of the instrument. One concern would be that the zones represent administrative borders instead of being based purely on geography. I address this by computing the standard deviation for each municipality based on colonies within a 100 km radius to the centroid. The first stage results can be seen in Appendix A Table A9 columns 1 and 2 while the second stage results using the entire sample can be seen in Figure A1, Panel A in Appendix A. The second stage results are similar to the main results both in significance and in magnitude while in the first stage the instrument results are very weak both in explanatory power and the K-P F-statistic (only 2.97). The weakness of the alternative instrument clearly shows that the subdivision into zones is more appropriate considering the Italian geography with mountainous terrain. As a second alternative, I use the mean distance to colonies in a zone as the instrument. The first stage results are shown in Appendix A Table A9 columns 3 and 4 while the second stage is shown in Panel B of Figure A1 in Appendix A. Reassuringly, when using the mean distance instead of standard deviations the results are still significantly different from zero even though the magnitude of the impact on FLFP is slightly smaller. In the first stage the mean distance has a high explanatory power, and the K-P F-statistic is also high (33.85). A final concern could be that by construction neither the mean distance nor the standard deviation of the distances to colonies consider the number of colonies close to a municipality. If agglomeration is important, then another instrument would maybe be more suited. However, since the location of a colony is connected to the location of a large estate, I argue that it is not the number of colonies but the simple fact that at least one colony was close to a municipality that explains where the reform was implemented.

6 Mechanisms

I explore three different mechanisms through which the land reform could have impacted FLFP. It has been shown that the reform increased the educational level (Percoco, 2018). If this is valid

for women, it would imply more employment possibilities. Furthermore, evidence suggests that the reform increased the share of labor in agriculture in the treated municipalities (Bianchi-Vimercati et al., 2022). According to the feminization U hypothesis this would imply an increase in FLFP in the agricultural sector in treated areas. Finally, as suggested by Federico and Martinelli (2015) the share of women participating in the agricultural sector in Italy in the 1920s depended on the agricultural product mix. More mechanisms are possible such as gender norms, but their investigation goes beyond the aim of this paper.

To investigate the proposed mechanisms, I estimate a series of cross-section regressions for the years after the reform using female levels of education and female employment in different sectors and as my outcome of interest. The following second stage model is estimated:

$$y_i = \beta treated_i + X_i'\Gamma + \theta_z + \varepsilon_i \tag{6}$$

where y_i is outcome of interest in year i, $treated_i$ is a dummy equal to one for treated municipalities, X_i' is a vector of the same control variables as above, θ_z represents zone fixed effects and ε_i is the error term. Equation 6 is estimated only using the treatment dummy, since what is now of interest is to see if there is a difference between treated and control municipalities in the outcomes of interest.

6.1 Educational Attainment

A higher level of education would give women more possibilities on the labor market both within and outside agriculture. Furthermore, a higher level of education overall is also connected to an increase in the agricultural sector and a considered choice of crop mix based on knowledge. Five measures of education are implemented: share of women with a university degree, share of women with a high school degree (scuola superiore), share of women with a middle school degree (scuole medie), share of women completing elementary school (elementari) and average years of education. Each level is computed for the years 1971, 1981, 1991 and 2001. They cover all levels of educational attainment and make it possible to see to what extent women in the treated areas are more educated. As a robustness check, the same is computed for men to see if the effect is due to an overall effect or specific to women. The results from the simple OLS can be seen in Figure A2 in Appendix A, while the IV results can be seen in Figure 9. Positive estimates indicate that the treated municipalities had higher levels of education in year i than the control

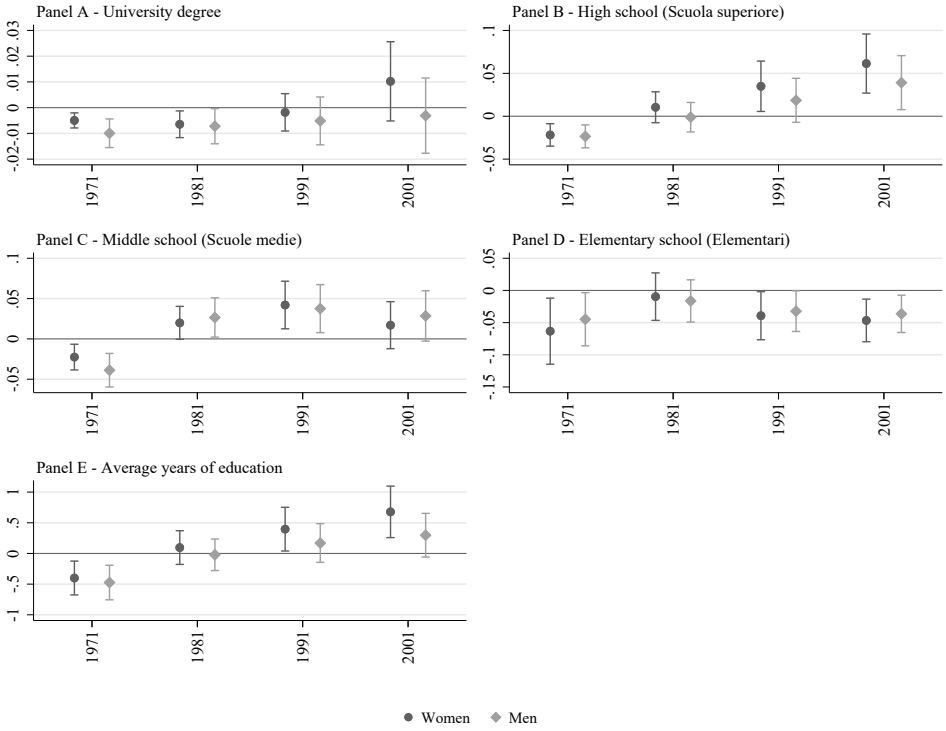
municipalities. It clearly appears that the effects for men and women are similar for most levels of education even though the effects for women are often somewhat bigger. The effect on the share of individuals with a university degree is negative, indicating that fewer men and women completed university in the treated municipalities, but only until 1981 and the effect is quite small (about 1 percentage point lower in treated municipalities). The share of individuals with a high school degree and a middle school degree follow similar patterns. In the first year, 1971, the effect is negative whereafter individuals in the treated municipalities were more likely to have a high school or middle school degree. Here the effect is larger ranging from about 1 to 5 percentage points higher shares. The effect on elementary school is negative, which is consistent with the fact that more individuals obtain higher levels of education and consequently a smaller share will have a lower degree. Finally, the effect on average years of education is again negative in 1971, but then becomes positive. In Appendix A it is possible to see the results for the individual zones where Figure A3 shows the estimates for individual zones using average years of education while Figure A4 uses the share of women with a middle school degree for individual zones as the outcome. Overall, the results suggest that women experience an increase in their educational attainment, but that the effect is not specific to them.

6.2 Sectoral Employment and Crop Mix

The two other mechanisms, sectoral employment and crop mix, are closely related to each other. An increase in the agricultural sector allows women to find employment according to the principles of the feminization U hypothesis. Before the population becomes more educated, men have a comparative advantage in the industrial sector and thus women will mainly find employment in agriculture. Furthermore, the historical evidence suggests that the *latifundia* were mainly involved in the production of wheat which is considered to be a male intensive crop (Federico and Martinelli, 2015). The crop mix is therefore likely to be important both in explaining the overall increase in the growth of FLFP rates but also to explain the differences between zones.

As a consequence of the reform, agricultural production could have changed towards more female neutral or intensive products. At the same time, the reform also opened the possibility of making more investments in the agricultural sector, partly aimed at mechanization and more modern technologies. This would also enable women to find employment more easily in the agricultural sector, even in areas with historically more male intensive agricultural production.

Figure 9: Cross-section IV estimates for the years 1971, 1981, 1991 and 2001 for the effect of the reform on different levels of education



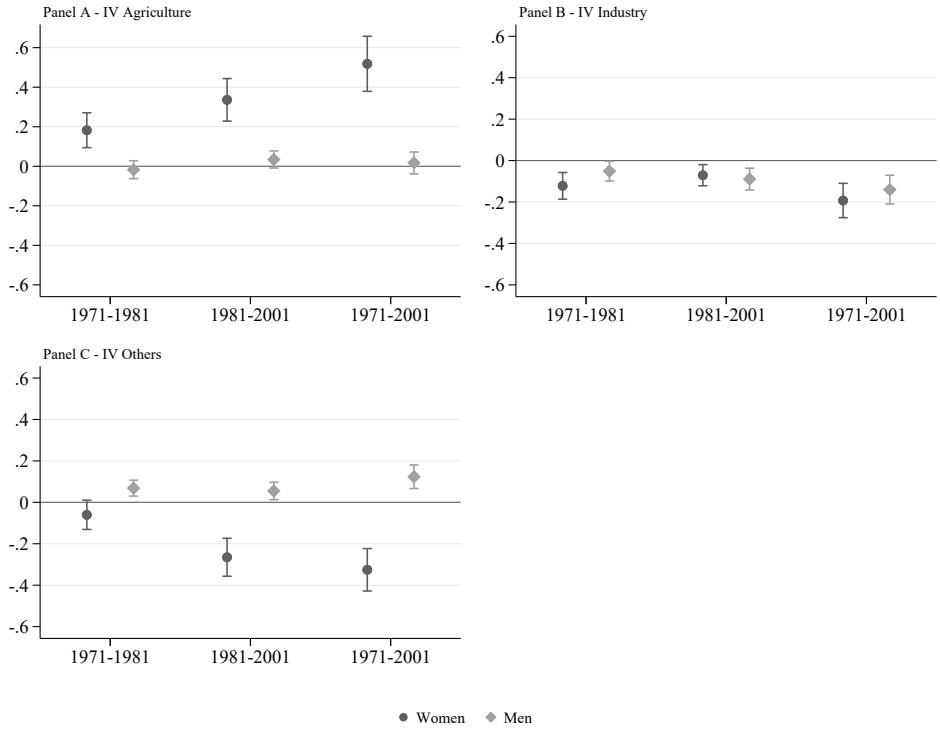
Notes: This figure shows cross-section estimates for different years and different levels of education using an IV approach where the treatment dummy is instrumented with *stddev_colony*. Panel A shows the effect on university degrees, Panel B on high school, Panel C on middle school, Panel D on elementary school and Panel E on average years of education. Controls included: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The error bars show $p < 0.05$ based on robust standard errors clustered at the municipality level.

The mechanization process was however slow especially in the South and only reached full speed in the 1970s. It can therefore also be expected that the effect on FLFP would exist with a temporal delay, consistent with the findings in Figure 8.

To conduct the analysis, I compute the difference between the years 1971-1981, 1981-2001 and 1971-2001 of the shares of women working in three different sectors: agriculture, industry and others.[4] These are used as the outcomes of interest in equation 6 and show the effect of the reform on changes over different time intervals. The first period 1971-1981 shows the effect in the medium run starting about ten years after implementation, while 1981-2001 and 1971-2001 show the effect over the long run. Once again, the same is done for men, to have a comparison. The OLS results can be seen in Figure A5 in Appendix A, while the IV estimates are illustrated in Figure 10.

[4]Included in the "Others" category are the commercial and the service sectors.

Figure 10: Change in the share of men and women employed in different sectors between treated and control municipalities using IV



Notes: This figure shows IV second stage cross-section estimates for the difference between 1971-1981, 1981-2001 and 1971- 2001 in the share of men/women working in different sectors. Panel A shows the change in agriculture, Panel B the change in industry and Panel C in other sectors. Controls included: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The error bars show $p < 0.05$ based on robust standard errors clustered at the municipality level.

Positive estimates indicate that the change in employment in a specific sector is higher in treated municipalities. There is a clear difference between men and women in terms of employment. Women in the treated municipalities have a large and highly significant increase in the agricultural sector, about a 20 percentage points larger share in the period 1971-1981 and 30 percentage points over the period 1981-2001. In the industrial and other sectors, the change is negative but still significantly different from zero. For men, employment in the agricultural sector is not different between municipalities included in the reform and the control group, while there is a significant decrease in the industrial sector and an increase in other sectors.

The results in Figure 10 clearly illustrate how women in the treated municipalities experience an increase in agricultural employment which is evidence in favor of this mechanism. They also illustrate how the change toward the agricultural sector persists in the long run and increases in magnitude. The results are also consistent with the idea that both the process of modernization

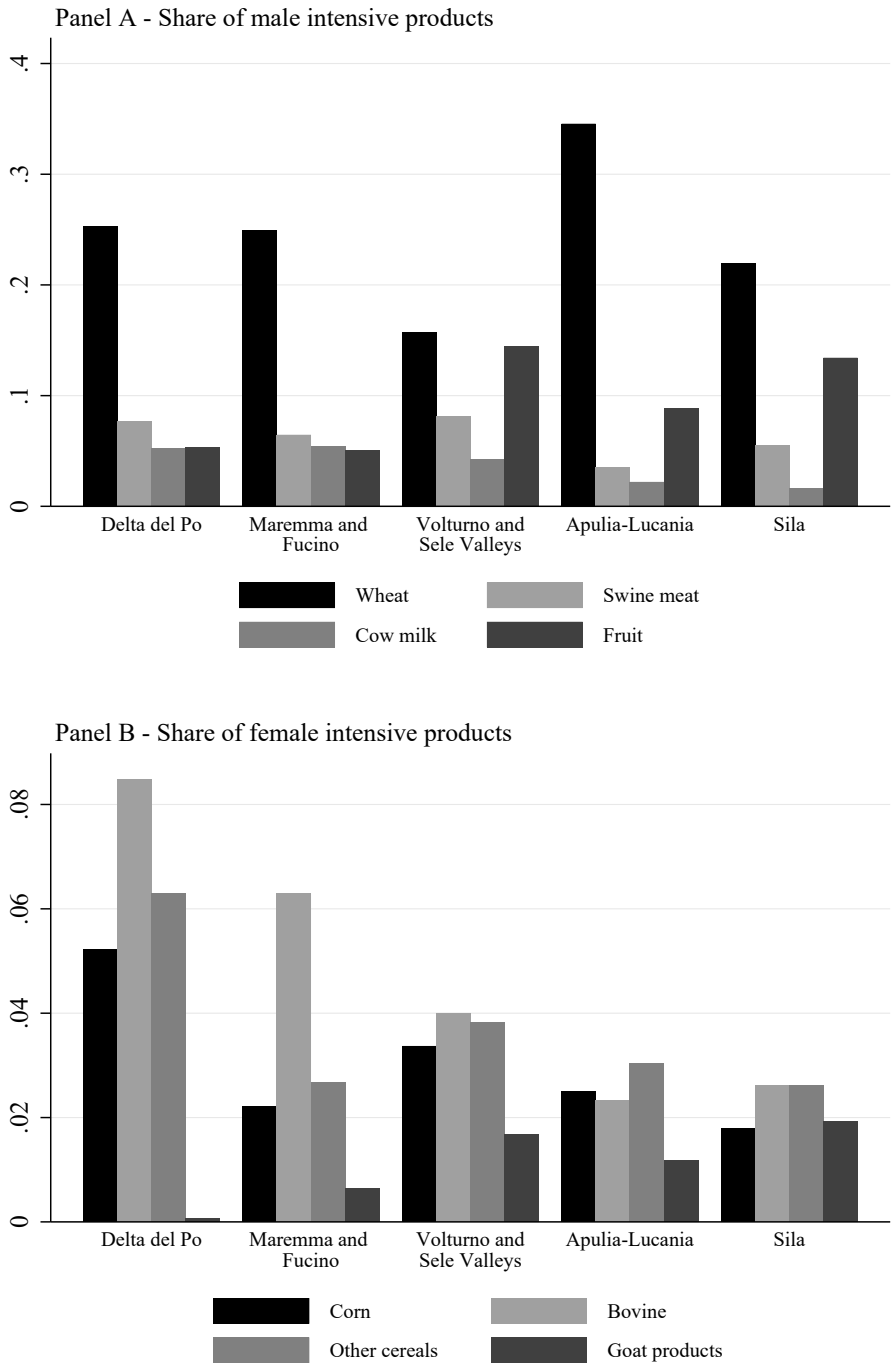
and a change in the crop mix takes time and hence, the change in the share of women in the agricultural sector increases over time.

As further evidence, I use the same database as in Federico and Martinelli (2015) which contains the Gross Salable Production (GSP) of all agricultural products in Italy for the period 1929-1930. The GSP is used to compute the share of each crop in the total agricultural output. The information is given for agricultural zones which is an intermediate unit between the municipality and the province and leaves me with 224 observations. For this reason, and given that data is available only from before the reform, I concentrate on a descriptive analysis including the most relevant crops identified as male or female intensive according to Federico and Martinelli (2015). Figure 11 shows the average of the share of different agricultural products for each of the five reform zones. Panel A includes what Federico and Martinelli (2015) classify as being male intensive crops while Panel B shows the female intensive crops. What is immediately clear is that the share of wheat production (Panel A), considered to be the most dominant male intensive crop, is high in all zones. However, in Volturno and Sele Valleys (zone 3), the share is significantly lower than in the other zones. At the same time, the share of female intensive crops in zone 3 is also higher than in the other zones in Southern Italy (Apulia-Lucania and Sila). This is consistent with the fact that no effect is found on FLFP in this zone since it would indicate that there is less room for improvement in female employment. Furthermore, even though wheat also appears to be important in Delta del Po (zone 1) in Northern Italy covering around one fourth of agricultural production, the share of female intensive products is higher than in the other zones. This can also explain why no significant effect is found there, given the higher share of women already having the possibility to join the agricultural sector before the reform.

7 Conclusion

This paper has for the first time estimated the impact on FLFP due to a change in land inequality towards a more equal distribution. By exploiting a land reform implemented in the 1950s in Italy and introducing a new instrument, it has been possible to estimate the causal relationship between the two and thus overcome the issue of reverse causality which otherwise makes inference difficult. It has been shown that after the reform, treated municipalities experienced higher growth in FLFP rates also in the long run. As a robustness check, the effect on MLFP was also estimated, but it is not significant. It can therefore be concluded that the effect of the reform is specific to

Figure 11: Share of male and female intensive products



Notes: The figure shows, for each individual zone, the average share of total agricultural production output for different agricultural products identified as being more male (Panel A) or female intensive (Panel B). The classification is taken from Federico and Martinelli (2015) who identify products correlated to a higher or lower gender ratio in agriculture. *Source:* Martinelli (2014b).

women. Furthermore, three mechanisms are explored. First it is shown that treated municipalities had higher levels of educational attainment. However, this effect was similar for men and women, and can therefore not entirely explain the higher growth in FLFP, since men did not experience a similar growth in employment. The second mechanism is through an increase in the agricultural sector. It is estimated that treated municipalities had a higher growth in the share of women working in the agricultural sector. The same results for men indicate that they move to other sectors and therefore this second mechanism better explains why a change in the concentration of land can increase FLFP. The third mechanism is through the agricultural product mix. The evidence suggests that wheat, a typical male intensive crop, was dominating production before the reform. This leaves the possibility for an increase in FLFP when technology improves, or the production is changed to other crops. The product mix can also explain the differences in the results between zones, where zones producing less wheat or more female intensive crops before the reform, did not experience the same effect on FLFP afterwards. It can therefore be concluded that the land reform had an effect on FLFP. More generally, the results show that a change in land inequality impacts the FLFP first of all through the agricultural sector and the crop mix. This second conclusion is of general economic interest, since it shows the importance of the agricultural sector and production for women in the first phases of development.

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Appendix A Additional Figures and Tables

Appendix A.1 Tables

Table A1: Summary statistics

Variable	Mean	Std.dev.	Min	Max	Obs
FLFP 1951	0.317	0.186	0.173	0.802	1574
FLFP 1961	0.290	0.173	0.129	0.748	1574
FLFP 1971	0.272	0.127	0.322	0.656	1575
FLFP 1981	0.223	0.778	0.382	0.556	1575
FLFP 1991	0.216	0.678	0.504	0.460	1575
FLFP 2001	0.243	0.687	0.757	0.471	1575
Theil_treat (All)	0.137	0.443	-2.958	3.244	1571
Theil_treat (Treated)	0.620	0.766	-2.958	3.244	348
Theil 1930	1.674	1.077	0	5.253	1571
Theil 1971	1.447	0.850	0.100	5.869	1575
stddev_colony	54.056	22.447	14.723	102.990	1575
Piano Casa	6.669	83.750	0	2335	1574
Malaria dummy	0.553	0.497	0	1	1525
Wheat suitability	4.896	1.690	1.000	7.966	1575
Ruggedness	131.914	110.016	0	603.647	1524
Distance to waterways	9.948	14.610	0.002	87.812	1524
Distance to nearest big city	159.157	94.836	0	361.158	1525
Roman roads	1170.369	6743.664	0	112677.3	1569
Sex ratio in 1951	97.602	7.296	70.192	263.281	1574
Employed in agriculture 1951	0.688	0.176	0.030	0.967	1574
Literacy rates 1921	0.548	0.152	0.193	0.995	1469
Additional variables					
University degree 1971 (females)	0.004	0.004	0	0.032	1575
University degree 1981 (females)	0.010	0.008	0	0.060	1575
University degree 1991 (females)	0.016	0.011	0	0.092	1575
University degree 2001 (females)	0.050	0.024	0	0.425	1575
University degree 1971 (males)	0.012	0.008	0	0.077	1575
University degree 1981 (males)	0.019	0.011	0	0.096	1575
University degree 1991 (females)	0.024	0.015	0	0.125	1575
University degree 2001 (females)	0.050	0.023	0.004	0.316	1575
High school 1971 (females)	0.039	0.017	0.000	0.139	1575
High school 1981 (females)	0.076	0.028	0.003	0.219	1575
High school 1991 (females)	0.132	0.044	0.023	0.307	1575
High school 2001 (females)	0.214	0.047	0.050	0.403	1575
High school 1971 (males)	0.046	0.019	0	0.153	1575
High school 1981 (males)	0.081	0.029	0.006	0.270	1575
High school 1991 (males)	0.131	0.042	0.016	0.301	1575
High school 2001 (males)	0.218	0.048	0.071	0.427	1575
Middle school 1971 (females)	0.074	0.025	0.013	0.203	1575
Middle school 1981 (females)	0.166	0.033	0.022	0.294	1575
Middle school 1991 (females)	0.245	0.042	0.081	0.425	1575
Middle school 2001 (females)	0.249	0.043	0.046	0.415	1575
Middle school 1971 (males)	0.122	0.033	0.032	0.261	1575
Middle school 1981 (males)	0.228	0.040	0.044	0.379	1575
Middle school 1991 (males)	0.318	0.044	0.143	0.5	1575
Middle school 2001 (males)	0.324	0.046	0.065	0.508	1575
Elementary school 1971 (females)	0.354	0.088	0.175	0.832	1575
Elementary school 1981 (females)	0.375	0.069	0.157	0.813	1575
Elementary school 1991 (females)	0.331	0.065	0.138	0.684	1575
Elementary school 2001 (females)	0.277	0.057	0.066	0.697	1575
Elementary school 1971 (males)	0.395	0.081	0.232	0.97	1575
Elementary school 1981 (males)	0.379	0.055	0.208	0.643	1575
Elementary school 1991 (males)	0.307	0.050	0.173	0.527	1575
Elementary school 2001 (males)	0.239	0.044	0.085	0.487	1575
Average education 1971 (females)	6.244	0.369	5.294	7.899	1575
Average education 1981 (females)	6.978	0.411	5.614	9.085	1575
Average education 1991 (females)	7.752	0.504	6.087	9.994	1575
Average education 2001 (females)	8.925	0.594	6.651	14.076	1575
Average education 1971 (males)	6.552	0.414	5.340	8.661	1575
Average education 1981 (males)	7.225	0.422	5.982	9.264	1575
Average education 1991 (males)	7.952	0.498	6.618	10.214	1575
Average education 2001 (males)	9.044	0.563	7.333	13.342	1575
Δ Agriculture (females)	-0.306	0.219	-0.825	0.341	1575
Δ Agriculture (males)	-0.306	0.220	-3.206	0.154	1575
Δ Industry (females)	-0.036	0.130	-0.793	0.363	1575
Δ Industry (males)	-0.123	0.124	-0.478	0.435	1575
Δ Other sectors (females)	0.341	0.170	-0.277	0.815	1575
Δ Other sectors (males)	0.241	0.098	-0.502	0.624	1575

Notes: This table illustrates summary statistics of the different variables included in the analysis.

Table A2: Effect of the reform on FLFP for individual zones using intensity of treatment and simple difference-in-differences

	(1) Zone 1	(2) Zone 2	(3) Zone 3	(4) Zone 4	(5) Zone 5
Panel A – OLS results					
$post \times theil\_treat$	0.048**	0.007	-0.000	0.017	0.026
	(0.018)	(0.008)	(0.020)	(0.014)	(0.016)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within R^2	0.588	0.469	0.621	0.683	0.466
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345
Panel B – IV second stage results					
$post \times theil\_treat$	0.373	0.171**	-0.656	0.446*	0.151
	(0.810)	(0.080)	(0.542)	(0.269)	(0.105)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within R^2	0.342	0.315	0.130	0.404	0.439
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345

Notes: Robust standard errors clustered at the municipality level in parentheses. Panel A shows the OLS results. Panel B shows the results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, piano casa 1957, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The zones are the following: 1) Delta of the Po, 2) Maremma and Fucino, 3) Volturno and Sele Valleys, 4) Apulia-Lucania and 5) Sila. See Figure 3 for the geographical location. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table A3: Effect of the reform on FLFP for individual zones using treatment dummy and simple difference-in-differences

	(1) Zone 1	(2) Zone 2	(3) Zone 3	(4) Zone 4	(5) Zone 5
Panel A – OLS results					
post × *dummy*	-0.031	0.016	-0.012	0.020	0.040**
	(0.029)	(0.011)	(0.035)	(0.013)	(0.017)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within R^2	0.584	0.470	0.621	0.683	0.468
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345
Panel B – IV second stage results					
post × *dummy*	0.819	0.243*	-1.394	0.247**	0.179
	(2.645)	(0.126)	(1.380)	(0.106)	(0.124)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within R^2	0.021	0.259	0.011	0.610	0.430
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345

Notes: Robust standard errors clustered at the municipality level in parentheses. Panel A shows the OLS results. Panel B shows the results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, piano casa 1957, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The zones are the following: 1) Delta of the Po, 2) Maremma and Fucino, 3) Volturno and Sele Valleys, 4) Apulia-Lucania and 5) Sila. See Figure 3 for the geographical location. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table A4: Event study of the effect of the reform on FLFP using intensity of treatment as explanatory variable

	(1) FE	(2) FE	(3) IV	(4) IV
Panel A - Using intensity of treatment				
1951 × *theil_treat*	-0.006	0.001	-0.031	-0.002
	(0.005)	(0.006)	(0.037)	(0.044)
1961 × *theil_treat*	0	0	0	0
1971 × *theil_treat*	0.009**	0.007	0.103***	0.084***
	(0.004)	(0.005)	(0.031)	(0.032)
1981 × *theil_treat*	0.026***	0.026***	0.417***	0.346***
	(0.007)	(0.007)	(0.072)	(0.058)
1991 × *theil_treat*	0.032***	0.032***	0.469***	0.397***
	(0.007)	(0.007)	(0.080)	(0.065)
2001 × *theil_treat*	0.040***	0.040***	0.570***	0.479***
	(0.008)	(0.008)	(0.093)	(0.074)
Zone FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Within R^2	0.412	0.527		
No. observations	8814	8814	8814	8814
No. clusters	1469	1469	1469	1469
Panel B – Using treatment dummy				
1951 × *dummy*	-0.013*	-0.002	-0.025	-0.015
	(0.007)	(0.007)	(0.030)	(0.042)
1961 × *dummy*	0	0	0	0
1971 × *dummy*	0.009*	0.010**	0.082***	0.069**
	(0.005)	(0.005)	(0.023)	(0.028)
1981 × *dummy*	0.029***	0.025***	0.333***	0.306***
	(0.007)	(0.007)	(0.046)	(0.047)
1991 × *dummy*	0.042***	0.041***	0.374***	0.348***
	(0.008)	(0.007)	(0.050)	(0.051)
2001 × *dummy*	0.057***	0.056***	0.455***	0.421***
	(0.008)	(0.008)	(0.056)	(0.056)
Zone FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Within R^2	0.417	0.530		
No. observations	8814	8814	8814	8814
No. clusters	1469	1469	1469	1469

Notes: Robust standard errors clustered at the municipality level in parentheses. Panel A shows the results when using the change in the Theil index as explanatory variable and Panel B when using the treatment dummy. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, sex ratio in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. Column 3 and 4 show results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone as instrument. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table A5: Event study of the effect of the reform on FLFP for individual zones using intensity of treatment as explanatory variable

	(1) Zone 1	(2) Zone 2	(3) Zone 3	(4) Zone 4	(5) Zone 5
Panel A - OLS results					
1951 × *theil_treat*	-0.036	0.002	0.009	-0.000	0.005
	(0.026)	(0.008)	(0.021)	(0.013)	(0.015)
1961 × *theil_treat*	0	0	0	0	0
1971 × *theil_treat*	0.007	-0.001	-0.003	0.006	0.020
	(0.021)	(0.006)	(0.014)	(0.009)	(0.015)
1981 × *theil_treat*	0.020	0.012*	0.027	0.016	0.036*
	(0.024)	(0.007)	(0.024)	(0.013)	(0.020)
1991 × *theil_treat*	0.016	0.015*	0.005	0.027*	0.047**
	(0.023)	(0.008)	(0.020)	(0.014)	(0.018)
2001 × *theil_treat*	0.015	0.016	0.015	0.037**	0.055***
	(0.023)	(0.011)	(0.023)	(0.016)	(0.017)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within R^2	0.589	0.471	0.622	0.685	0.470
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345
Panel B – IV second stage results					
1951 × *theil_treat*	0.480	-0.024	0.608	-0.165	0.074
	(0.840)	(0.054)	(0.518)	(0.205)	(0.091)
1961 × *theil_treat*	0	0	0	0	0
1971 × *theil_treat*	0.424	0.085	-0.057	-0.001	0.120*
	(0.635)	(0.062)	(0.166)	(0.104)	(0.066)
1981 × *theil_treat*	0.946	0.156**	-0.074	0.375**	0.329***
	(1.302)	(0.068)	(0.221)	(0.163)	(0.108)
1991 × *theil_treat*	1.510	0.247***	-0.141	0.384**	0.341***
	(2.211)	(0.090)	(0.229)	(0.167)	(0.112)
2001 × *theil_treat*	1.397	0.242***	0.018	0.666**	0.360***
	(1.987)	(0.090)	(0.218)	(0.266)	(0.112)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345

Notes: Robust standard errors clustered at the municipality level in parentheses. Panel A shows the OLS results. Panel B shows the results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, sex ratio in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The zones are the following: 1) Delta of the Po, 2) Maremma and Fucino, 3) Volturno and Sele Valleys, 4) Apulia-Lucania and 5) Sila. See Figure 3 for the geographical location. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table A6: Event study of the effect of the reform on FLFP for individual zones using treatment dummy as explanatory variable

	(1) Zone 1	(2) Zone 2	(3) Zone 3	(4) Zone 4	(5) Zone 5
Panel A - OLS results					
1951 × *dummy*	0.076**	0.012	0.017	-0.016	-0.013
	(0.037)	(0.009)	(0.041)	(0.013)	(0.017)
1961 × *dummy*	0	0	0	0	0
1971 × *dummy*	0.034	0.013*	0.004	-0.013	0.022*
	(0.025)	(0.004)	(0.019)	(0.009)	(0.013)
1981 × *dummy*	0.070**	0.027***	0.018	-0.008	0.026
	(0.032)	(0.008)	(0.031)	(0.012)	(0.018)
1991 × *dummy*	0.067**	0.043***	-0.002	0.012	0.040**
	(0.033)	(0.009)	(0.026)	(0.012)	(0.018)
2001 × *dummy*	0.053*	0.058***	0.004	0.030**	0.048***
	(0.031)	(0.009)	(0.028)	(0.013)	(0.018)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within R^2	0.591	0.481	0.621	0.685	0.471
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345
Panel B – IV second stage results					
1951 × *dummy*	-2.498	-0.037	1.336	-0.078	0.030
	(40.200)	(0.078)	(1.348)	(0.091)	(0.105)
1961 × *dummy*	0	0	0	0	0
1971 × *dummy*	2.646	0.121	-0.089	0.016	0.096
	(166.825)	(0.091)	(0.320)	(0.054)	(0.061)
1981 × *dummy*	1.981	0.222**	-0.106	0.221***	0.309***
	(28.557)	(0.110)	(0.376)	(0.079)	(0.099)
1991 × *dummy*	-17.152	0.349**	-0.157	0.223***	0.318***
	(300.750)	(0.147)	(0.353)	(0.077)	(0.100)
2001 × *dummy*	0.959	0.340**	0.060	0.385***	0.335***
	(17.358)	(0.137)	(0.369)	(0.101)	(0.099)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345

Notes: Robust standard errors clustered at the municipality level in parentheses. Panel A shows the OLS results. Panel B shows the results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, sex ratio in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The zones are the following: 1) Delta of the Po, 2) Maremma and Fucino, 3) Volturno and Sele Valleys, 4) Apulia-Lucania and 5) Sila. See Figure 3 for the geographical location. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table A7: Event study of the effect of the reform on MLFP using intensity of treatment as explanatory variable

	(1) FE	(2) FE	(3) IV	(4) IV
1951 × *theil_treat*	-0.002	-0.002	-0.029*	-0.002
	(0.002)	(0.003)	(0.015)	(0.019)
1961 × *theil_treat*	0	0	0	0
1971 × *theil_treat*	0.015***	0.009***	0.057***	0.053***
	(0.003)	(0.004)	(0.019)	(0.020)
1981 × *theil_treat*	0.014***	0.005	0.034	0.013
	(0.004)	(0.004)	(0.023)	(0.021)
1991 × *theil_treat*	0.001	-0.002	0.061**	0.042*
	(0.004)	(0.004)	(0.025)	(0.022)
2001 × *theil_treat*	0.001	0.000	0.050**	0.045**
	(0.004)	(0.004)	(0.023)	(0.021)
Zone FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Within R^2	0.905	0.926	0.895	0.922
No. observations	8814	8814	8814	8814
No. clusters	1469	1469	1469	1469

Notes: Robust standard errors clustered at the municipality level in parentheses. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, sex ratio in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. Column 3 and 4 show results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone as instrument. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table A8: Event study of the effect of the reform on MLFP for individual zones using intensity of treatment as explanatory variable

	(1) Zone 1	(2) Zone 2	(3) Zone 3	(4) Zone 4	(5) Zone 5
Panel A - OLS results					
1951 × *theil_treat*	0.008	0.005	0.003	-0.008*	-0.017***
	(0.007)	(0.004)	(0.008)	(0.004)	(0.006)
1961 × *theil_treat*	0	0	0	0	0
1971 × *theil_treat*	0.003	0.011**	0.020**	0.001	0.010
	(0.009)	(0.005)	(0.009)	(0.005)	(0.006)
1981 × *theil_treat*	0.006	0.008	-0.001	-0.001	0.012
	(0.010)	(0.008)	(0.010)	(0.007)	(0.009)
1991 × *theil_treat*	0.001	0.011*	-0.018	-0.010*	-0.011
	(0.014)	(0.006)	(0.017)	(0.006)	(0.009)
2001 × *theil_treat*	0.002	0.009	-0.008	-0.001	-0.019
	(0.003)	(0.006)	(0.014)	(0.006)	(0.012)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within R^2	0.918	0.898	0.941	0.941	0.940
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345
Panel B – IV second stage results					
1951 × *theil_treat*	-0.116	0.070**	0.097	-0.006	-0.152***
	(0.414)	(0.036)	(0.109)	(0.043)	(0.049)
1961 × *theil_treat*	0	0	0	0	0
1971 × *theil_treat*	0.844	-0.065*	-0.045	0.071	-0.050
	(1.255)	(0.039)	(0.120)	(0.066)	(0.040)
1981 × *theil_treat*	0.558	-0.085	0.097	-0.063	-0.035
	(0.779)	(0.053)	(0.139)	(0.067)	(0.051)
1991 × *theil_treat*	0.752	-0.037	0.096	-0.089	0.003
	(1.121)	(0.043)	(0.151)	(0.070)	(0.049)
2001 × *theil_treat*	0.598	-0.010	0.079	-0.029	-0.043
	(0.865)	(0.037)	(0.152)	(0.060)	(0.042)
Zone FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
No. observations	750	2160	1248	2586	2070
No. clusters	125	360	208	431	345

Notes: Robust standard errors clustered at the municipality level in parentheses. Panel A shows the OLS results. Panel B shows the results for the second stage of an IV using standardized values of the standard deviation of the distances to all colonies in a zone. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, sex ratio in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The zones are the following: 1) Delta of the Po, 2) Maremma and Fucino, 3) Volturno and Sele Valleys, 4) Apulia-Lucania and 5) Sila. See Figure 3 for the geographical location. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

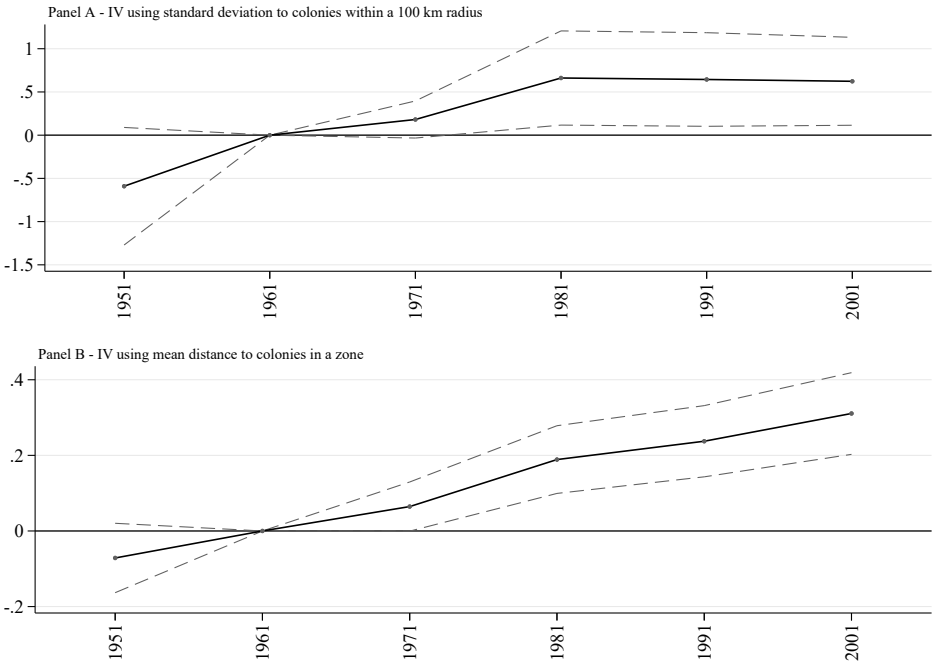
Table A9: Power of instrument (first stage regressions) using alternative instruments

	(1)	(2)	(3)	(4)
*stddev_colony*2	-0.006	-0.017*		
	(0.009)	(0.010)		
mean_colony			-0.001***	-0.002***
			(0.000)	(0.000)
Zone FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Adj R^2	0.001	0.212	0.013	0.224
K-P F-statistic	0.487	2.97	23.60	33.85
No. observations	1469	1469	1469	1469

Notes: Robust standard errors in parentheses. Included controls are: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. Columns 1-2 show the results when using the standard deviation of the distances to colonies within a 100 km radius from a municipality centroid. Columns 3-4 use the mean distance in km to colonies within a zone as the instrument. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

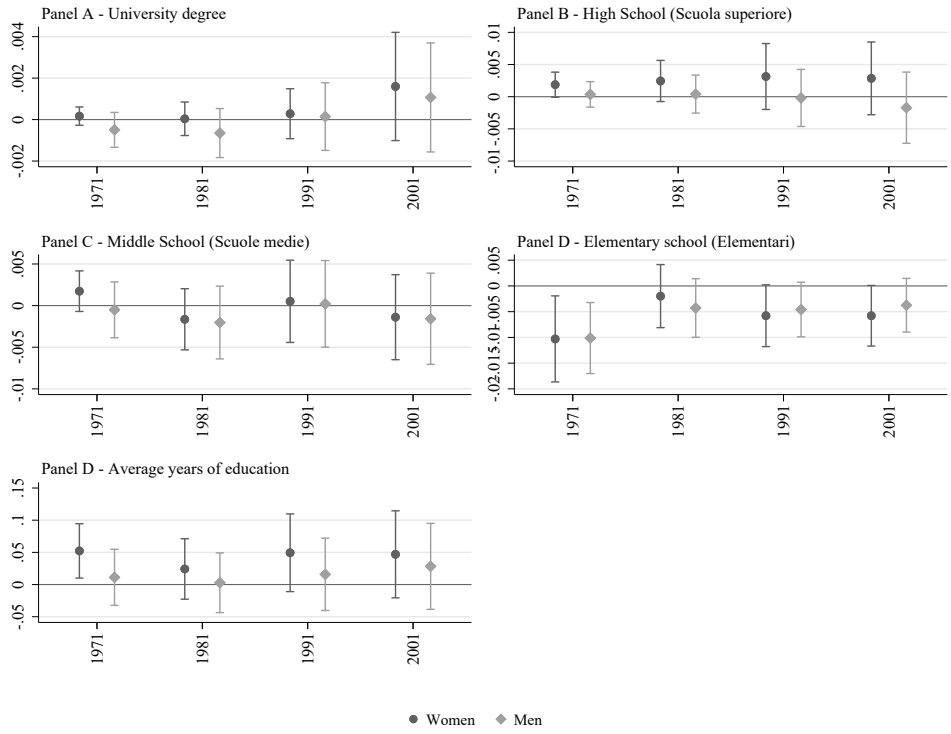
Appendix A.2 Figures

Figure A1: Event study of the effect of the reform on FLFP using alternative instruments



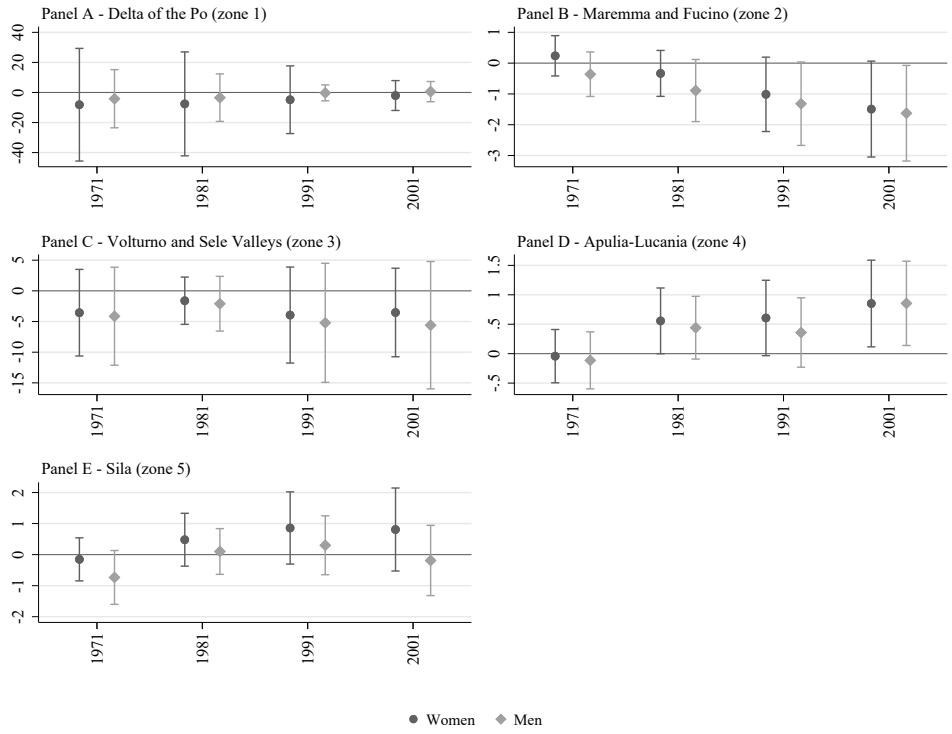
Notes: This figure shows the dynamic effects of the reform on FLFP using equation 5 and instrumenting treatment intensity with alternative instruments. Panel A shows the effects using the entire sample and instrumenting with the standard deviation of distances to colonies within a 100 km radius. Panel B uses the entire sample and instruments treatment intensity with the mean distance to colonies in a zone. The base year is 1961 and the error bars show $p < 0.10$ based on robust standard errors clustered at the municipality level. All regressions include year, municipality and zone fixed effects together with the following controls: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, piano casa 1957, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters.

Figure A2: Cross-section OLS estimates for the years 1971, 1981, 1991 and 2001 for different levels of education



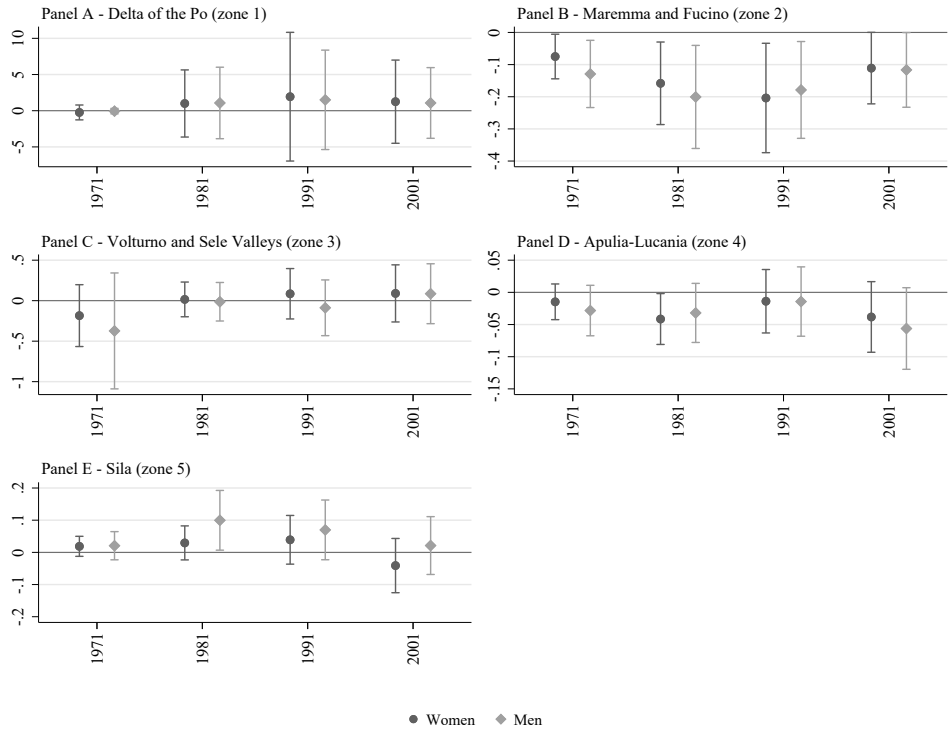
Notes: This figure shows cross-section OLS estimates for different years and different levels of education. Controls included: literacy in 1929, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, piano casa 1957, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The error bars show $p < 0.05$ based on robust standard errors clustered at the municipality level.

Figure A3: Cross-section IV estimates for the years 1971, 1981, 1991 and 2001 for average years of education and individual zones



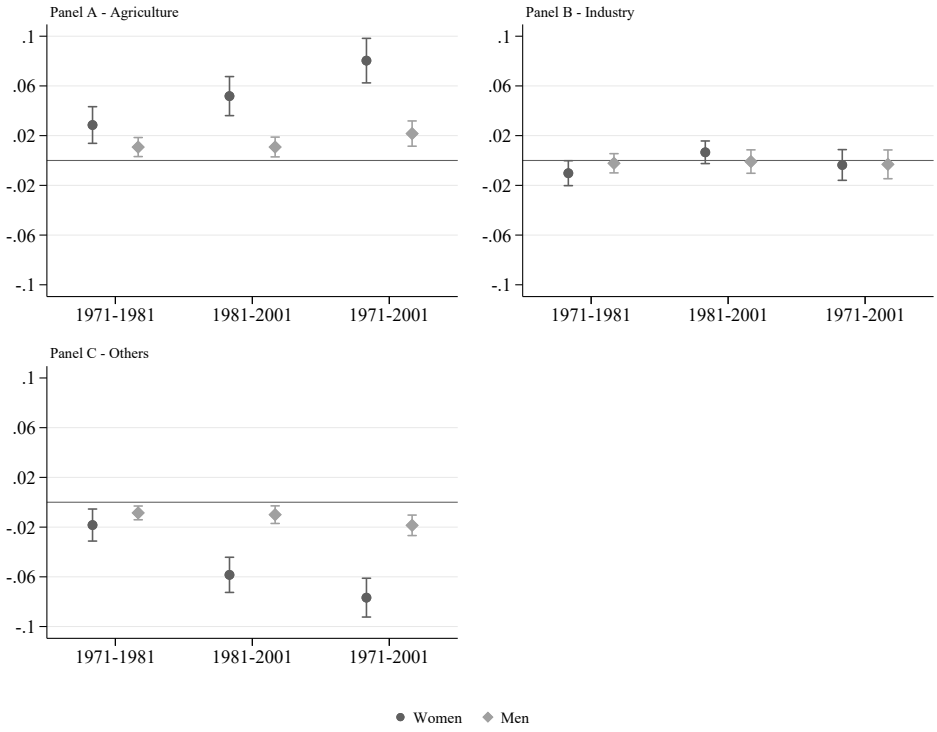
Notes: This figure shows cross-section IV estimates for different years and zones with average years of education as the dependent variable. Controls included: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The error bars show $p < 0.05$ based on robust standard errors clustered at the municipality level.

Figure A4: Cross-section IV estimates for the years 1971, 1981, 1991 and 2001 for middle school and individual zones



Notes: This figure shows cross-section IV estimates for different years and zones with share of individuals with a middle school degree as the dependent variable. Controls included: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The error bars show $p < 0.05$ based on robust standard errors clustered at the municipality level.

Figure A5: Change in the share of men and women employed in different sectors between treated and control municipalities



Notes: This figure shows OLS cross-section estimates for the differences between 1971-1981, 1981-2001 and 1971-2001 in the share of men/women working in different sectors. Controls included: literacy in 1921, sex ratio in 1951, Theil index in 1930, share of workers in agriculture in 1951, Piano Casa houses, presence of historical malaria, wheat suitability, ruggedness, distance to waterways, distance to nearest big city and length of Roman roads in meters. The error bars show $p < 0.10$ based on robust standard errors clustered at the municipality level.

Appendix B Data Description

Map of Italian towns. I use a shapefile of the 2001 municipality borders available from ISTAT and combine with my sample of municipalities representing the 1951 borders. I take into account events of merging and splitting between 1921 and 2001. To avoid splitting municipalities with the problem of assigning appropriate weights, whenever a municipality was split into more entities, I use the smallest common border that existed over the period 1921-2001. In this way I only merge and the final sample of municipalities represent the smallest common borders. However, most changes in municipality borders have been splitting, meaning that the number of cases in which the borders do not represent 1951 is quite small.

Treatment. This variable has been collected and digitized by Caprettini et al. (2021) who I thank for sharing their data with me. The treated municipalities are defined in the executive orders enacting the land reform (D.P.R. 66/1951, D.P.R. 67/1951, D.P.R. 68/1951, D.P.R. 69/1951, D.P.R. 70/1951, D.P.R. 264/1951, D.P.R. 265/1951).

Land distribution. Land distribution data comes from the Italian Agricultural censuses conducted by ISTAT in the years 1929, 1971 and 2000. Data from 1929 has been collected by Carillo (2021), from 1971 I digitized the data myself thanks to a generous grant from the Economic History Association while the 2000 data has been digitized by ISTAT. Additionally, I include data from Medici (1948) Table 2 which reports the values and number of estates for 11 categories of estate value. The data is used to construct the Theil index as a measure of inequality to use together with the treatment dummy.

Labor force participation. Data on labor force participation for both males and females has been taken from the Italian population census for the years 1951, 1961, 1971, 1981, 1991 and 2001, conducted by ISTAT and can be found on "ottomilacensus.istat.it". They represent the number of active males/females on the total number of males/females in the age group 15-69.

Wheat suitability. Potential wheat yield per hectare is taken from the FAO GAEZ' v3 methodology with low inputs and rain-fed conditions. The measure is defined in 9.25×9.25 km grids and by joining the raster file with the shapefile of Italian municipalities the measure represents the average potential wheat yield for grid cells contained within the municipality.

Historical malaria. The variable takes value 1 if the centroid of a municipality is less than 5 kilometers away from malarial zones as defined by the map of malaria prevalence in Italy in 1870

from Torelli (1882).

Ruggedness. This variable is the standard deviation of elevation computed across grid cells within a municipality and is calculated with GIS software using the GOTOPO 30 - 30 arc seconds resolution elevation data from U.S. Geological Survey.

Roman roads. Length in meters of roman roads present in a municipality.

Distance to water. This variable represents the minimum distance in km from major rivers and coastline.

Distance to nearest big city. Represents the distance in km to the closest most populous city in 1921. The cities included are Milan, Naples, Palermo, Rome and Turin.

Piano Casa houses per 100000 inhabitants. This data has also been collected by Caprettini et al. (2021). The information on the Piano Casa housing projects built between 1949 and 1955 is from the Ministry of Labor's Piano incremento occupazione operaia case per lavoratori, (1959). The variable is equal to the total number of apartments built divided by 100000 inhabitants (from the 1951 census).

Share of workers in agriculture. This variable is the number of workers employed in agriculture on the total active population. The information is taken from the population censuses and is available from "ottomilacensus.istat.it".

Educational attainment. I use different measures of human capital. For the entire population I use literacy rates from the population censuses of 1921, 1951-2001 conducted by ISTAT. Separately for men and women I have the share of population with a university degree, high school degree, middle school degree, elementary school degree and average years of education. The numbers consider the number of males/females with a degree over the total male/female population over 14. Average years of education has been calculated by assigning to each degree the number of years nominated to obtain the degree. I assign 5 years for elementary school, 3 years for middle school, 5 years for high school and 5 years for a university degree.

Women and men working in different sectors. The population censuses of 1971, 1981 and 2001 contain information about the number of women/men employed in different sectors. The sectors included are agriculture, industry and others. I compute the share by taking the number of women/men working in each sector over the total number of employed women/men.

Sex ratios. The sex ratio is the number of males over the number of females in a municipality. The information is taken from the population censuses and is available at "ottomilacensus.istat.it".

Agricultural output. The database contains information about the value of agricultural products in 1929-1930 for agrarian zones (an observational unit in between the municipality and provincial level). The Gross Salable Production is used to compute the share of each crop in the total agricultural production of an agrarian zone. It has kindly been shared by Pablo Martinelli and a full explanation of the database is available in Martinelli (2014b).