Essays on local and regional Italian agriculture (1880-1929): sharecropping in Siena

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To Clelia and my parents.

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ESSAY 3

AGRICULTURE AND ECONOMIC SHOCKS IN SIENA (1880-1929). A MICRO TERRITORIAL ANALYSIS.

INTRODUCTION

This doctoral thesis consists of three essays on Italian agrarian history from the 1880s to 1929. Essay 1 studies the development of Italian agriculture in the 1880s. Essays 2 and 3 looks at agriculture in the province of Siena during the period 1880 and 1929 using data at a farm and municipal data.

Essay 2 studies the effects on production of the crisis of the 1880s in a large Tuscan sharecropping property. Essay 3 the effects the most important economic shocks between 1880 and 1929 on Sienese agriculture, a sharecropping area, through original and homogeneous data at a municipal scale.

The history of Italian agriculture has been widely reviewed thanks to the contributions by Giovanni Federico who introduced a Cliometric approach (Federico, 2003). These studies have brought new light to the Italian agricultural world in a purely macro dimension.

Before contributions of Giovanni Federico, scholars had studied Italian agrarian history through an approach mainly of a qualitative nature. Despite this, important agricultural studies have been developed by important institutions such as the Accademia dei Georgofili (2002) which promoted a series of volumes on Italian agrarian history from antiquity to the contemporary age. It is also important to mention the volumes on the history of Italian agriculture edited by Piero Bevilacqua (1989).

The general objective of this doctoral thesis is to try to observe the development of agriculture in at a regional level during the major economic crises that occurred between the late 19th century and the 1920s. The research question will be carried out mainly through the study of southern of Tuscany and in particular the province of Siena.

This thesis constitutes a regional study of the Tuscan agriculture. Scholars such as Mirri (1970), Biagioli (1970), Galassi (1984, 1989, 1992) and Galassi and Cohen (1994) have highlighted that

previous studies had approached Tuscan sharecropping without considering the distinctive characteristics of this specific agricultural contract comparing production and productivity with those of high farming (Giorgetti, 1974; Pazzagli, 1979; Sereni, 2016).

Looking at Tuscan sharecropping from a perspective different to that of the traditional historiography and contributing to regional and local economic history are the main objective of this doctoral thesis. This will allow to bring new interpretations of the production system of the Tuscan sharecropping.

This was carried out by trying to create a synergy between national history and local history.

In this perspective, the study of local cases becomes particularly motivating because I could access relevant information available at local archives that allows to significantly local and regional agricultural history of Siena.

Essay 1 reviews literature about the effects of the 1880s crisis in the process of growth of Italian agriculture, starting from the controversy between Romeo (1958) and Gerschenkron (1956, 1968) on the origins of the Italian economic take-off. During the years of the “Italian Economic Miracle” Gerschenkron elaborated an index of Italian industrial production from 1881 to 1913 that allowed to identify how the State had a significant role in the delay of Italian economic development, because of the protection of traditional manufacturing that blocked the emerging modern industry, as well as the tariff policies such as the protectionist tariff on wheat introduced in 1887.

Romeo (1958), using a methodological approach linked to Rostow (1959), considered that late take-off was mainly attributable to foreign countries. Romeo also criticized Sereni's Marxist interpretation on a lack of a revolution in agriculture that would have led to rising living standards of rural population, but also slow down the development process based on industry and capital accumulation. To sum up, a key role in this delay can be attributed to the state and to the lack of attention to certain specific of the global economy.

Recently economic historians have reexamined this issue again. Especially important are the contributions of Stefano Fenoaltea (2020), recently died, which have allowed us to start a broader

debate and led to the publication of fundamental studies that estimate national economic aggregates such as those of Federico and Cohen (2001) and Baffigi (2015), which made possible to examine whether protectionist policies negatively affected the Italian agricultural development process.

On the other hand, economic historians examine the role of human capital accumulation in the process of economic growth in Italy (Felice, 2007; Cappell, 2016; Cappelli and Vasta 2020). In this sense, Manuel Vaquero Piñeiro (2011) drew attention to the training of agricultural technicians considering this variable essential to be able to observe the Italian agricultural development.

In order to examine the development of agricultural production, I decided to focus attention on wheat and wine, as wine led to production specialization and is closely related to the development process.

The study was carried out through the reconstruction of the long-term evolution of output, prices, imports, exports and labor productivity in the period from 1861 to 1911 in order to verify conclusions by Fenoaltea (2006, 2020) in the long term.

Essay 2 considers the effects of the cereal crisis of 1880s in a big Tuscan sharecropping latifundia located between the provinces of Siena and Florence, the Canonica's farm of Certaldo, which was initially composed of 25 production units over an area of over 600 hectares. The study examines the long-term evolution of production of sharecroppers from 1858 to 1889, especially in the 1880s. This was possible thanks to the well-preserved archival documentation kept at the State Archives of Siena (Zanibelli, 2019a).

This new data of a large Tuscan sharecropping farm allows to contribute to the debate on sharecropping that has attracted attention to economic historians in recent years. The Marshal's (1920) interpretation of sharecropping as a backward institution has conditioned literature for a long time.

This first interpretation was reconsidered by some pioneering studies (Cheung, 1969; Stiglitz, 1974) and more recent ones (Hoffman, 1984; Esptein, 1994; Carmona and Simpson, 1991; Ackerberg and Botticini, 2000, 2002).

The revision of the literature has shown that it is not correct to speak of a single sharecropping institution, but of different models depending on the region. For instance, Tuscany and its neighboring areas had different sharecropping contracts. This would be attributable to the customs and traditions of each individual region. This diversity supports the thesis behind this work that it is important to carry out studies on farms in order to start a wide research path on specific territorial areas. (Biagioli, 2000).

Studying the Tuscan regional case becomes interesting because sharecropping was prevalent in the region from the Middle Ages to the contemporary age and because in Tuscany the majority of large properties were concentrated as emerged from the INEA (1948) surveys carried out during the first half of the 20th century. This essay, as already mentioned above, is in line with the studies of Francesco Galassi (1984, 1989, 1993) who have observed how difficult it is to compare the Tuscan region one with high-farming areas.

The research objective was addressed through a careful study of the accounting documentation of the Canonica's farm kept at the State Archives of Siena. This information has allowed to estimate production trends of the main products of the Tuscan agricultural economy: wheat, oil and wine. In order to promote a greater precision of the value of production, the historical series of the prices of agricultural products have also been elaborated through data available at the *Camera di Commercio* of Siena. These prices were compared to those of the *Camera di Commercio* of Florence (Bandettini, 1957) to verify the existence of a common trend in Tuscan prices.

In order to verify the initial hypothesis, the total production of wheat, oil and wine of the farm was calculated from 1858 to 1889. This was achieved using the values of the individual production units.

Subsequently, a comparative analysis was carried out with other regions in order to verify whether elements of crisis are detectable during the 1880s. Data at farm level was compared with provincial data elaborated by MAIC (various years) in order to be able to verify similarities or divergences.

Essay 3 studies how agriculture in the province of Siena reacted to economic shocks such as the Cereal Crisis of the 1880s, the Great War (Zanibelli, 2019b), the "Biennio Rosso", and the advent of fascism. This analysis is based on original and homogeneous data at a municipal scale, which is difficult to find without accurate archive research. In addition, this study uses the results of the *Catasto Agrario* of 1910 for the province of Siena (BCAS, 1910), which was never been published.

As an initial analysis it was observed how crises affected Italian agriculture between 1880 and 1929 (Fenoaltea, 2006) and subsequently all the idiosyncrasies that make Siena an interesting regional case study, given the predominance of sharecroppers on total provincial population and the high percentage of agricultural population, as compared to the whole Tuscany.

Factors of production and production have been estimated at an aggregated level from the 1880s to 1929. The important role of the *Consorzio Agrario* of Siena has been also explored. Aggregated production was calculated on the following products: cereals (wheat, corn, barley, rye and oats), oil, legumes and wine. In order to calculate the value of the production, the prices of the Siena market recorded by the *Mercuriali* of the prices kept at the archive of the *Camera di Commercio* of Siena were used.

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ESSAY 1

THE FIRST MOMENTUM: THE ORIGINS OF ITALIAN AGRICULTURAL GROWTH. A REFLECTION ON THE EIGHTIES OF THE NINETEENTH CENTURY.

ABSTRACT

The problem of the initiation of agrarian growth, which had affected by historiography in the first decade of the second half of the twentieth century, began to attract new attention within the debate between historians and economists, thus paving the way for further epistemological interpretations. This study, starting from a literature review, aims at the identification of the fundamental elements of the Italian agriculture's taking off during the 80s of the 19th Century.

KEY WORDS

Agriculture - Growth - Protectionism - Wheat - Liberal State

Introduction

Recent contributions have led to look at the 1880s under a different perspective regarding the evolution of the agricultural economy, in respect to the traditional view of crisis, that has characterised the Italian economic historiography for many years. According to this new interpretive strand, seeing Stefano Fenoaltea (2020) as the greatest exponent, it is at that time that a first taking off attempt for the Italian agriculture, and in particular crops specialisation was retrievable.

Starting from these works, the objective of this study is to verify whether it is possible to anticipate agricultural growth, or rather to identify its basis (albeit an embryonic form), before the "boom giolittiano" which, according to this perspective, could be likened to a consolidation phase of a previously arisen positive trend, rather than to an agricultural taking off in parallel with the industrial one.

The analysis was carried out through a quantitative approach on the development of the main agrarian products, paying special attention to wheat and wine. The study was realised by using the ISTAT time series of the Italian agriculture, and the statistical yearbook of the period.

The work presents the following structure: a reconnaissance of the main historiographic interpretations on the development of agriculture in the post-unitary years and an analysis of the eighties of the nineteenth century to identify the main and contributing causes that would anticipate the start of the growing process of the Italian agriculture.

Although such a synthesis should not be seen as exhaustive due to the complexity of the phenomenon, the historiography agrees on the fact that the evolution of the Italian agriculture from the Unitarian period to the consolidation of the Fascism can be divided into three macro-periods: 1861-1880; 1881-1896; 1897-1925, and this according to a classification that takes into account the convergences and divergences within the macroeconomic analysis of those countries that like Italy

initiated the process of late-comer development (Bevilacqua, 1992; Accademia dei Georgofili, 2002).

However, when we think of the readiness of the German case and wanting to compare the two realities in relation to their late unification process compared to other European nation states that, since centuries, had already accomplished the process of "building the nation" (Cameron and Neal, 2003).

As Francesco Galassi and Jon S. Cohen wrote (1992), the periodization used in this research is also suggested by a study on the average increase in the value-added growth of agriculture, which, from 1861-63 to 1928-30, grew by 0,7%. According to the new estimates made by Federico for the Bank of Italy, in reality, growth would be slightly higher (1,48%)[1], as critically pointed out by Fenoaltea (2020), these small divergences can be identified in the different estimation methods.

Starting from the traditional historiography, if we analyse some historical periods within the so-called "boom giolittiano" we can see that the social policies carried out by the statesman of Dronero, had significant results for the agriculture.

In the years 1895-1914 (according to the new estimates) the geometric growth rate of the agricultural added value was 2,53%, the highest figure for agricultural growth in the period under review. Confirmation of this can be found by comparing the period 1914-1926 (up 18,08%) 1926-1930 (-11,98%) where you can clearly see negative growth. The picture that appears from this analysis, however, needs a historical-institutional contextualization that allows to be able to identify exogenous and endogenous factors that contributed to the growth and subsequent period of decline, it is for this reason that it becomes essential to identify where the causes that led to the reversal can be grasped; the result can be found in the Giolittian period.

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[1] For the updated data on the added value of agriculture, see the new historical series produced by the Bank of Italy. The growth rate was calculated through the logarithmic regression line of the equation $LOGVA = \alpha + \beta_t$, *VA* corresponds to the Added Value variable of the Crop and Beta
are values and *beta* =ln(1+r) to be estimated. Being *b** the estimate with the lowest ordinary squares the rate of growth as a percentage is obtained: {[exp(b*)-1]*100}.
Summary model: R^2 =0,67***. Sign. Lev. *** 0.1%; ** 1%; * 5%.

Although it doesn't see so right to speak about growth equal to or less than zero, the First world war, played a decisive role in the growth decrease. The agrarian mobilization significantly changed the productive balance of the Italian agricultural economy by concentrating all resources in favor of food supplies for troops and this emphasized all the problems that characterized what is commonly called as an *Fronte Interno* (Soldani, 2010). The Italian agriculture and in particular the sharecropping areas were able to support the brunt of the war effort, but this was possible thanks to factors such as the pax temporal between masters and settlers and the sharing of public and private capital in support of agriculture, as it emerged the case from some sample studies on a provincial scale (Zanibelli, 2019).

I. The historical debate on Italian economic development in the post-unitary years

To the scholar who approaches the research question presented above, some questions arise spontaneously that seem right to be reported: does it make sense to compare Italy with the other European states that, excluding Germany, had already reached the process of national unity for several centuries? And was a rapid transition to intensive agriculture feasible for Italy?

The Italian agriculture was based on several regional systems and it seemed difficult to achieve a reversal that would transform a mainly extensive system into an intensive one modelled on the *Padania Felix*[2]one. Trying to create a unified Italian agriculture from so many regional agriculture models was not an easy task, as it was not easy also to identify a line of development that could abandon the old economic theories replacing them with the neoclassical one, and in particular for the new implications the international economy was taking for the transport's modernisations and the contribution of a particularly equipped chemical industry. As you can see, although the new trends in economic history are able to give explanations to any questions, many doubts still persist.

[2] The term Padania Felix refers to a specific geographical area in which agriculture helped to significantly improve the standard of living of the population. This is to emphasize the substantial differences in living conditions between North and South

And one of them is whether the 1880s were really shaken by a disastrous crisis or if the phenomenon was more mitigated.

Returning to our periodization of Italian agricultural history, it is clear that the debate on the first twenty years, often harsh, between historians and economists offers significant ideas for reflection and analysis. Before starting the literature review it is crucial to point out that the statistical elaborations made available to the pioneers of the Italian agricultural history, were different and less precise than the current ones.

The Italian agriculture of the post-unitary years has risen the attention of illustrious historians such as Rosario Romeo (whose studies were later taken up by Guido Pescosolido) and also by historical economists such as Gerschenkron, and then fade a little before the arrival of the cliometry, which objectively, revolutionized the world of economic history, by giving a strong and decisive change of course towards economics, at the expense of traditional historical and economic research (which as a border discipline had favored the birth of important studies).

The cliometric approach to date presents some methodological issues (particularly with regard to primary sources) that puzzle the traditional historian accustomed to the contextualization of phenomena and their explanation through different qualitative factors. Despite these legitimate doubts, quantitative vision can be an enrichment when used within what is commonly called the historical method. In such a perspective it becomes an element of growth for research.

During the years of the Economic Miracle Gerschenkron (1955, 1968) proposed to the scientific world an index of the Italian production from 1881 to 1913 (built on mining, metallurgical, textile, mechanics, chemistry and food) where he identified a period of growth in the first phase (about 4,6% per annum) and then seized a slight recession (0,3%) in what is commonly called the crisis of the 1880s. Gerschekron indicated rapid growth (6,7%) in its estimates which had led to the 'boom' of the 70-year-old, a figure that was destined to decrease during the years of the Libyan War, a phase which is not referred to in his analysis. According to the scholar, this growth had presented problems for during the take-off period the own estimates of the modernization of other countries

(8-12%) had not been reached. For Gerschenkron, the great flaw of Italy's late industrial take-off was identifiable by the state's erroneous economic policy, which had not protected the most innovative industries and also implemented a risky customs policy. The protectionist wheat policies of 1887 promoted by the Depretis government had therefore, according to the scholar, been detrimental to the industry as interventions to protect wheat had damaged the emerging sectors. Gerschenkron seemed to take back Ricardo's model of differential annuity where protectionist measures had been viewed negatively for the economy (Ricardo, 1815)[3].

He therefore identified the entry of German capital into the mixed banks which had replaced the state in the take-off's management, as an exogenous variable of the industrial development.

The study of the Russian-American historical economist opened a strong debate among historians including in particular Rosario Romeo who had already dealt with the problem and responded, by setting the question (in what was called the Romeo-Gerschenkron controversy) according to the traditional historical method.

He also strongly criticised Sereni's positions and therefore the Marxist and *Gramsciana* according to which the "Risorgimento" would not produce the agrarian revolution that Italy needed (Sereni, 1974). According to Romeo, the revolution could never have occurred because of the impediment of foreign powers, nor were there the conditions that fulfilled the vision of Sereni who, with reference to the different outcome of the revolution French, denounced the lack of a trust link between the state and the rural masses, as a possible political prodrome of the agrarian take-off (Romeo, 2008; Pescosolido, 2009).

For Romeo, having a clearly traditional setting based on the Rostow (1959) model, the economic development can only take place through the development stages, so that the eventual agrarian revolution would have brought prosperity among farmers, but would also have caused a capital dispersion, that would have delayed the development itself. His growth model was based on the

[3] On the subject of Italian trade in the period covered by this research, see: (Tena, 1992; Federico and Tena, 2014).

idea of accumulation of capital that comes not from the agricultural wage, rather from the land income and from the savings through the intervention of the state that, by adding up the public debt, creates the basis for the creation of an infrastructure system (Romeo, 1988).

The controversy between Romeo and Gerschenkron can be summed up by trying to pinpoint the role of the state in the growth process. The idea of an absent state does not seem entirely correct, while it would seem more appropriate to speak of little attention to the real problems of the nation, as confirmed by the measure relating to the sale of ecclesiastical land (1866) that ended up in the hands of the big owners, not being provided for protection and aid for small owners and thus significantly increasing the value of the agricultural annuity Over the years historiography has returned to address the subject and distinguished scholars have entered the debate with seriousness. Among these, one of the most original contributions comes from Stefano Fenoaltea (1993) who, thanks to the debate that developed after the Romeo-Gerschenkron's controversy, has brought new light to the post-unitarian period Scholars such as Bonelli (1988) and Cafagna (1989) linked the beginning of the accumulation process to the first half of the nineteenth century thanks to the export of silk with a consequent increase in imports of raw materials without all this creating problems for the trade balance.

According to Bonelli, the National Unity brought benefits for the proper use of taxes and tariffs, so that its interpretation would seem to be very close, at least in principle, to that of Romeo in which the state had been attentive to the needs of agriculture. The historian also points out how what is called as the original accumulation at the beginning was used essentially to grow the population and then evolve into an investment in the most marketable products, From the study of Bonelli's work emerges what we could define as an economy based on necessity and almost purely monopolistic, and based on the needs of the moment, that did not benefit from the Italian agrarian take-off.

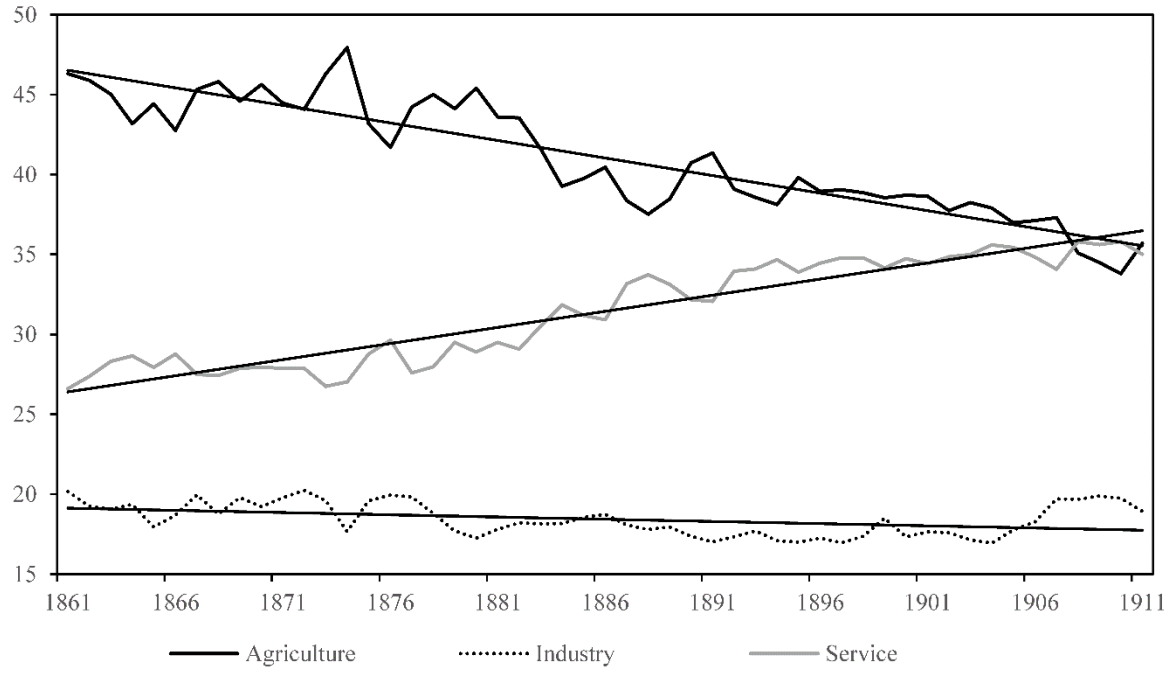
Recently the economic history of agriculture has lived through a period that we could call flourishing, thanks to the studies of Giovanni Federico (2003) and others who, with a substantial use of complex economic analyses, have offered new tools to be able to deal with the problem with

greater rigour (Zamagni and Ciocca, 1994; Ciccarelli and Fenoaltea, 2007; Federico and Cohen, 2001; Carreras and Felice, 2007; Battilani et al., 2014).

The scholar through a work promoted by the Bank of Italy, to which must be added that of Alberto Baffigi on the GDP (Baffigi, 2015), recalculated the series of large aggregates made by Ercolani, Fuà and Maddison for among economic historians doubts persisted about their composition.

To date, the historical debate on the period remains essentially open, the new investigative techniques and the work of Federico and Baffigi, among others (Felice and Vecchi, 2015), have allowed to acquire new elements and at the same time to have more certain data, but there are still many questions to which, probably, analyses of local dimensions could try to give answers.

Figure 1
Impact of value added agriculture on Italy GDP 1861-1911



Reference: Own processing from: Serie Storiche Banca d'Italia.

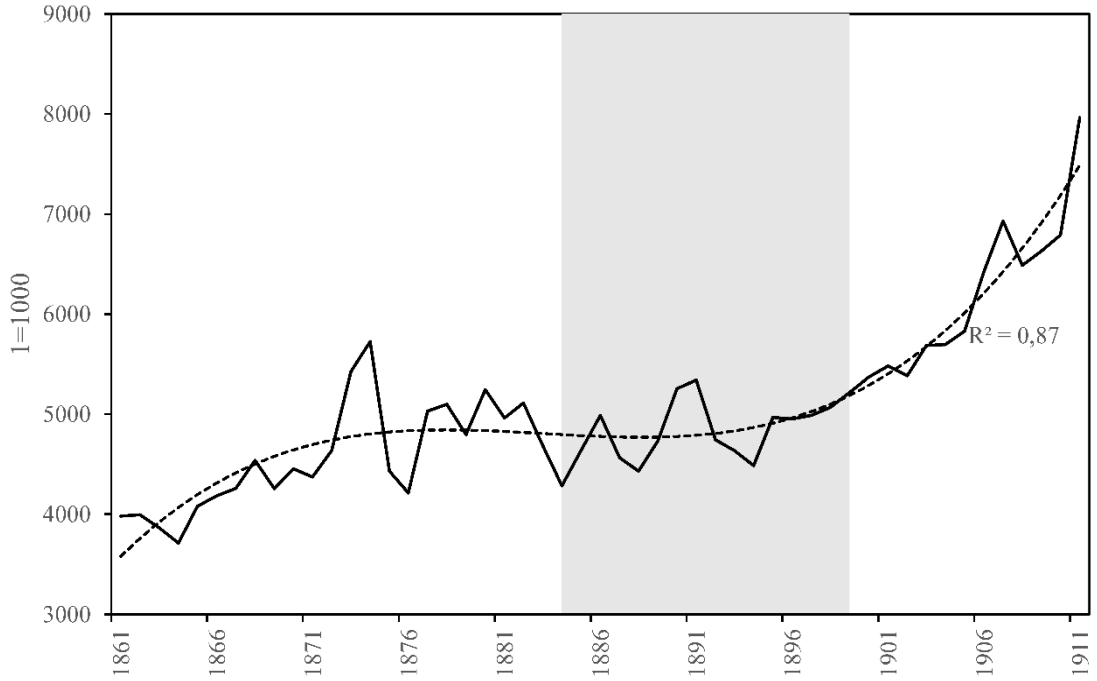
The graph (**Fig. 1**) on the new estimates of sectoral value added shows an increasing trend in agricultural value added since 1879, for the period analyzed in this study. In recent years it is significant to note that measures to support agriculture led to a decrease in the value added of

services and industry. If we look at the trend line we can see that it shows a slightly negative slope (-0,22). Focusing on the slope of the line, it is noted that the added value of the agricultural sector begins to slightly decrease, compared to that of services which has a positive slope (0,20) and tends to get closer and closer to the values of agriculture, as the "Short Century" approaches. The graph also shows a substantial static of the value of the industry, whose the trend line of which has a slightly negative slope (-0,03), until the take-off of the early twentieth century. What is striking is the slight growth of the agricultural sector in the period from the late 1870s to the beginning of the 1880s where the recorded values are higher than expected. In this regard, if we focus on the trend of the sector value of agriculture (**Fig. 2**) we can see that the latter showed a linear trend, albeit with periods of rapid growth and decrease, and then moving towards rapid growth from the early years of the twentieth century.

For this reason, the trend is not linear but polynomial[4] as confirmed by the R^2 determination coefficient. As it can be seen from the graph, a first momentum can be seen from the early 1870s, which was arrested in the following years due to the Great Depression. As can be seen from the graph, a first momentum can be seen from the early 1870s, which was arrested in the following years due to the Great Depression. In the period of maximum crisis, highlighted in gray, it is seen that in some years the series shows higher values than those expected by the polynomial regression of growth and that therefore the idea of a strong agricultural crisis should be reconsidered, it is therefore not wrong to develop reflections that lead to rethinking the evolution of the rural world in the eighties of the nineteenth century.

[4] It have opted for a third degree polynomial trend line being the large and fluctuating dataset. The linear forecast had a lower determination coefficient, thus becoming less suitable for detecting the series' growth trend.

Figure 2
Value-added agriculture trend Italy 1861-1911



Reference: Own processing from: Serie Storiche Banca d'Italia.

Trying to combine the historical and statistical-descriptive survey it is important to note that immediately after the Unity the ruling class had to face serious problems at least in the agricultural field as they have been well highlighted in the Jacini inquiry (1885), especially for the South where, at least according to traditional interpretations, the fight against brigandage would have significantly slowed down the process of integration of the South with the rest of the country. The Jacini inquiry, however, had to deal with the real priorities of the State: to build an administrative machine through laws, taxes and tariffs. Recent work has shown great interest in these issues by offering new research perspectives and also quantitative data that rather than zero growth appears more correct to talk about slow growth (Lupo, 1990; Federico, 1997; Pescosolido, 1998; Felice, 2005, 2006; Perrotta et al., 2012; De Lorenzo, 2013; Felice and Vasta 2015). Jacini's vision was still tied to Malthus's vision, fearing that a scarcity of resources would lead to a halt in growth. To this must added that at the dawn of the 80s of the nineteenth century more than 50% of the population

(**Tab. 1**) continued to live on agriculture and that, although with some physiological declines, it continued to be the driving sector of the Italian economy (Villani, 1988).

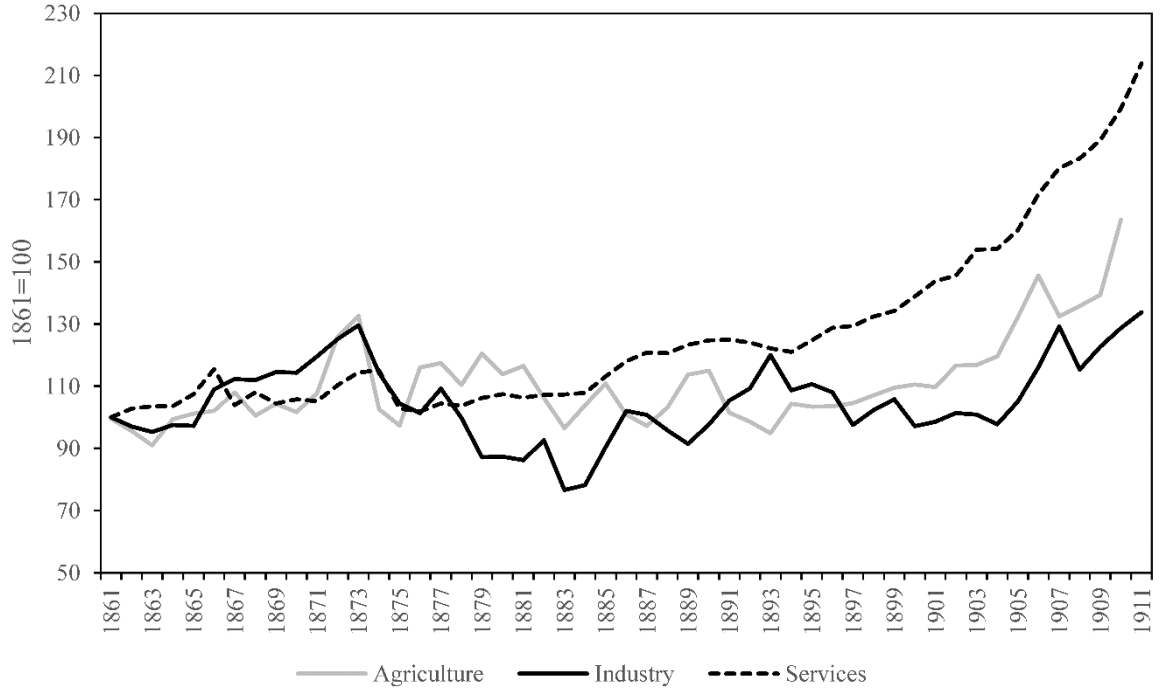
Table 1
Percentage of workers by manufacturing sector 1861-1881

	1861	1871	1881	Δ% (1861-1881)	Cv
Agriculture	62	62	57	0,54	0,053
Industry	25	24	26	1,12	0,097
Services	13	15	17	2,4	0,192

Reference: Own processing from: Serie Storiche ISTAT, ISTAT (1871-1881). Notes: Δ%= growth rate; Cv= coefficient of variation.

Employees were also calculated with a growth index (1800=100) of productivity per worker in the three sectors (**Fig. 3**).

Figure 3
Value-added performance of the th sectors per employee Italy 1861-1911



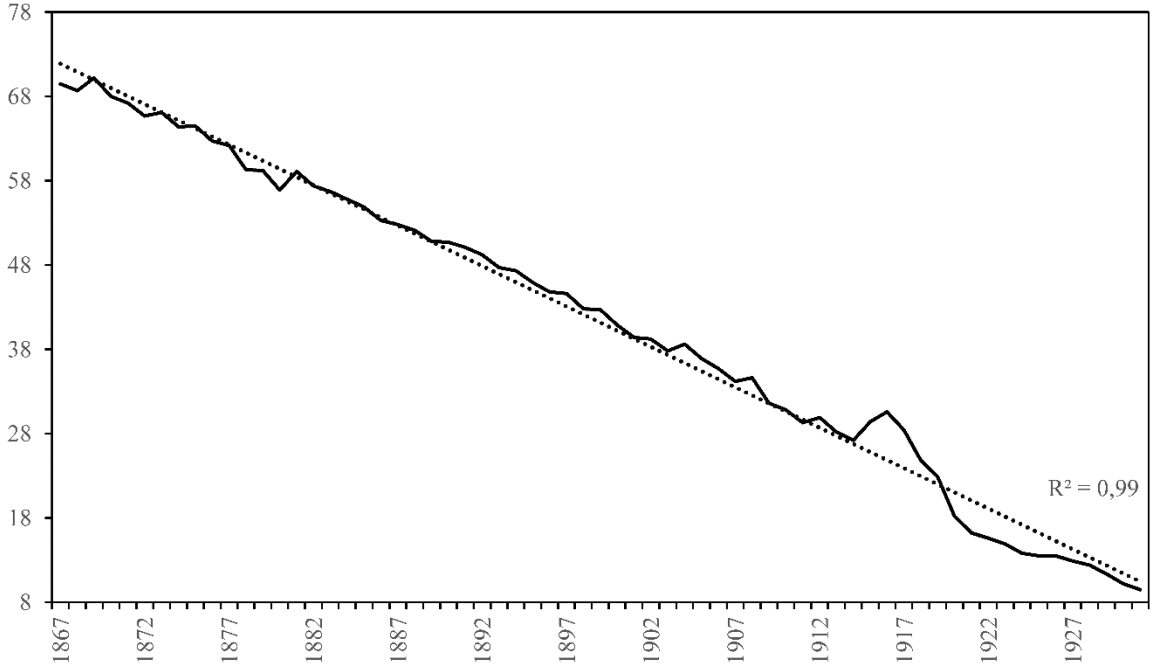
Reference: Own processing from: Serie storiche Banca d'Italia; FELICE (2013).

This additional indicator allows further explanatory elements to be acquired for the years covered by this research. The historical series clearly shows how between the end of the 1870s and the beginning of the 1880s productivity per worker in the agricultural sector had grown more than in other sectors, the industry showed a sharp decrease compared to the base year. Nevertheless, the trend of agriculture, excluding these slight variations, was almost homogeneous until the end of the nineteenth century when it began to grow significantly along with that of industry. What emerges from this analysis is that the years of cereal protectionism helped the productivity of the service sector to increase. These anticipate other sectors in take-off both at a chronological level and in terms of growth rates.

As has been widely explained in the literature, the work's productivity is linked to the formation of human capital and with regard to the Italian case there were still many questions (which cannot be divided by the economic survey), one of them that of education based exclusively on the model of the classical high school devised by Gabrio Casati in 1859 for the Sabaudo State, favoring the formation of bureaucracy to the technical-agrarian one (Raicich, 1980). To this it must be added that the rates of illiteracy were very high during the unit period and then fade slightly during the eighties and nineties of the nineteenth century as confirmed by the percentage of newlyweds (Fig. 4) who during the period 1867-1931 signed the act of marriage with a cross because he could not read or write, despite the fact that in the twenty years studied there is a variation of the annual geometric growth of -2,32 % , most likely due to the early effects of the Coppino Law (1877) on primary school and later the Daneo-Credaro of 1911. Looking at the slope (**Fig. 4**) and slope of the regression line, we see that the trend is decreasing, the goodness of adaptation of the linear model is confirmed by the R^2 determination coefficient that has a value close to 1. Shifting the focus to the period of the Great War we can see that the percentage of illiterates grows more than the expected values, but the phenomenon appears easily explained due to the contingencies of the conflict. This, however, did not hold back the advance of the fight against illiteracy as it can be seen for the years following the First World War, during which values are recorded below the linear model. The

problem of agricultural training is also clear through an analysis of the historical series on the education of the period covered by this investigative work. The data confirm (**Fig. 5-6**) a strong concentration towards classical education at the expense of the technical and in particular the agricultural education, especially with regard to the number of students enrolled (Genovesi, 2010) [5].

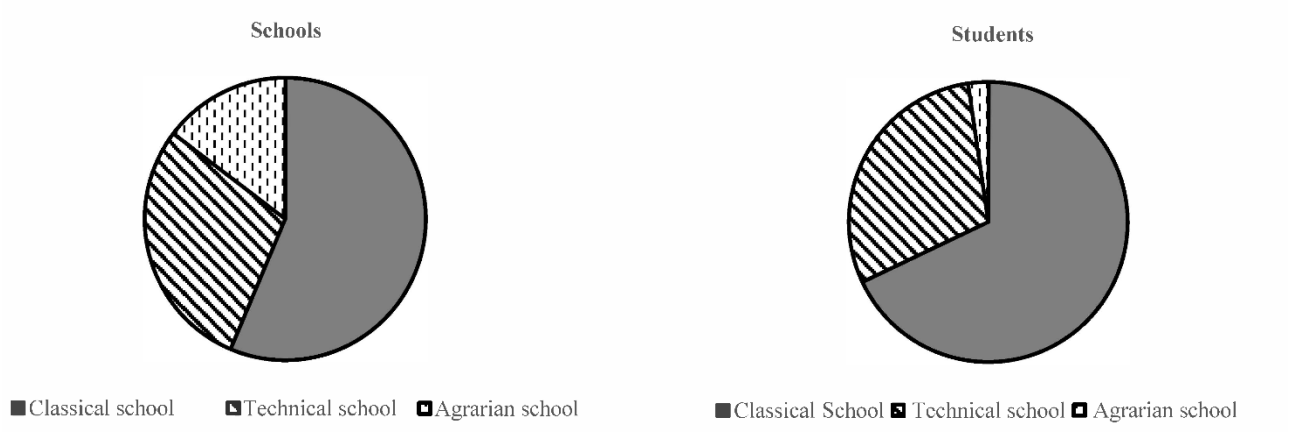
Figure 4
Incidence of illiterate spouses Italy 1867-1931



Reference: Own processing from: Serie Storiche ISTAT.

[5] In relation to the historical economic analysis on education see: (Cappelli, 2016; Cappelli and Vasta, 2020)

Figure 5-6
Incidence of schools and students by type of high school Italy 1886

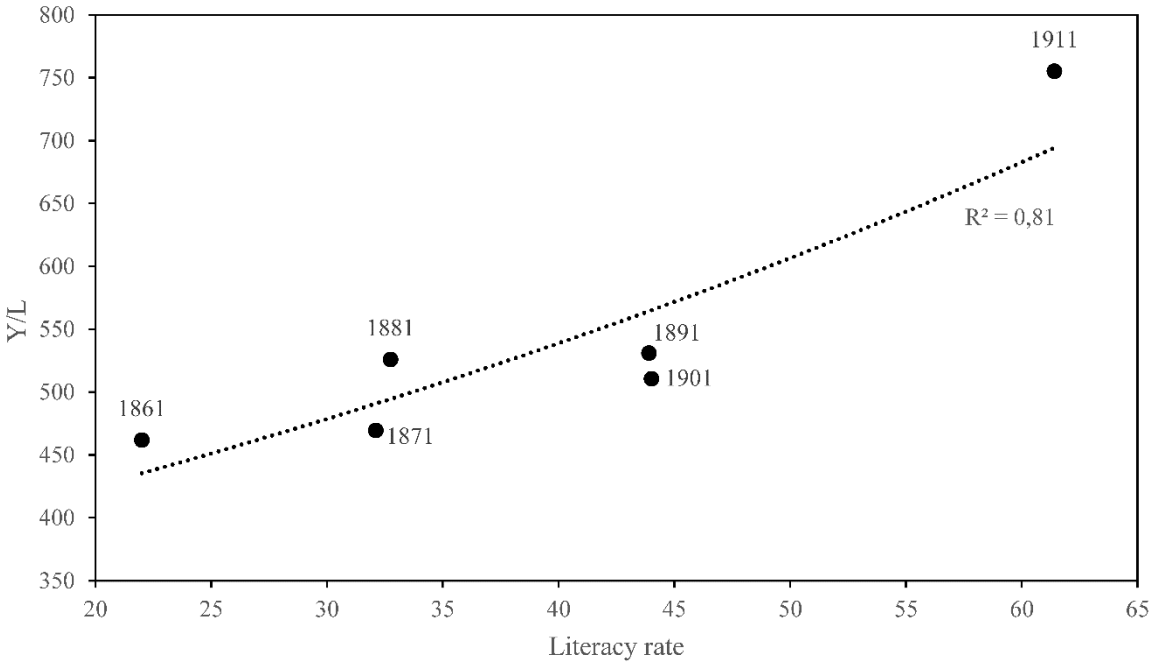


Reference: Own processing from: ISTAT (1886:198, 199, 202, 214. The "Classic Education" series consists of data on Gymnasiums and High Schools:. ISTAT *(*1886:198, 199, 202, 214)

It is therefore clear that there is a close connection between the growth of agriculture and the general development of the country. In this sense, cliometry can help by providing data sets useful to accompany the historical-political-social studies that are now not lacking in Italian historiography (Rogari, 1999).

Using this key, coupled with a rational use of statistical models, and especially by verifying what has developed in some significant territorial realities, it is possible to provide important elements of understanding of the national growth trend of the agricultural sector. In this regard, it was noted that there was a relationship between literacy rate and labour productivity in agriculture between 1861 and 1911.

Figure 7
Relationship between human capital and agricultural labour productivity Italy 1861-1911



Reference:. Own processing from: Serie storiche Banca d'Italia; Felice "Appendice Statistica" (2013:23) (Y/L); Genovesi (2010:246), Felice "Appendice Statistica" (2013:15) (literacy rate).

The graph (**Fig. 7**) shows how the relationship is exponential between the two variables as confirmed by the coefficient R^2. Particularly interesting is the 1881 point, which is above the expected value that would confirm what was already observed, namely an increase in the agricultural sector before 1887 which marked a halt as confirmed by the data of 1891-1901 which are below the values estimated by the regression.

The excellent adaptation of the model makes it possible to observe how an increase in literacy would follow, theoretically, one of the productivity per employee in the primary sector. Although this is a first analysis, it is clear that the agricultural growth would necessarily also pass through a substantial increase in human capital. The idea of opting for literacy as an independent variable of the model seems to find a natural explanation for the fact that at least until the Gentile reform higher education was intended for figures to hold positions within the public sector, although as well was written by Vaquero Piñeiro (2011) regarding the training of agricultural agents, essential figures within the agrarian development process. The studies of Vaquero Piñeiro have raised, with regard to

the Italian case, the need to invest in territorial studies to try to understand the evolution of macro phenomena through surveys of a sample nature through which it is possible to acquire more explanatory variables than those that can be detected on a national scale.

II. Italian agriculture in the years of protectionism. Economics and history an comparison

If, as previously anticipated, it is a common interpretation that the Giolitti's period marked the growth of the Italian agriculture, from a careful analysis the prodromes of take-off could be identified at least twenty years earlier. In order to hope to meet some significant results, we must focus on the last twenty years of the nineteenth century (1881-1896), because that is where we need to investigate in order to catch the first signs of a reversal (Ciuffoletti, 2017).

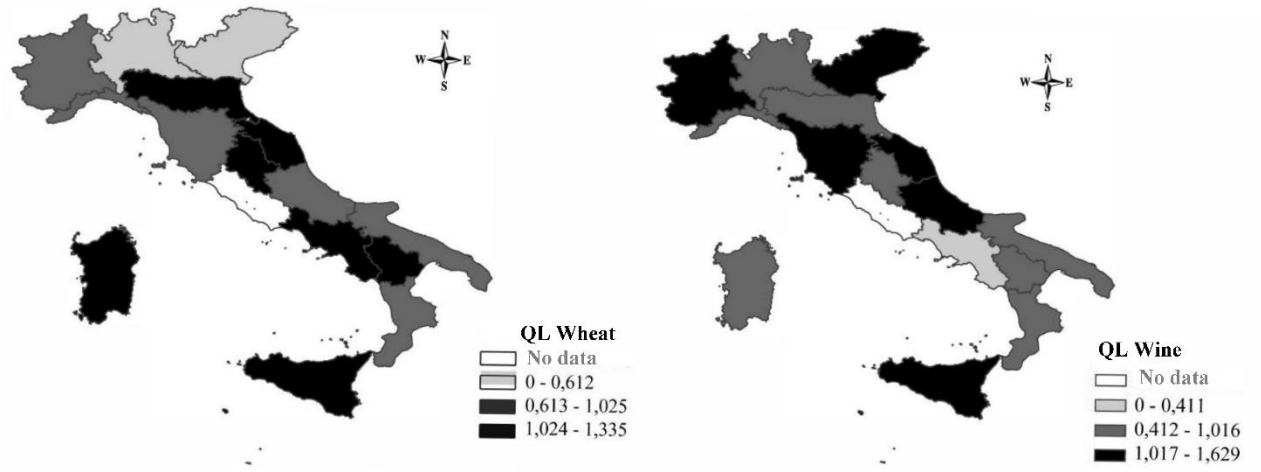
What is interesting is to dwell on the period before the protectionist wheat laws came into force in order to be able to fully understand the agricultural policies of the years to come, in the belief that in these years that the interpretive key can be found to try to explain a process that then converged into the fascist *ruralista* model.

Before proceeding with the specific analysis of the research question, it seems consistent to observe some key aspects of the Italian agricultural economy in 1881, by reconstructing all the indicators that the literature identifies as symptomatic to measure the level of agrarian modernisation of a country.

The general census of the population shows that much of this, over 50%, had its main occupation in agriculture (Vitali, 1970) and that therefore Italy continued to be a nation with a mainly agricultural vocation, this is also confirmed by calculating the incidence of the rural population on the total on a regional scale (Vitali, 1970). The values are in a range from 24,21% (Sicily) to 41,27% (Umbria), whereas the figure for Italy is 31,51 there is a certain homogeneity of the distribution of the rural population throughout the Italian territory. In 1881, the distribution of the main crops in the different Italian regions was reconstructed (ISTAT, 1881). The basket of crops used for spatial

analysis has been identified by inserting the main productions of the Italian agrarian world[6]. The localisation quotient *QL* of wheat and wine was calculated as the first indicator to see where these crops were mainly located along the peninsula[7].

Figure 8-9
Wine and Wheat localization 1881.



Reference: Own processing from: ISTAT (1881).

The cartograms (**Fig. 8-9**), made with GIS technology, allow you to develop some interesting reflections. Wheat, the cereal that underpins the European diet and which has also marked its growth in some respects, we can see that it is located in most of the regions of the South but also of the North Center, the wine instead has a localization in those areas where a specialization process had already started and that subsequently will be destined to acquire a leading role within the market that will continue until today. In this regard, it is important to focus the attention on Piedmont, Veneto, Tuscany and Sicily. This is in line with the latest work by Manuel Vaquero Piñeiro (2019) on the exports of Italian wine. By shifting our gaze towards the quantities produced,

6 The sample consists of: wheat, corn, rice, rye, oats, potatoes, hemp, flax, wine and oil.

7 The Localisation Quotient was calculated through: $Q^{ij} = \frac{A_i^j / B_i}{A_j / B_j}$ corresponding to the ratio of the *Aij* factor (in this case type of crop) of the region and the national total of the same factor *Bi* divided the ratio between the total factors of the *Aj* region and the national total *BJ*. The values >1 indicate a specialization in factor i of region *j*.

of the same basket of crops used for the localisation quotient, an *IC* crop concentration index was calculated in order to see whether or not a product was spread, values close to or equal to 1 indicate a strong localization of the observed phenomenon[8].

Table 2
Crop concentration index Italy 1881

Production	IC
Wheat	0,14
Grapevine	0,15
Potato	0,18
Corn	0,23
Rye	0,33
Oat	0,42
Flax	0,43
Olive	0,46
Hemp	0,51
Rice	0,64

Reference: Own processing from: ISTAT (1881).

The concentration index of production (Tab. 2) shows that the production of the main crops was widespread throughout the territory, the higher values such as those of rice can be explained in relation to natural factors that necessarily affect the possibility of planting the crop, the nature variable becomes essential within any reflection linked to the world of agricultural production, climatic and soil-formation factors therefore necessarily enter into the agricultural production function. The analyses developed so far bring to light a very similar picture for the whole peninsula, in order to be able to find confirmation of this it was decided to observe also the relationship between land productivity and labour productivity. Using variable logarithms, the Pearson correlation coefficient was calculated to see whether the two variables moved in the same direction. The correlation is 0,61*, so very positive and also significant as confirmed by the p-value[9]. We can

[8] The concentration index was calculated: $C_j = \frac{1}{2}\sum_i \left|\frac{A_j^i}{A_j} - \frac{B_j}{B}\right|$ For the construction see above and takes values between 0 and 1.

[9] Sig. Level: 0 '***' 0.001 '**' 0.01 '*' 0.05.

therefore infer that there were no differences between the input factors Land and Work. As a last resort, to check the state of modernization of the country, it was decided to focus on grain yields and vines, by using regional data, to be symptomatic indicators of the phenomenon. Within the yield per hectare we find enclosed explanatory variables such as work, land and even capital (Ruwet, 1964; Bonin, 1968; Porisini, 1970). Unfortunately, statistical documentation, as already mentioned above, does not allow to observe indicative variables of what is commonly called as technical progress.

Although, as the literature has shown (Porisini, 1970), in the period after 1880 the wheat yields declined due to the arrival of American grains that had brought the best land to specialised crops the analysis can be developed for it was a phenomenon on a national scale and therefore involved all regions. This significantly reduced the price of cereals, between 1880 and 1885 it was -33.33%. The Daziary policies brought back managed to appease the descent and in 1892 there was a value close to the 10-year average of 1870-1880.

In 1881 the average yield per hectare of wheat was 11,27ql and 14,65hl for wine. 37,5% of the regions had a value above the average for wheat and 31,25% for wine. For the latter, there is a strong territorial location. It is clear that, at least for wheat, the decline was in most Italian regions. In this regard, in order to have a more detailed and effective picture, the Peninsula has been divided into three macro-areas North, Central and South and Islands in order to better observe aspects related to inequality and differences between different areas of the country. For wheat, the highest average is detectable in the North (11,66ql), the lowest in the Centre (10,41ql). The South is located just above the value of the central regions (10,63ql). As for wine, the highest yields were in the South (16,59hl) followed by the North (12,73hl), in last place is the Centre (12,73hl). From this first analysis we can see that the values are very homogeneous even for macro-areas. In order to find further confirmation of this, an index of dissimilarity between geographical areas was calculated[10].

[10] $ID_{XY} = 0.5 * \sum |Y - X|$; In the formula Y corresponds to the single observation of Y on the total of Y, and X corresponds to the single observation of X over the total of X. The index is shown as a percentage. In order to obtain a

By identifying the North as an indicator for comparison, the results show that the Centre is dissimilar to 5% and the South to 4,3%.

Italian agriculture was presented in the early 1800s as a sector that still needed significant structural interventions, as confirmed by the strong similarity of the indicators of modernisation between North and South.

The last twenty years of the "Long nineteenth century", according to Galassi and Cohen, can be divided into two additional sub-periodisations with the entry into force of protectionist wheat measures (1888). In the first period (1881-1887) there was a reversal in the agrarian world with a gradual abandonment of granary crops to quickly start a process of specialisation towards processed products such as meat, cheese and wine, as we are also confirmed by the decrease in wheat production and the increase in imports from abroad (Galassi and Cohen, 1992). Milk production had also increased in relation to the growth of cattle, but this showed a slight decline in the period 1881-1890[11]. It is important to point out that in the first fifty years there was no doubling of the number of animals and this ended up having a significant impact in the growth process as production was still strongly linked to animal traction. As a result, after the first post-unitary decade, milk products had grown and in this regard a compound growth index of 10-year averages, cheese and butter was created, identifying the period 1861-1870 as the base year in the following period, confirming the recent literature on the subject[12].

In the decade of customs laws coming into force, the trend was slightly slower and then resumed the initial rhythms in the last decade 1901-1910. As for cheese exports, these were lower in the period 1871-1800 (22.100.000ql) compared to the previous period 1861-1870 (23.100.000ql). These in the eighties doubled and were one of the few products to grow so sharply. This is also due to the

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more precise data and that it was also exhaustive the dissimilarity index was calculated using the total sample of products: wheat, corn, rice, rye, oats, potatoes, hemp, linen, wine and oil.

[11] The growth rate of cattle and buffaloes is reported: 1861-1870=100; 1871-1880=131,30; 1881-1890=159,67; 1891-1900=161,51; 1901-1910=190,44. Growth index of milk production: 1861-1870=100; 1871-1880=119,78; 1881-1890=147,37; 1891-1900=159,58; 1901-1910=182,34.

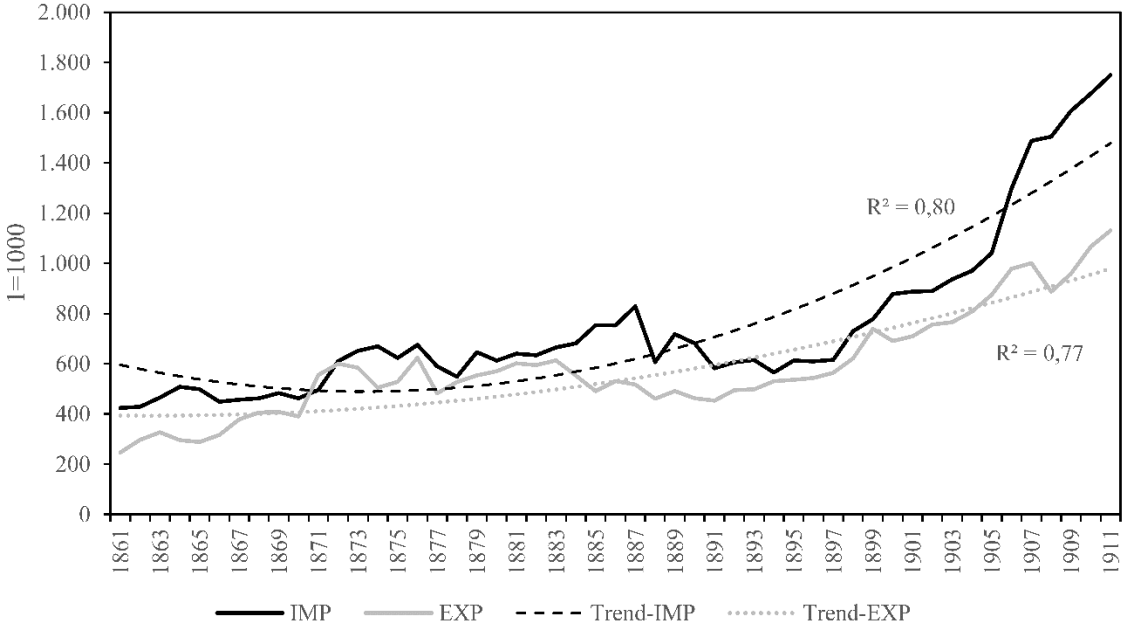
[12] The composite index of milk derivatives was constructed from an arithmetic average of cheese and butter indices. 1861-1870=100; 1871-1880=202; 1881-1890=272,4; 1891-1900=311,2; 1901-1910=396,7. With regard to studies on the history of milk products, see: (Besana et al., 2017)

opening of the “Gottardo” tunnel in 1882, which also favoured the trade directive to Northern Europe. Returning to the analysis on wheat and wine in 1880 Italy imported 2.296.000 tons of wheat and in 1887 the figure grew exponentially to 10.159.000 tons with an average annual growth rate of 23,67%[13]. Protectionist measures led to a sharp fall in imports, as confirmed by the 4.644.000ql. By 1887, the annual decrease had been 17,77%. Shifting the focus to wine exports in 1880, 2.296.000hl of wine were exported and by 1887 the figure had risen to 3.603.000hl with an annual increase of 6,64%. The daziary measures blocked the reversal towards wine by farmers as confirmed by the 1.179.000 hectolitres exported. The annual decrease in the period 1887-1891 was 24,37%.

The following allows us to confirm that after the protectionist measures came into force, the rate of growth in exports and imports began to decline, having a strong impact on Italy's propensity to trade (Federico, 1984; Federico et al., 2011). We will have to wait until the last 5 years of the nineteenth century to be able to return to talk about the growth of Italian international trade as shown in the following chart which shows the trend of imports and exports from 1861 to 1911.

[13] The processing was done using the database: Seriestoricheistat.it

Figure 10
Import and export trends Italy 1861-1911



Reference: Own processing from: Serie Storiche ISTAT. Values are in current euro 2015.

The two series (**Fig. 10**) show a trend of polynomial growth and the values recorded in the period before protectionist tariffs come into force are above the forecast, while for the following years the series are below the expected values. This allows us to confirm the above regarding a slowdown in the Italian international trade.

As reported in the literature in these years there was a change in agricultural production.

In this regard, a comparison between wheat and wine was made by identifying the latter as an indicator to assess the extent of this change, considering the wine as a high-quality commodity and therefore also inclined to export. According to Galassi and Cohen, the shift from wheat to other products increased the supply that led to a decrease in prices and a consequent shift in the supply curve, this is confirmed by observing the relative price of wheat and wine from 1861 to 1911.

Figure 11
Relative price wheat/wine 1861-1911

Reference: Own processing from: Serie Storiche ISTAT. Values are in current euro 2015.

The graph (**Fig. 11**) confirms what Galassi and Cohen pointed out, with the arrival of US grains in European markets in Italy there was a further decrease in the relative price between wheat and wine, we had to wait for the tariffs of 1887 to return to the previous values. Between the end of the nineteenth century and the early twentieth century the price returned to growth assuming a linear trend as can be seen by comparing the observed values with those expected.

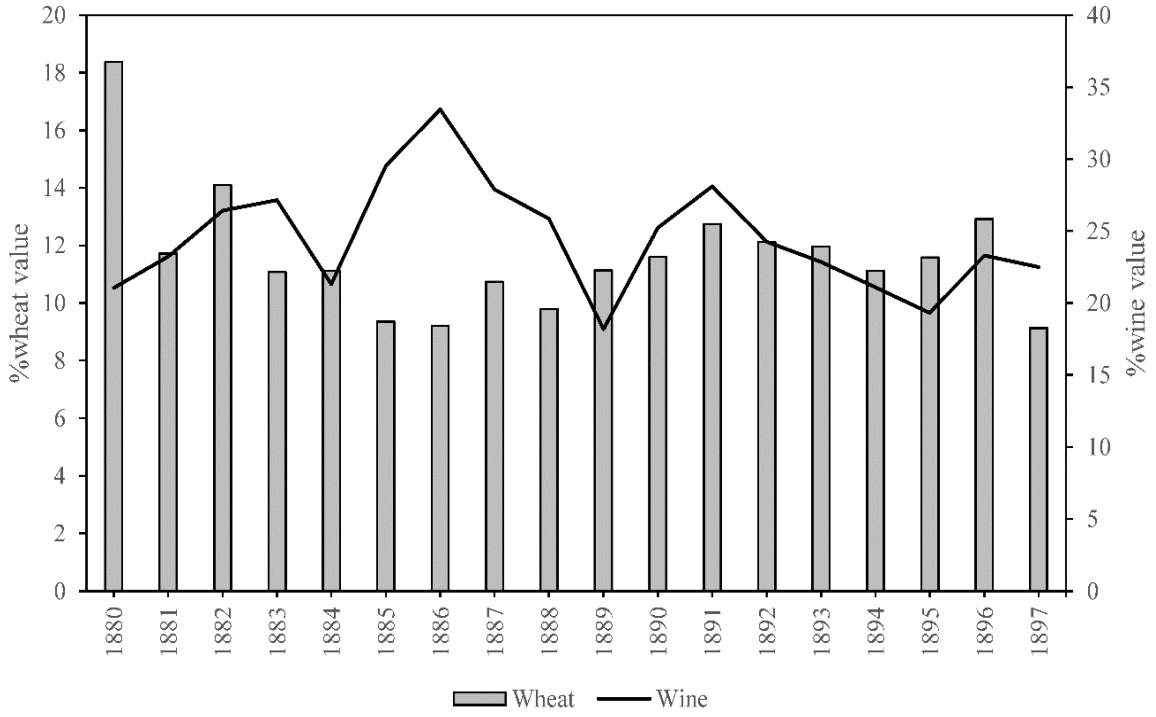
In order to be able to observe in detail the trend of granary and wine production, a basket of the main agricultural products was built[14].

Subsequently, the value of wheat and wine production was compared to the total value of wheat and wine production in order to identify the impact of the 1887 production measures.

By analysing the data in **figure 12** in detail, we can see that after the increase in production between 1881 and 1882, wheat had a period of decline due to the arrival of the U.S cereals on the European markets, whereas wine production was increasing. This would have fallen slowly since the introduction of new taxes to protect granary production.

[14] The basket of products consists of: wheat, maize, rice, oats, potatoes, beans, oil and wine. The units of measurement are in thousands of tons, excluding wine where they are expressed in thousands of hectyalitters. The values were detected by: seriestoricheistat.it

Figure 12
Value wine wheat production 1880-1897



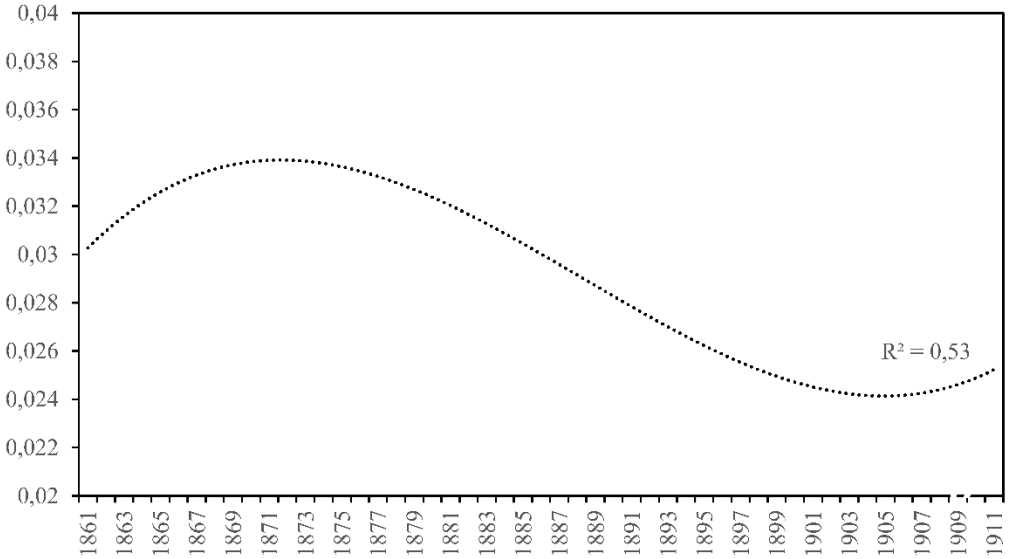
Reference: Own processing from: Serie Storiche ISTAT. The wheat and wine series correspond to the percentage impact on the total production of the baskets of goods above. Values are in current euro 2015.

With regard to wine we can say that, between 1873 and 1884, the cultivation of vines grew considerably also thanks to the attention to a greater specialisation in the care of the plant that led to the birth of five special schools for winemaking (Federico and Martinelli, 2020).

In addition, state interventions must be added to protect the vines from phylloxary and peronospora. Over the period under review, the area cultivated increased from 1.927.000 to 3.167.000 hectares, attesting an average growth rate of 4,6%. As a result, the value of production also increased significantly from a total average of 324.826 lire to 885.329 hectolitres (average annual growth rate of 9,54%) (ISTAT, 1890:610). During the 1870s there was also an exponential growth in exports, from 240,000 hectolires in 1870 to 2.206.000 hectolitres in 1880, in ten years they had grown with an average annual growth rate of 24%. The quantities exported continued to grow until 1887 when 3.603.000 hectolitres were recorded. Growth has declined since this year, in 1888 it rose to 1.829.000 hectolitres, the figure fell again in 1889 to 936.000 hectolitres of 1890 in just three years exports had decreased by 36,20% on average per year. The quantities had returned close to the

values before 1880. Prices had also risen during that period, particularly in the years before protectionist measures came into force. From that date then prices began to fall as can be seen from the chart below (**Fig. 13**) that shows the trend, obtained through the polynomial regression, of the price of wine from 1861 to 1911.

Figure 13
Trend wine price Italy 1861-1911



Reference: Own processing from: Serie Storiche ISTAT. Values are in current euro 2015.

Returning to production, as it can be seen from **Table 3** showing a sample survey, the increase in vine cultivation did not occur in all regions in a homogeneous way. Although the data in our possession do not allow us to carry out a detailed analysis, however, it allows us to find some confirmations of a reversal of agricultural production in favor of specialized crops and high-quality products. This is also confirmed by Ratio 3 of the individual locations that show very positive percentages of production growth in Piedmont, Lombardy and Sicily.

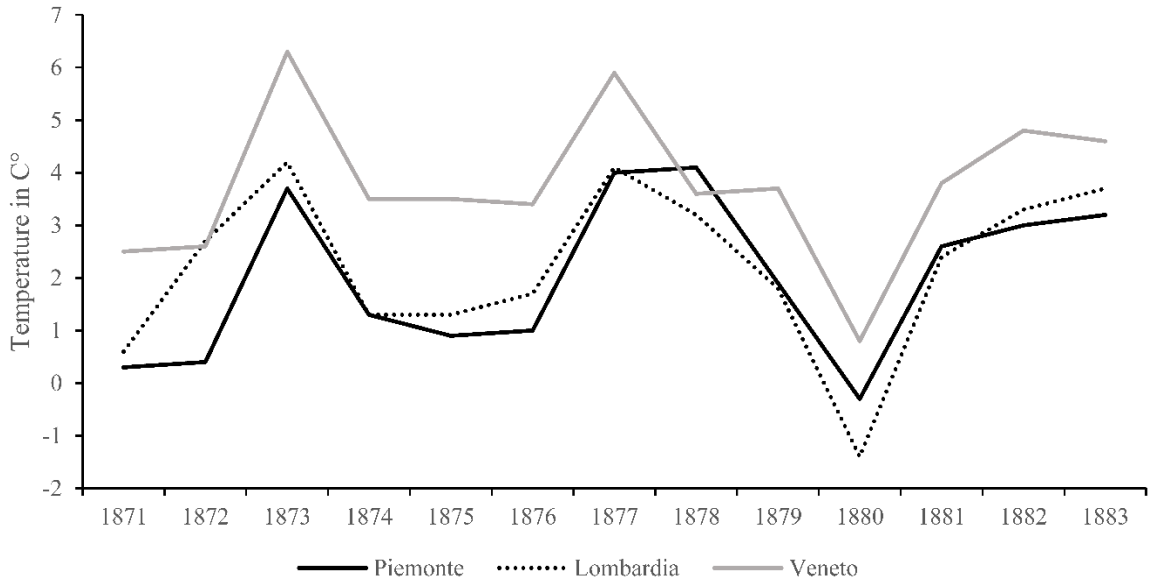
Table 3
Wine production trend Italy 1870-1883

Provinces	1870-1874	1879-1883	R^1	R^2	R^3
Cuneo	494.506	870.539	5,46	4,38	76,04
Alessandria	933.750	2.404.570	10,30	12,11	157,52
Sondrio	53.316	138.605	0,59	0,70	159,97
Reggio Emilia	244.200	451.747	2,69	2,27	84,99
Ravenna	144.991	398.672	1,60	2,01	174,96
Perugia	606.408	1.024.815	6,69	5,16	69,00
Livorno	60.673	142.500	0,67	0,72	134,87
Roma	835.924	1.917.782	9,22	9,65	129,42
Foggia	306.600	659.308	3,38	3,32	115,04
Bari	752.822	1.359.643	8,31	6,85	80,61
Lecce	302.400	854.240	3,34	4,30	182,49
Caserta	395.941	759.629	4,37	3,82	91,85
Napoli	330.220	624.293	3,64	3,14	89,05
Avellino	335.019	776.767	3,70	3,91	131,86
Salerno	383.688	814.727	4,23	4,10	112,34
Messina	316.320	870.558	3,49	4,38	175,21
Catania	723.801	1.463.807	7,99	7,37	102,24
Siracusa	554.800	1.824.845	6,12	9,19	228,92
Trapani	837.490	1.326.757	9,24	6,68	58,42
Cagliari	227.615	579.206	2,51	2,92	154,47
Sassari	223.212	600.135	2,46	3,02	168,86
Total	9.063.696	19.863.145	100	100	119,15

Reference: Own processing from: ISTAT (1890:610). Notes: The values are in hectolitres. R^1 and R^2 correspond to the percentage of the provincial data on the total kingdom; R^3 represents the annual growth rate between 1870 and 1883.

Summing up we could say that, at least 4 factors contributed to the increase in wine production: new pruning systems (low); the use of chemical and natural fertilizers; the use of pesticides and the abandonment of vine farming with plants such as maple in favour of the specialised (Rossetti, 1930). The reversal towards wine production at the expense of cereals is part of what Mokyr describes as a weak sector which, as a result of structural changes, tends to replace what was formerly the driving force (Mokyr, 2002).

Figure 14
Winter temperatura trend Italy 1871-1883

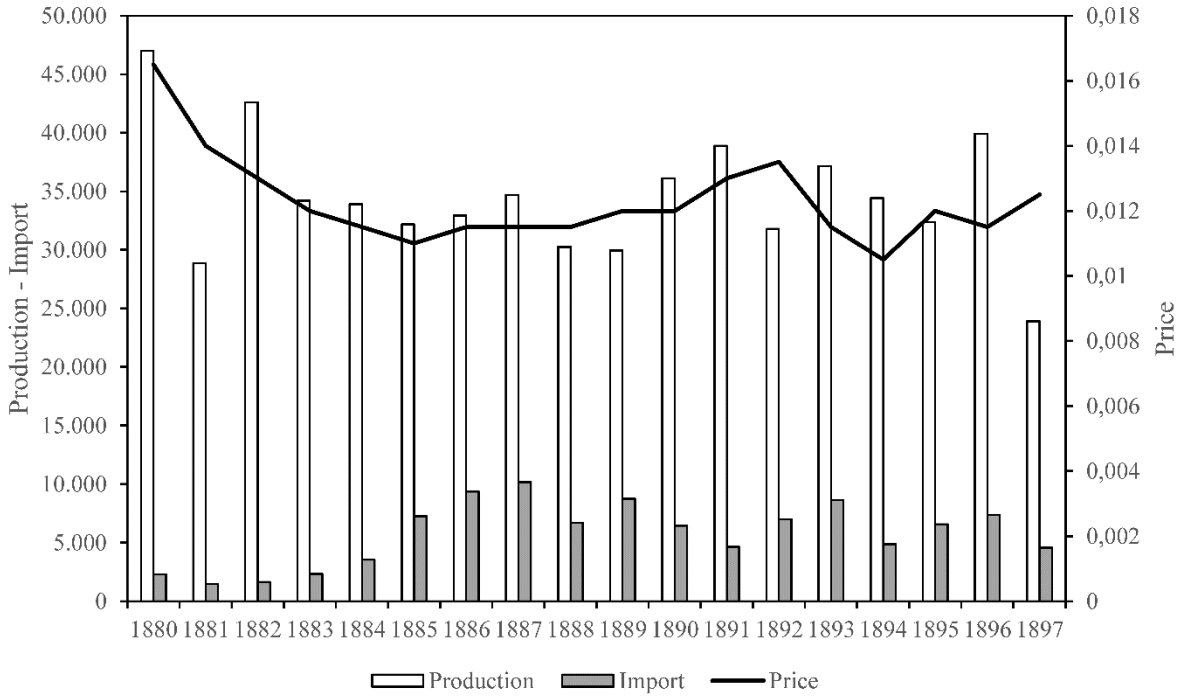


Reference: Own processing from: ISTAT (1900)

We must also specify that in the North production was affected by the frost of the year 1879-1880, as shown by the temperature data that fell significantly in the regions analysed (**Fig. 14**). In addition to this, the rise of the livestock industry in the "Padana" area must also be added. Going back to our analysis on wheat we can see that starting from the theories of Gerschenkron, Romeo and Luzzatto (what Fenoaltea calls the "pessimists"), we can see how according to these scholars the protectionist period was undoubtedly a time of crisis and increase in poverty (Romeo, 1959; Luzzatto, 1968; Gershenkron, 1995).

In other words, if we try to analyse the phenomenon from wheat we can take the theories of those who argue that it is not right to talk about a period of crisis but rather that it is not risky to be able to say that there was economic growth, in serious consideration.

Figure 15
Wheat production, import and price 1887-1897



Reference: Own processing from: Serie Storiche Istat. Notes: Price=Euro-100Kg. Values are in current euro 2015; Production=100Kg*1000; Import=100Kg*1000.

By analysing the economic data for the period, it can be seen that protectionist measures caused a distortion in the distribution of resources, resulting from the decision to concentrate most of them towards wheat. As can be seen clearly from the graph (**Fig. 15**), which compares the quantity of wheat produced and the price of cereal, the decrease in production (for the years before the protectionist measures came into force) corresponded to a consequential increase in imports which caused prices to fall. Imports grew significantly from 1885 (7.326q) to 1887 (10.159q) and then fell sharply in 1888 (6,698q). If we want to try to delve into in more detail the change between price (R), production (Q) and imports (I) for the years 1881-1896 we can see the following between the three coefficients of variation (Va)[15].

$$Va_I > Va_Q > Va_R$$

15 Va_I=0,45887313; Va_Q=0,11690557; Va_R=0,088187793

So by comparing imports, production and price we can see that the greatest variation is found in imports, followed by production. This confirms how protectionist policies were successful in reducing the quantity of imports and also that the price of cereal was that, among the three data analyzed, which suffered less variation. This consideration offers new elements in order to be able to draw up an analysis of the period. Moreover, if we focus on the territorial distribution of wheat crops between 1883 and 1895, it can be noted that there were growth rates, although not striking, confirming that protectionism did not result in a return to investing decisively in granary production.

Table 4
Hectares for wheat cultivation 1883-1895

	North	Center	South	Italy
1880	1.294	940	2.198	4.432
1895	1.384	996	2.193	4.573
R_1	0,45	0,39	-0,02	0,21

Reference: Own processing from: *Annuario Statistico Italiano,* ISTAT(1887-1888, 1894, 1897). Notes: The values are shown in the scale 1=1.000ha. R_1 corresponds to the average annual rate of change.

The data in the **table 4** show that the average rate of change for the twelve years surveyed shows positive results for the North and The Centre, while in the South there has been a decrease in wheat-grown land. The Southern data could also have a relationship with the political choices of the ruling class to reduce and limit the frumentary mountains, ancient granary loan structures, located largely in southern Italy. Legislative measures that would have significantly reduced the action of these early forms of rural microcredit. Another key aspect was the presence of a localisation of woody and specialised crops in the South of the Peninsula. Moving the survey nationwide we can see that the increase was 0,21%. The data, while confirming what is hypothesised, report the phenomenon within a smaller size despite in 1911 there were scholars who, like Ghino Valenti, claimed that Italy was the European country with the largest amount of land grown in wheat and that this had delayed the development by at least fifty years (Valenti, 1911). Wheat, therefore, the focal point of our

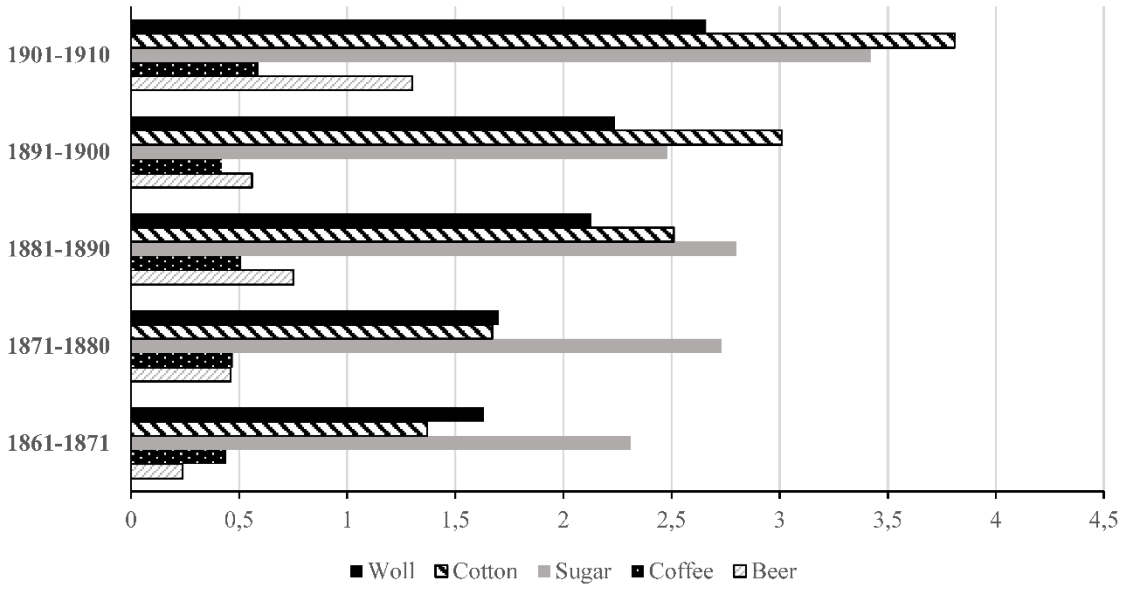
reasoning, allows us to be able to introduce the debate on non-growth growth in the period under consideration, in order to better grasp the meaning and in particular the scope of the "boom" of the Giolittian. According to scholars such as Stefano Fenoaltea (2006), the pessimistic view of the 1880s is the result of a historical misinterpretation, considering that scholars such as Pareto and Einaudi had basically talked about growth. The so-called pessimists would fuss their theories on what we might call the sophism of the 'cuckold' according to which the collapse in the price of wheat, before protectionist measures, and in part of production damaged cereals and as this was the majority part of agricultural production as a result, all agriculture was in crisis, and so, as Italy was a predominantly agricultural country, the whole economy suffered a shock that led to an impoverishment of the masses and the consequential increase in emigration. This syllogism is certainly fascinating and if we calculate the Laspeyres index on the price and production of wheat, looking at the years 1881-1885, it becomes even more appealing and seems to solve without any problem the whole affair considering that there was a decrease in the price of -17.86%. However, we must take into account what has been said above in relation to the comparison of the coefficients of change in production, imports and prices where the latter showed a change lower than the other factors examined. The optimists, or rather critics of the pessimistic view, have tried to bring down these convictions through the use of a more advanced survey that to date finds positive feedback in the scientific debate.

If we try to analyse these years through the Ricardo's model of comparative advantages we can see, taking up what Fenoaltea expressed, that a lowering of the price of wheat would have caused a substantial well-being that would also attract capital from abroad.

The international economic situation, although observed through the eye of a contemporary historian, appears to confirm this. If, for example, we go back to our grain-wine analysis we can see that Italy had greater use in producing wine in which it had clearly an "absolute advantage" (due to the environmental factor) and importing low-priced wheat from the markets of the new world where the availability of land was very large. *Sic stantibus* rebus lowering the price of wheat would have

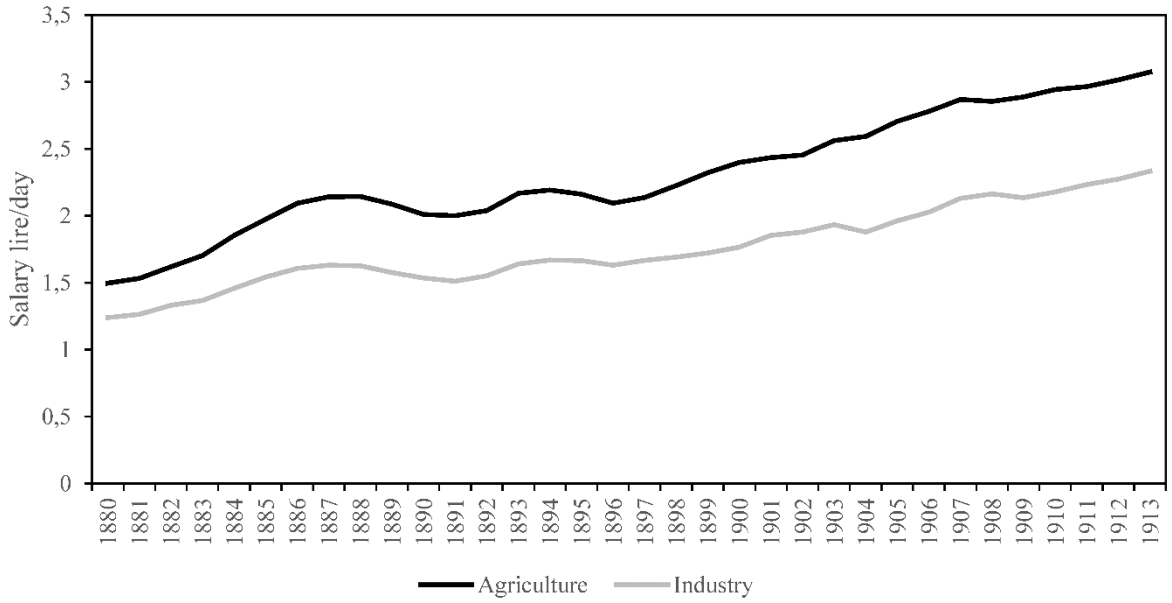
improved the conditions of rural areas and damaged those of the big owners. In addition, this would have led to greater land availability for specialised crops, along with higher yields per hectare, while also favouring a specialisation of labour. Despite this, however, some problems are not fully clarified by the Ricardian model and some misgivings carried out (after Luzzatto and Romeo) by Castronovo, Pescosolido and Zamagni seem to remain if we continue to observe the story from the grain point of view and in particular if we focus our research on regional or provincial phenomena.

Figure 16
Per Capita consumption Italy 1861-1910



Reference: Own processing from: Fenoaltea (2002:261-267). Notes. Average annual values in kg.

Figure 17
Average real wages Italy 1880-1913



Reference: Own processing from: Fenoaltea (2002:273-274).

The graphs (**Fig. 17**) clearly show that if the granary sector was critical it is not consequential and obvious to say that the crisis was general. Fenoaltea rightly reports some data (**Fig. 16**) on the consumption of certain goods (with the specification that statistics cannot be 100% reliable), such as sugar, coffee, beer, wool and cotton. That basket of goods has some peculiarities that must necessarily be specified. While the basket's food figures are indicative of the wealthiest classes of the population, the data on clothing goods can reveal some interesting aspects of the majority of the population, within which rural workers can also be placed. Thus, the increase in the consumption of cloth suggests an increase in well-being with a relative shift in the consumer curve to other goods besides those of survival. Another aspect, on which the historian warns us of the weakness of the data, is that of the average wage of agricultural and industrial workers (the latter, however, attributable within the rural population because they lack the specific skills that could allow them to meet a job in the factories), which seems to be in both cases increasing over time.

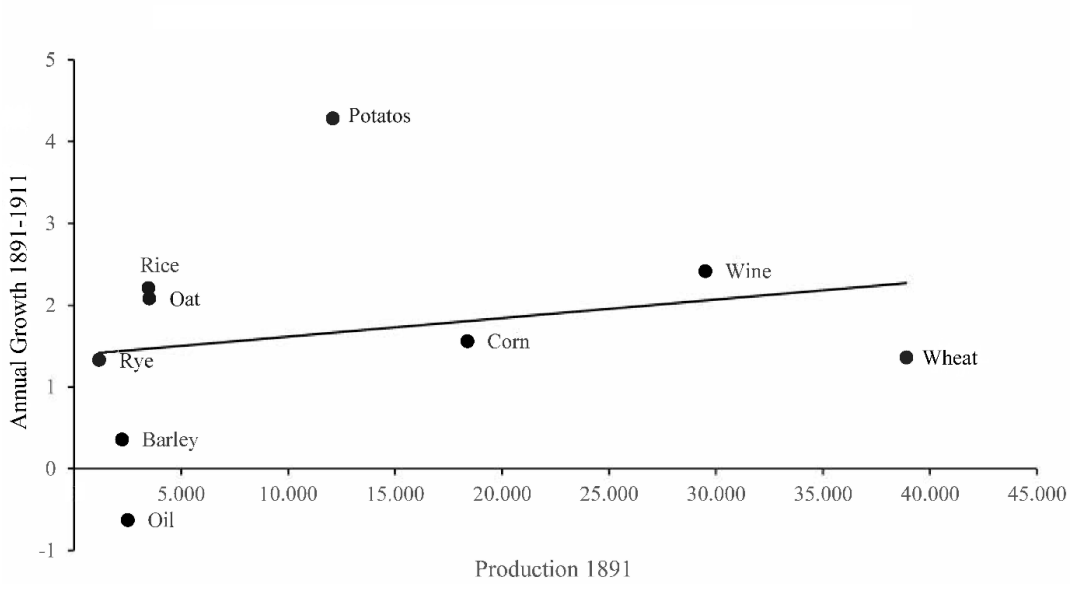
The problem is that the data, at least for most of the nineteenth century, refer only to Lombardy, one of the Italian regions with the highest rates of development in the rural area. For this reason, the issue of wages becomes very angular, encouraging the emergence of new questions which lead us,

necessarily, to address the arguments of the pessimists. In such a perspective rather than convictions, it is more significant to speak of misgivings and questions to which it is objectively difficult to answer by looking only at macroeconomic factors.

Conclusions

At the end of this study it is particularly clear that the new contributions made within the scientific debate have necessarily led to a rethink of the period, also offering new ideas for future research. Further confirmation of the slowdown in agricultural policies can be found when one compares the 1891 production of the basket of goods under consideration with that of 1911.

Figure 18
Production performance of major agricultural products Italy 1891-1911



Reference: Own processing from: ISTAT (1911).

The graph (**Fig. 18**) clearly shows that the annual growth rate was not very high for all products, even oil decreased but this is due to natural and climatic factors. Even the trend line that you decided to insert has a slight positive inclination but with a slope close to zero. The hints of the

critical issues of protectionist policies were also felt by contemporaries as it also emerges reading the pages of the "Giornale degli Economisti" (Giretti, 1988).

The pages of the journal show how protectionist measures were driven by the strong manufacturing interests of northern Italy and the large landowners, who had an interest in preserving the incomes given by cereal cultivation and were not interested in developing crop improvement projects by investing in specialized crops that could have a significant weight within international trade. An initiative that ended up blocking, in fact, a growth path that had projected the country within an international dimension in relation to trade policies aimed at promoting the comparative advantages that would allow Italy to enhance those typical crops such as wine and citrus fruits.

We will have to wait until the first decade of the twentieth century to see the take-off of Italian agriculture, but it will be immediately halted by the entry into the war. Although the debate on the agricultural world had not stopped, we will have to wait until the early 1920s to return to talk of agrarian modernization.

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ESSAY 2

SHARECROPPING IN SOUTHERN TUSCANY FROM 1858 TO 1889: A MICRO ANALYSIS

ABSTRACT

This essay studies the effects of the 1880s cereal crisis at a micro level. It looks at the sharecropping system of southern Tuscany from 1858 to 1889 by observing the production trend of a large property Canonica, located in Certaldo (Tuscany), a municipality between Siena and Florence. The results obtained showed that Canonica did not suffer the effects of the cereal crisis of the 1880s, but showed an improvement in the production of wheat, oil and, especially, wine. There was also an increase in the use of fertilizers which resulted in an improvement in grain yields. The comparison with the aggregate production of the provinces of Siena and Florence and the region of Tuscany allowed to conclude that Canonica presented a production trend similar to that of the province of Siena.

KEY WORDS

Agriculture -Sharecropping – Tuscany – Protectionism – Micro

Introduction

This study looks at the effects of the 1880s cereal crisis on a large sharecropping property in Tuscany with the aim at seeing whether the crisis encouraged sharecroppers to shift production into wine and to move resources in agricultural improvement. The property studied is the Canonica of Certaldo.[1] Canonica was located in Tuscany, on the border between the provinces of Siena and Florence. This essay tests the hypothesis by Fenoaltea (2006) that the years of the cereal crisis were in fact a period of growth and specialization for agriculture.

The main contribution of this study is that data for Canonica starts in 1858, much earlier than in similar studies by Galassi (1986, 1989). This made possible to estimate the evolution of the production of wheat, oil and wine in longer term from period of the Grand Duchy of Tuscany to the process of unification and consolidation of the new state.

Recently, scholars have reviewed previous studies that considered sharecropping as a backward and inefficient institution (Carmona and Simpson, 1999, 2007; Ackerberg and Botticini, 2000, 2002). According to Marshall (1920), the sharecropping brought an inevitable inefficiency that resulted in a decline of agricultural output and yields, becoming an obstacle for technical progress. Before Marshal, physiocrats had argued that *metayage* should be replaced by a form of capitalist that transformed and modernized agriculture through significant investments by owners and with a salaried work (Biagioli, 2013). Later, Einaudi (1946) considered that sharecroppers had incentives to improve the production system in order to assure the renewal of theoretically annual contracts. From the 1960s, however, interest in sharecroppers turned to the measure of production efficiency in sharecropping (Cheung, 1969; Stiglitz, 1974).

The sharecropping contract, particularly in the Middle Ages, was also considered a means to attract farmers in times of crisis when labor was scarce (Stiglitz, 1974; Esptein, 1994). In this perspective,

[1] This essay is the result of chronological in-depth work of the following contribution: Zanibelli (2019).

Hoffman (1984) and Galassi (1994) Sharecroppers had greater advantages than laborers, such as access to access credit. (Hoffman, 1984; Galassi, 1994).

Much recent studies have pointed out that sharecropping has fostered modernization, particularly considering the better access of sharecroppers to agricultural credit. In the sharecropping, the landowners also carried out important land-use renovations before the contract started (Galassi, 1986).

Furthermore, sharecropping contracts were different across Europe, so it seems difficult trying to draw up a recapitulatory and, at the same time explanatory spectrum for the whole European continent. Even within central Italy, where this contract was predominant, substantial differences persisted between regions. It is estimated that about half of the agricultural workers in the central regions were sharecroppers (ISTAT, 1861). In 1861, sharecroppers accounted for 16% of the total agricultural population in the Kingdom of Italy (1861). According to the first General Census of the Population of United Italy (1861) 34% of the agricultural population were sharecroppers in Modena, Reggio and Massa, 57% in Romagna, 71% in Marche, 38% in Umbria and 40% in Tuscany (ISTAT, 1861). In 1881, sharecropping had decreased to 13% of the agricultural workers. The share of sharecroppers in the total agricultural labor force decreased in all central regions 1881 (Emilia 41%, Marche 55%, Umbria 24%). Only in Tuscany, the importance of sharecropping slightly increased (from 40 to 44%). By 1929, sharecropping accounted for 13% of agricultural holdings in Italy, and 43% in Tuscany.

Many authors have considered that sharecropping slowed agricultural development process (Georgetti,1974; Pazzagli, 1979; Sereni, 2016). Only Galassi (1986) started to look at Tuscan sharecropping from a different perspective, following the more optimistic view of Mirri (1970) and Biagioli (1970) for the Tuscan case. Galassi (1986) considered that sharecropping cannot be assessed under the perspective of Italian (Lombardy) and European high farming management systems. Consequently, it seems important to try to approach the phenomenon using data at a farm

(*poderi*) level, trying to bring new elements into the international debate on sharecropping and its socio-economic characteristics.

The economic structure of the sharecropping required proper and extensive accounting-administrative documentation and this helped to promote a good preservation of *Libri di Fattoria* and *Libretti Colonici*. These documents are very important for accounting because they allow to see the development of production and the economic relations between landowner and sharecropper (Cianferoni, 1973; Poni, 1978; Biagioli, 2000). It is important to point out that the history of the companies is distinct from the history of the owners' assets and therefore can be used for general analysis of agricultural history (Galassi and Zamagni, 1993).

We will try to see whether the Tuscan "sleep"', theorized by the so-called pessimists, was real or it is necessary to look at the phenomenon from another perspective and with the use of more precise indicators. Particular attention will be given to the eighties of the nineteenth century to see how a sharecropping territory was able to respond to the arrival of American grains in Europe in order to observe similarities and differences with the Italian case addressed in the previous chapter.

The essay is organized as followed. Section I presents an economic political study of the Tuscan sharecropping from the early 19th century to the Unification of Italy. Section II presents data on the size of Canonica's farms and its agricultural workers from 1858 to 1889. Section III analyzes the evolution of agricultural production of Canonica for the same period and comparing this results with those of previous studies. Finally, some conclusions are provided.

I. The sharecropping in Tuscany. An economic political analysis

According to Biagioli (2013) the Tuscan *mezzadria* had similarities to French *metayage* and Catalan *masoveria*. The factors that distinguished them from other contracts were:

1. Agreements were essentially based on the Roman law. Sharecroppers were bound to land improvement works, while owners had to make investments before the establishment of the family.
2. Investment in livestock and agricultural tools in the Catalan *masoveria* were at the worker's expense, although landowners sometimes provide grain for sowing. In France and Italy, the owner was involved in the provision of goods, although in some areas the livestock has to be provided by sharecroppers. In Tuscany, seeds were provided in half, while cattle were supplied by the landowner.
3. Production units were based on the polyculture of wheat, oil and wine.
4. The worker's family had an obligation to cultivate the land received in concession and the prohibition of cultivating other land.

This specific form of land management linked the landowner and the tenant (sharecropper[2]) through a contractual form that provided the use of a plot of land and a rural house. This structure was called the *podere*. The sum of all these units formed the *Fattoria*. Although in many cases output (the "parte dominicale")[3] was divided by half between sharecropper and landowner, there are many examples of different quotas, depending on the crop (Federico 2006).

During the Grand Duchy of Tuscany, the Marquis Cosimo Ridolfi (1858), in the pages of the "Giornale Toscano di Agricoltura", claimed that the Tuscan sharecropping was suffering a crisis

[2] The term enters into common language, but contracts usually did not refer to the word sharecropper.

[3] A common use can be found in numerous registers of farm accounts and in particular in those of the "Azienda la Canonica di Certaldo".

caused by the division farms. Regarding the latter part, he writes: «Vedo io spesso giovani contadini vangare avendo un sigaro in bocca ed il collo avvolto in una lunga sciarpa variopinta. E questi giovani che avranno passato metà della notte a veglia non potranno che fiaccamente menar le mani!» (Ridolfi, 1858:39). According to Ridolfi, the fragmentation of the property would lead to a decrease in production due to a dispersion of resources.[4] James Bowring (1838) also pointed to a social immobilism in sharecropping regions, given the lack of progress in technical knowledge and human capital accumulation.[5]

Rogari's (1998, 2002) pointed out that during the Unification, sharecropping occupied 800.000 hectares, about 1/3 of the Tuscan territory and that 63% of the population of this area lived under this contract. Rogari (2009), reporting a study by Bellicini (1989), points out that the importance of sharecropping increased between 1830 and 1930. In Tuscany there was a growth of farms from 1,000 to 4,000, *poderi* inside the farm system had grown from 12,000 to 44,000, and autonomous *poderi* from 50,000 to 100,000. This shows a growth in the conduction of the land in sharecropping (Rogari, 2009). The 1930 Census of Agriculture shows a slight increase in the importance of sharecropping, which accounted for 40% of agrarian population. (ISTAT, 1930). In three

4 "Secondo Gino Capponi nel 1838 in Toscana erano presenti 50-60mila poderi con una composizione media di circa 8 componenti per famiglia rappresentando circa ⅓ della popolazione totale regionale. Il Marchese sottolinea anche come le condizioni di vita fossero migliori in Toscana rispetto che altrove: In Toscana le case dei contadini sono di un genere assai superiore agli altri paesi, e in nessun luogo essi sono così bene alloggiati. Credo che da 60 anni a questa parte più della metà delle case dei contadini sieno state rifabbricate, e il rimanente riattate. È riconosciuto che una casa per l'altra costa 1000 scudi o 5000 franchi l'una; e il termine medio del valore di un podere si calcola a 2000 scudi. Il vitto del contado non corrisponde al lusso delle abitazioni; è salubre, sebbene frugale, e proporzionato alla povertà del suolo; e molta lode si deve a questa classe così industriosa ch'ella sia contenta a un vivere sì mediocre. Il pane cambia secondo la qualità del suolo, e il grano che produce. In molte provincie è un misto di segale, orzo, fave e granturco, con poco grano; in alcuni altri, poi, è di grano quasi schietto: ma ovunque il terreno è riccamente produttivo, non è necessario il ricorrere a granaglie di seconda qualità. Dopo il pane, i fagiuoli formano l'articolo principale di nutrimento ai contadini. Essi bevono poco vino, essendo la loro bevanda consueta, l'acquerello. Si considera come cosa di lusso il mangiar la carne una volta la settimana; i più poveri si contentano d'un pezzo di carnesecca. Il numero del bestiame va considerabilmente crescendo, e la consumazione della carne ancora più. Una gran porzione viene dalla Lombardia". (Bownring, 1838:42)

5 "Mi sembra però che vi sia un punto di vista il quale non ha eccitato sufficientemente l'attenzione, cioè, l'isolamento universale de'contadini, conseguenza necessaria del sistema di mezzeria. Ove non è associazione, ivi è necessariamente somma ignoranza. Ogni famiglia di contadini in Toscana sta come se fosse sola; ciò, a vero dire, è una bella sicurezza per la tranquillità pubblica: ma è una tranquillità a prezzo terribile, vale a dire, a prezzo di una civiltà stazionaria, o retrograda. Non veggo come l'educazione possa atterrare le barriere che circondano ogni famiglia di contadini. Ho avuto occasione più di una volta di vedere quattro generazioni abitanti la medesima casa, senza che l'ultima abbia aggiunto alcuna cognizione all'ignoranza della prima: l'istesse grossolane superstizioni; gl'istessi pregiudizi contro i libri; la stessa ripugnanza nell'introdurre ogni specie di progresso nella coltivazione; infine, la stessa tenacità negli usi dei loro antenati". (Bownring, 1838:39).

agricultural areas of Tuscany, the prevalence of sharecropping was even highest: in the hills (71%), followed by the mountain (18%), while the lowest is recorded in the lowland area (11%). Hills were good land for vines and olive trees, but the introduction of agricultural machinery was difficult (Galassi, 1986).

Shifting the focus to the provincial scale, sharecropping was mostly concentrated in the province of Siena with 61% of holdings in 1930 followed by Florence with 60%.[6] The high presence of sharecropper production units in Siena and Florence was due to the significant number of large landholdings. In Florence, large landholdings occupied 48% of the agricultural area and in Siena 24%. The values of the other provinces were much lower. This confirms that most of the population in the two provinces (Siena and Florence) lived under sharecropping and in a productive dimension linked to the *fatoria* (Detti and Pazzagli, 2000).

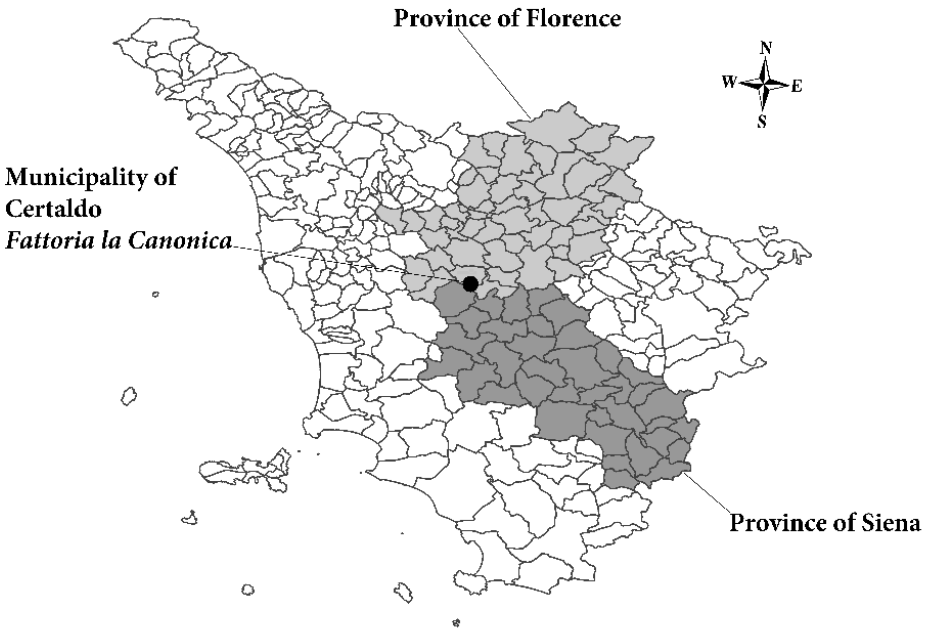
II. Location and agricultural workers of Canonica (1858 to 1889)

The Canonica'*s* farm was located in the area of Certaldo on the border between Siena and Florence.[7] The rivers Elsa and Fosci ensured a good water supply for crops (**Fig. 1**). The property extended over 647 hectares in 1858-1868. Initially, it was divided into 25 farms, but later sub-divided in more. Before the process of national unification, the average size of the *podere* was 26 hectares (Archivio di Stato di Siena, *Azienda la Canonica*).

[6] The values of the other provinces are reported: Arezzo (46%); Livorno (33%); Pisa (47%); Pistoia (31%).

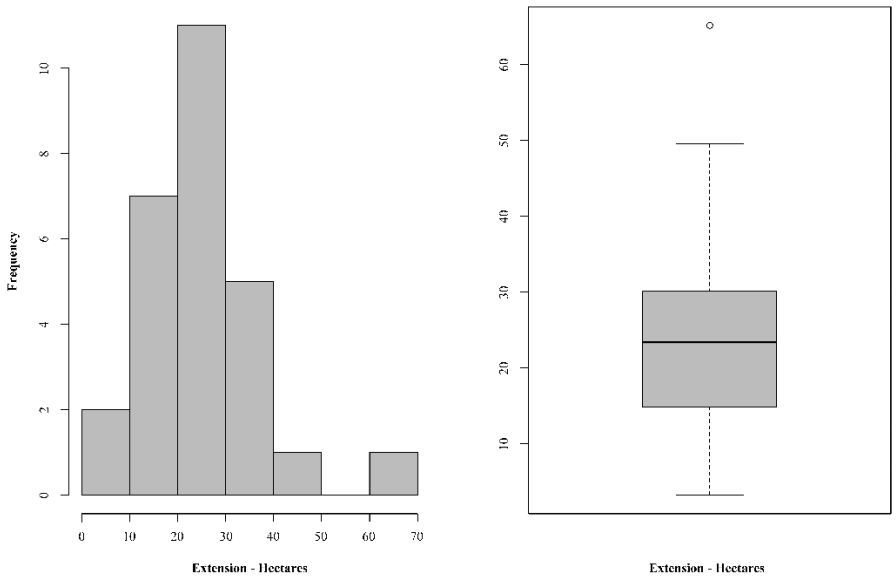
[7] The accounting and administrative documentation is kept at the State Archives of Siena, from now (ASs). In 1817 the farm was acquired by the Corsini family, on the death of the last heir the property passed to the Counts Gherardi del Turco Piccolomini until the twenties of the twentieth century when Rolando Barducci became owner. On barducci's death the property passed to the San Marco di Siena Orphanage. (Merlini, 2018).

Figure 1
The localization of *Canonica* in Tuscany



Notes: Own processing with GIS.

Figure 2
Analysis of the size of the production units of the Canonica's



Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

Figure 2 shows that the average size of the individual production units was 24 ha, the minimum value of 3 ha, the maximum of 65 and the standard deviation of 13 ha[8]. The histogram allows to see how the owners of the company probably fractionalized units, as in other areas of Tuscany (Ridolfi, 1858). The community of Certaldo covered 7.396 hectares[9], of which about (97%) corresponded to the agrarian and forest area[10]. Canonica's farm occupied about 9% of the agricultural and forest area of Certaldo,

Certaldo's agricultural population, which accounted for 82% of the total resident population before the Unification, was mainly formed by sharecroppers which accounted for 63% of agricultural producers (Azzari, 1982). The average size of the sharecropper family was 9 components, compared to 7 of the owners' and 4 of the day laborers'.

The archival documentation allows to study the production factors, including capital (land rent), work and land (corresponding to the *poderale* dimension understood as arable land). Age corrections were made, taking 1870-74 as the reference period for the survey. For this reason, deaths and births since 1858 have been considered. This made it possible to reconstitute the population of all the production units on the farm.

8 The accounting and administrative documentation is kept at the State Archives of Siena. The size of the production units was in Stiora, an ancient Tuscan measure, it was taken to bring them back in hectares through the following coefficient of transformation: 1stiora=5,25are.

9 The idea of deepening a business structure located in the Certaldo area finds a precise connotation in the fact that already in the great period this territory had been carefully accessed within a specific social statistical study concerning the whole Grand Duchy of Tuscany promoted by Attilio Zuccagni Orlandini (1854).

10 Zuccagni Orlandini (1854:184-185). The values reported by Zuccagni Orlandini are in "Quadrati Toscani" for the Total Surface and in "Staia" for the Forest Agricultural Area. In order to bring the values back to hectares, specific processing coefficients were used: 1 quadrato toscano= 3406,19m^2; 1 staia= 1750,10m^2.

Table 1
Size of the family by Podere in "Canonica 1858-1889"

			Family 1870				1870	Ext.	Hectares per worker	Land Rent.	land rent por work unit
N.	**Podere**	**Sharecropper**	**Men**	**Women**	**Child**	**Tot**	**Work Units (estimated)**	**Hect**		**Lire 1870**	
1	Bosco	Ioni Benedetto	3	2	2	7	4	49,46	12	448	112
2	Canonica	Faraoni Pasquale	2	3	0	5	3,5	35,23	10	1.102	315
3	Cantone I	Rosi Luigi	4	3	1	8	5,5	20,90	4	1.063	193
4	Cantone II	Ceccarelli Giuseppe	4	3	4	11	5,5	20,90	4	1.063	193
5	Casanuova	Baragatti Giovanni	5	3	1	9	6,5	-	-	-	-
6	Calcinaia	Sardelli Valente	4	4	1	8	6	25,2	4	-	-
7	Capperi I	Corsi Andrea	2	6	1	9	5	11,67	2	465	93
8	Capperi II	Corsi Francesco	4	5	3	12	6,5	11,67	2	465	72
9	Capperi III	Mugnaini Pietro	2	3	4	9	3,5	11,67	3	465	133
10	Casabassa	Ciampolini Valente	5	2	0	7	6	23,84	4	864	144
11	Casale	Sani Giuseppe	3	3	1	7	4,5	18,74	4	393	87
12	Casarsa	Tani Ferdinando	4	4	6	14	6	33.08	6	1.856	309
13	Casalta	Corsoni Paolo	3	2	2	7	4	-	-	-	-
14	Corniola	Corbinelli Giuseppe	3	3	2	8	4,5	17,85	4	611	136
15	Fibbiana	Giovannoni Pellegrino	4	3	4	11	5,5	65,1	12	553	101
16	Fossato	Meniconi Luigi	2	2	1	5	3	11,45	4	710	237
17	Fraille	Gori Giovanni	4	3	2	9	5,5	23.36	4	1.023	186
18	S.	Taddei	2	1	2	5	2,5	4,46	2	245	98

	Gaudenzio	Massimo									
19	Leccio I	Sani Giuseppe	3	3	1	7	4,5	25,78	6	324	72
20	Leccio II	Lazzerini Angiolo	5	3	0	8	6,5	25,78	4	647	100
21	Mulinaccio	Bucalossi Giuseppe	4	6	1	11	7	11,08	2	645	92
22	Morzano	Marchetti Niccolò	3	2	6	11	4	33,92	8	774	94
23	Murate I	Bucalossi Vincenzo	7	4	3	14	9	21,79	2	1.065	118
24	Murate II	Cavallini Giuseppe	4	3	4	11	5,5	21,79	4	1.065	194
25	Rasoia I	Calvetti Angiolo	5	2	0	7	6	28,35	5	338	56
26	Rasoia II	Calvetti Angiolo	5	2	0	7	6	28,35	5	338	56
27	Torre	Ancillotti Francesco	1	2	2	5	2	3,20	2	184	92
28	Torrione	Mori Giuseppe	4	2	1	7	5	31,71	6	495	99
29	Valle	Papucci Francesco	7	4	0	11	9	34,02	4	1.511	168
Fattoria			**108**	**88**	**55**	**250**	**152**	**650,35**	**5**	**18.712**	**140**

Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*. Notes. Work units was calculated: a value of 1 was given for men because they were employed full-time in the processing of crops, whilst 0,50 for women considering that they devoted part of the day to home management) The labor and land do not change significantly over the course of the decade

The analysis of the population of the *Canonica* (**Tab. 1**) was detected through the *Libretti Colonici* available until 1870-74. Data on population for the following period in not available but considering the average age of 28 years the surveyed people, total population should not have undergone significant changes. During this time there was a migration of 11 men and 13 women. The values are of little importance considering that in order to leave the farm it was necessary the authorization of the master. The women left the house to marry, the men probably to take over other *poderi* of other farms. During the period between 1870 and 1874, population of Canonica was 250 people, of

which 108 were men (43%), 88 women (35%) and 55 children (22%)[11]. The average number of men, women and children was 4, 3 and 2, respectively. The average household size was 9. The *Libretti Colonici* have allowed to detect an average age of death under 50 years. Canonica had 152 work units spread over 650 hectares [12]. The average number of workers per farm was 5 and 1 for every 4 hectares. The total rent was 18.712 Lire and an average per unit of 720 Lire. The rent per hectare was 31 Lire. In the sharecropping system, work had a significant weight, and it was not part of the distribution of profits divided by the *parte dominicale*. This term refers to the part of the production due to the landowner. The landowner took for his part the best quality production (Biagioli, 2000). During the period under study (1858-1889), sharecroppers carried out land improvement activities to repay the debt with the landowner, it's important to explain that landowners were the only source of credit that the sharecroppers could have access to. A reduction in debt would have led to an improvement in sharecropper conditions given that the debt was measured in wheat (Biagioli, 2000).

[11] All males and females under the age of 10 have been included in the category of children.

[12] The differences with the total value previously analyzed are due to the fact that some farms could not rebuild the extension.

III. The farm's production system. A study on wheat, oil and wine 1858-1889 and an analysis of the 1880s.

This section presents an analysis of the general production of the entire agrarian farm.[13] The values, reported in ancient Tuscan measures, were converted into those currently in use in agriculture[14]. Subsequently, the value of production was estimated using prices of the Tuscan markets and the agricultural deflator of the Bank of Italy[15]. The analysis focuses on wheat, oil and wine as indicative of sharecropping economy.

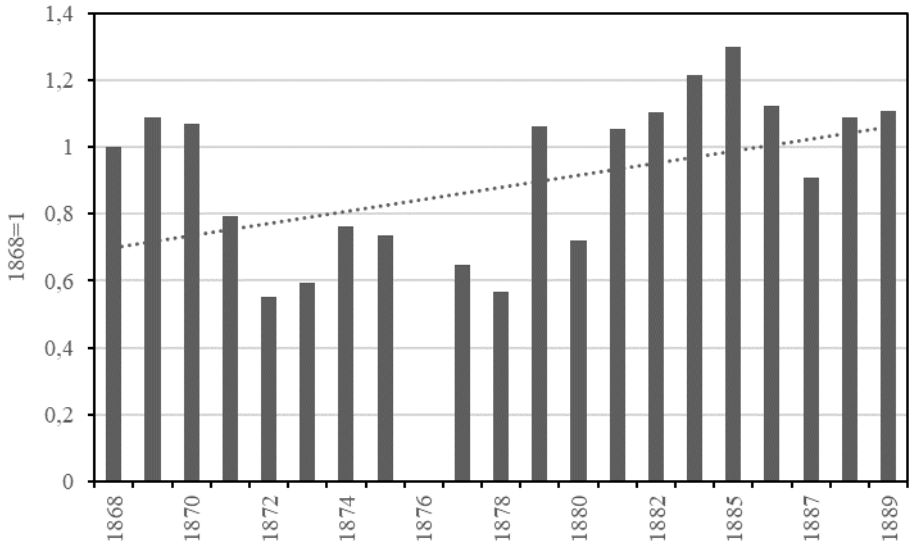
As it can be seen from the farm accounting, the value of fertilizers per hectare (at constant prices) declined from 1868 to 1878. It possible to detect a strong immobility in production and a concentration on wheat during this period. During the cereal crisis in the 1880s, expenditure on fertilizers grew, showing the willingness of the property to invest in production improvements, in particular for wine. Considering that demand for Tuscan wines increased because of the outbreak of phylloxera in France, it became appropriate for farms to invest in this product. The value of fertilizers per hectare fell again with protectionist measures (1887) when there was a new tendency to favor the cultivation of wheat because increasing cereal prices.

13 *ASs, Postunitario, Azienda la Canonica, amministrazione*.

14 The conversions were made using the conversion coefficients contained in: MARTINI (1976). The wheat was brought back to the "Staia"; wine and oil "Barili" and "Fiaschi". The conversion coefficients for wine and oil are not the same despite the names being the same.

15 The appendix shows the analysis of historical price series. The figures have been adjusted for inflation. 1911=1 (Serie Storiche Banca d'Italia).

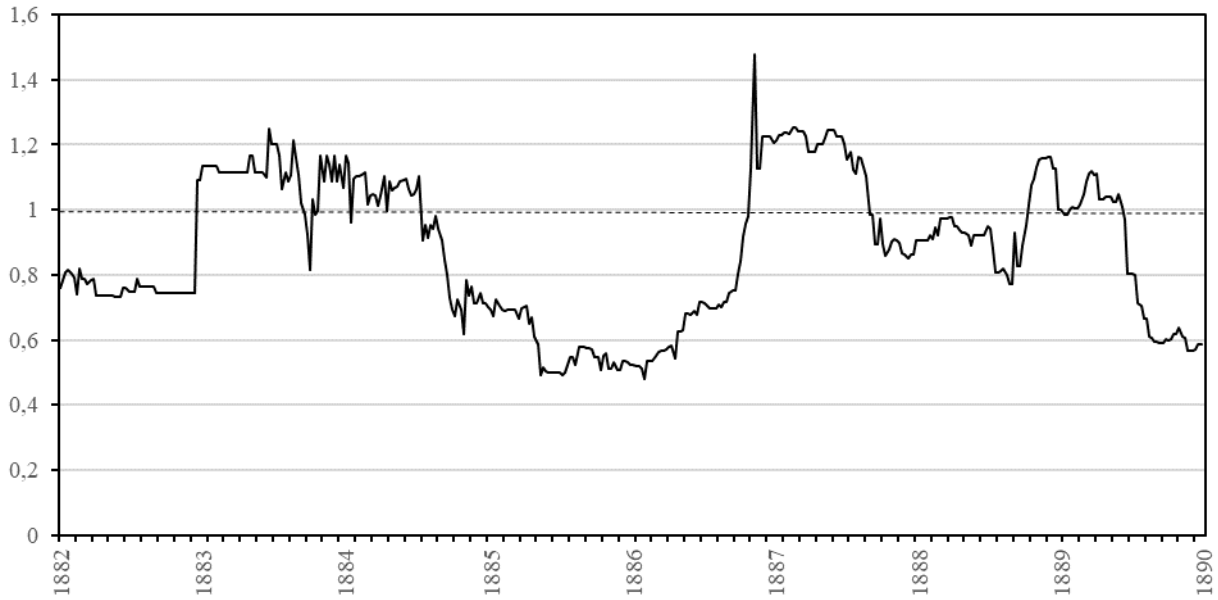
Figure 3
Index of expenditure (1868=1) on fertilizers per hectares 1868-1889



Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*. The values are at constant prices. the deflator for agriculture carried out by the Bank of Italy (1911=1) was used.

As for the years related to the economic crisis, the relative monthly price (1882-1889) of wheat and wine was calculated using the price series *Mercuriali* of the *Camera di Commercio* of Siena (nominal values). During the cereal crisis there was a decrease in the relative price of wheat /wine both in the provincial markets and in the *Canonica*. The latter shows a growing trend in relative prices with the peak in the central years of the cereal crisis. The value decreases with the entry into force of protectionist measures, returning to be similar to the initial one. It grew again from 1888 to 1889 and the value is in line with the provincial data. These analyses made it possible to verify whether the trend in the relative price affected the farm's cereal production for each year from 1858 to 1889 (**Fig. 4**).

Figure 4
Monthly price relative Wheat/Wine Province of Siena 1882-1889

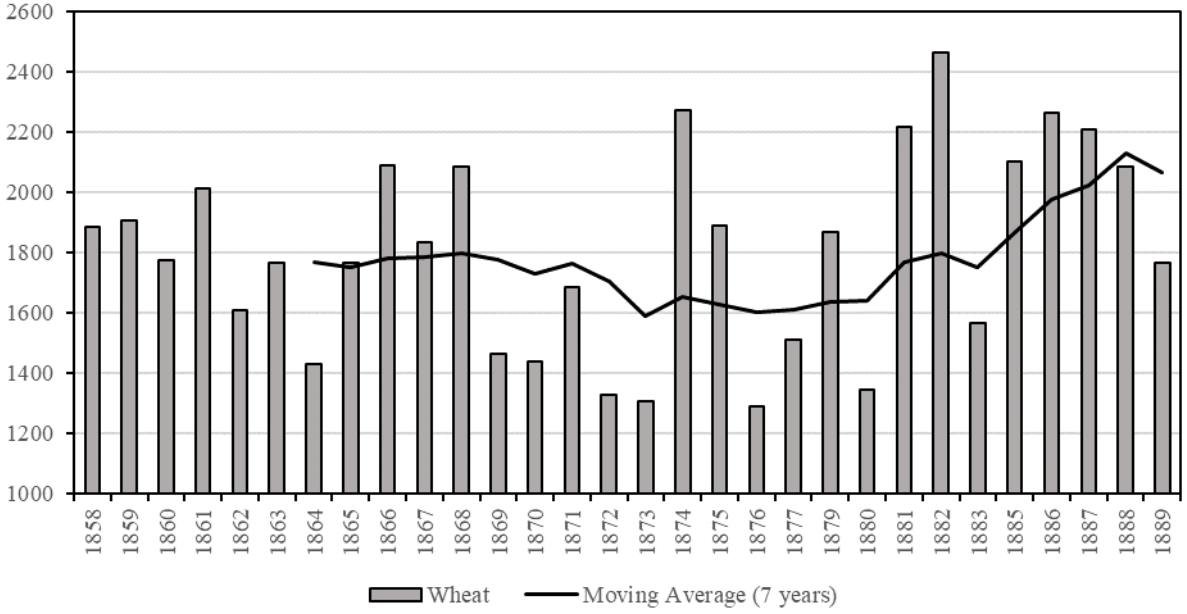


Own processing from: *Mercuriali Camera di Commercio Siena.*

Figure 5
Index (1876=1) relative price of wheat and wine of the Canonica (1876-1889)

Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

Figure 6
Wheat production (hectolitre values). Canonica 1858-1889

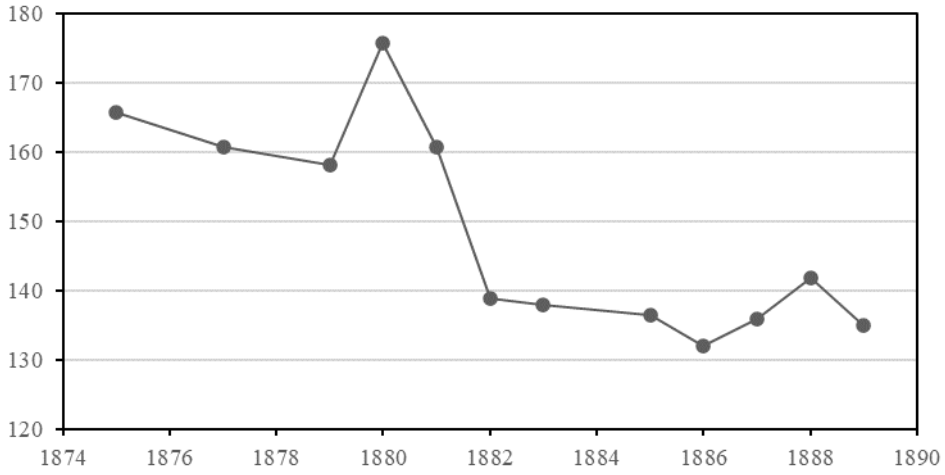


Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

The **figure 6** shows the long-term trend of production. The moving average allows you to observe how the production of wheat remains constant until the 1880s. Particularly interesting is the data of 1882 where it retrieves a relationship between the trend of the production price and the quantity produced. The data would show that during the cereal crisis there was also a substantial improvement in wheat production. The quantity began then to decrease with the entry into force of protectionist measures (1887). A decrease that continues until 1889. What is observed is significant as for the period 1885-1889 the average wheat production of the Canonica (2.085 hectoliters) increases compared to the period 1880-1884 (1.898 hectoliters) and this data is different from what emerged from the studies of Galassi (1986, 1989). In the sample of farms he observed, there was a decrease in wheat production over the same period. As a first analysis, the quantity of seeds produced for each year was reconstructed and subsequently reused to examine the percentage incidence of seeds on the harvest. As it can be seen in **figure 7** sowing decreased in relation to the development of the relative price. The reuse of seeds reported in **figure 8** shows a decreasing trend

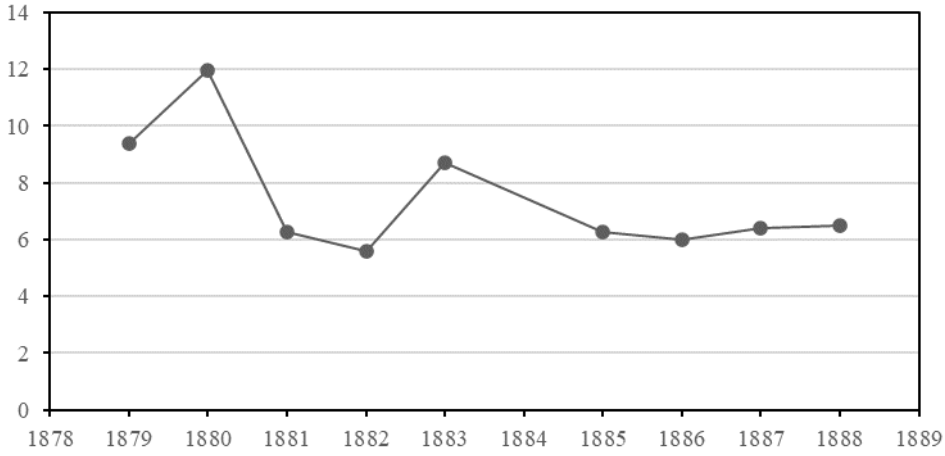
until 1882 when it begins to grow and then stabilizes. As a last analysis, the yield per seed has been reconstructed (**Fig. 9**) and this makes it possible to detect how the increase in wheat production in the period 1885-1889 could be explained by the increase in yields resulting from the higher expenditure on fertilizers during the period of the crisis.

Figure 7
Evolution of Canonica wheat seeds (values in hectoliters) 1875-1889



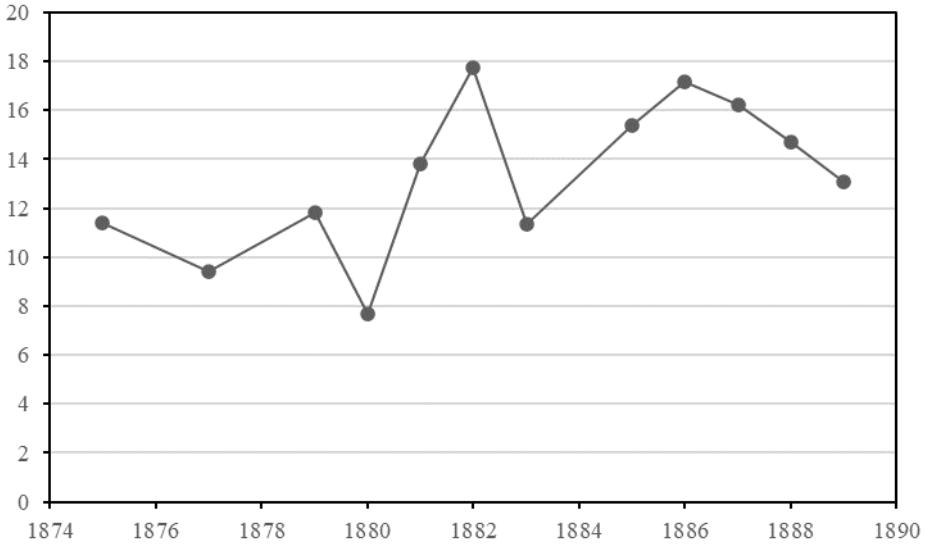
Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

Figure 8
Re-use of wheat seeds on harvest (values in %). Canonica 1875-1889



Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

Figure 9
Seed yield wheat production in hectoliters. Canonica 1875-1889

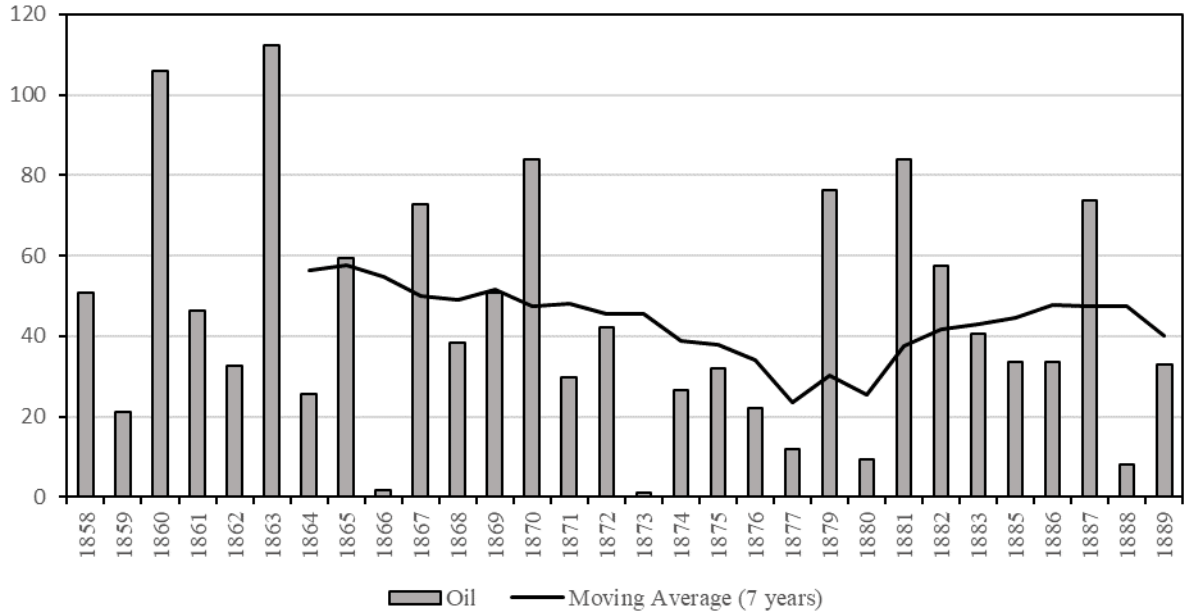


Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

Oil Production 1858-1889

Oil production (**Fig. 10**) occupied a small part of the total production of the farm and was located on some specific farms (such as San Gaudenzio). Confirmation of this can be found in the fact that during the period covered by this study about 1/3 of the production units had a specialization in this product. Between 1858 and 1889 production declined until the end of the 1870s, subsequently beginning to grow until 1887 (the year of entry into force of protectionist measures). For this type of product, the importance of the effects of atmospheric agents must also be taken into account. These condition the production of this specific product

Figure 10
Oil production in hectoliters. Canonica 1858-1889



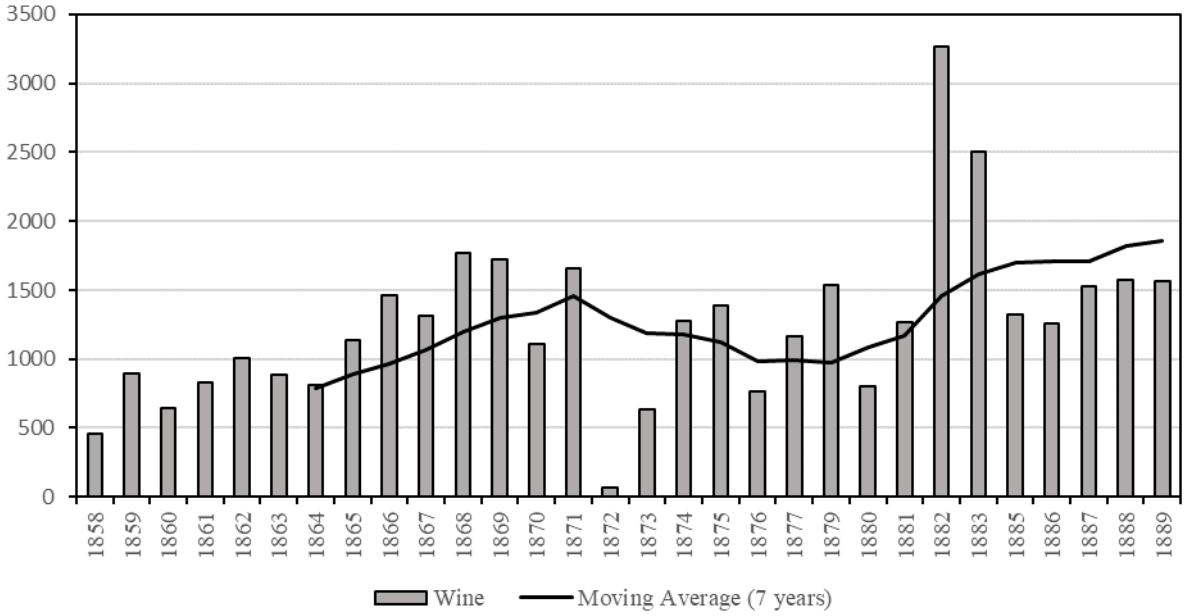
Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

Wine Production 1858-1889

Wine production (**Fig. 11**) grew until the 1870s when it stabilized. From the 1880s production began to grow with peaks between 1882 and 1883. This would also be confirmed by what emerged at the aggregate level for the province of Siena in essay number 3 of this thesis. The growth of wine production is closely related to that of relative provincial prices (**Fig. 4**) and farm prices (**Fig. 5**).

In the years after 1887 production stabilized and returned to the values before the crisis. For these years the trend is similar to one of the farms analyzed by Galassi (1986, 1989) located in the province of Siena.

Figure 11
Wine production (hectolitre values). Canonica 1858-1889



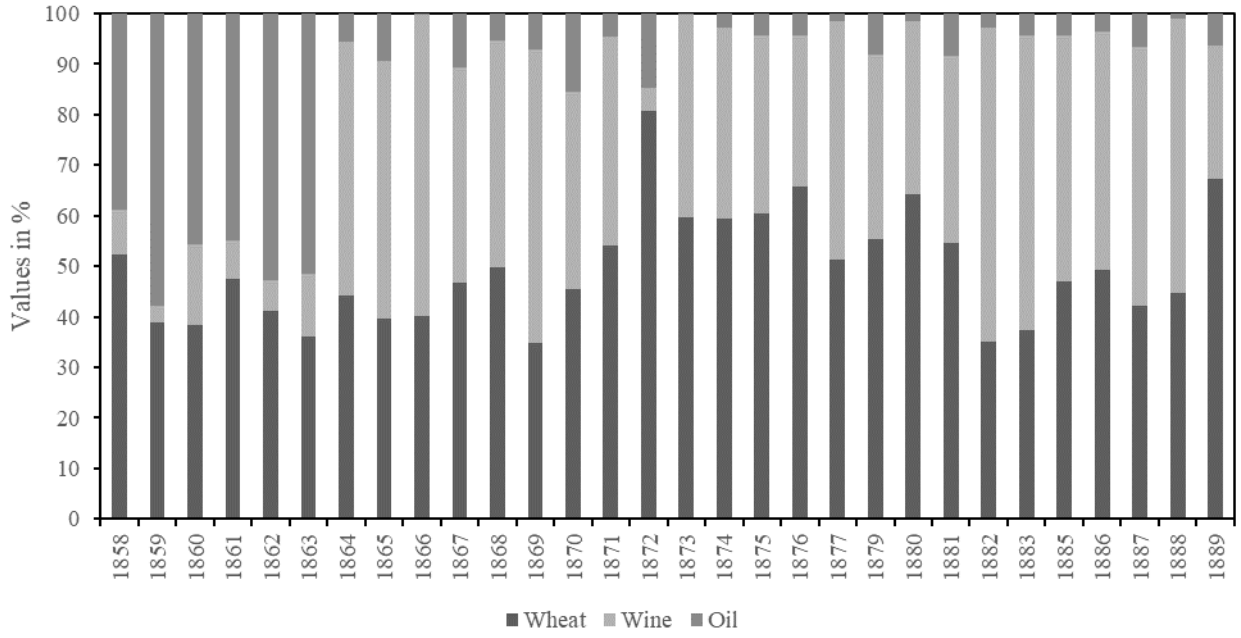
Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

Production value: Wheat, Oil and Wine Canonica 1858-1889.

As a last analysis, the trend in the value of production (constant values) from 1858 to 1889 was calculated using the market prices of Florence from 1858 to 1863 (Bandettini, 1957) and Siena from 1864 to 1889. The prices of Siena have been rebuilt by the *Mercuriali* present in the archive of the *Camera di Commercio* of Siena. For the period of the cereal crisis, the value of production was also calculated with farm prices from 1876 to 1889.

As a first data gathering operation, it provided the reconstruction of the percentage evolution of the annual value for the single products (constant prices) on the farm total.

Figure 12
Incidence of wheat, wine and oil (values in %) on observed production values (annual data). Canonica. 1858-1889

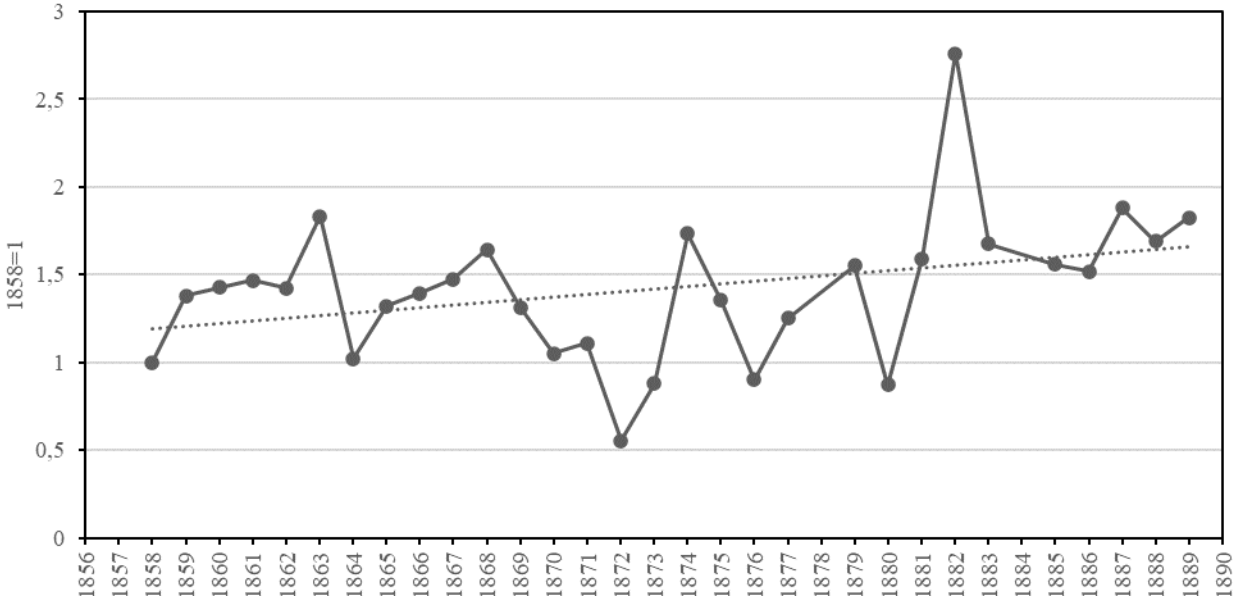


Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

The **figure 12** shows how wheat until the 1880s occupied the largest annual share of the total value of the farm's production. Since the 1880s, the wine share that constitutes the majority has increased significantly. The oil occupies a very significant part during the period from 1858 to 1863. Subsequently, the share of this product becomes a minority. However, there was a rise in value in the years of the crisis.

A fixed-based index (1858=1) of the total value of production was also created in order to observe the trend from 1858 to 1889 and to verify in detail the changes that occurred during the 1880s.

Figure 13
Total production index of Canonica. 1858-1889. Annual Data



Reference: Own processing from: *ASs, Postunitario, Azienda la Canonica, amministrazione*.

In **figure 13** the trend is constant with some fluctuations until the end of the 1870s. Starting from the 1880s it is possible to observe an increase in the value of wine, also calculating the value of production with farm prices. From here it can be seen that during the period of the crisis the value of wheat decline (for the decrease in prices and not in production) and the wine grows. Particularly interesting was the period after 1887 during which both wheat and wine grew, while the oil remained constant.

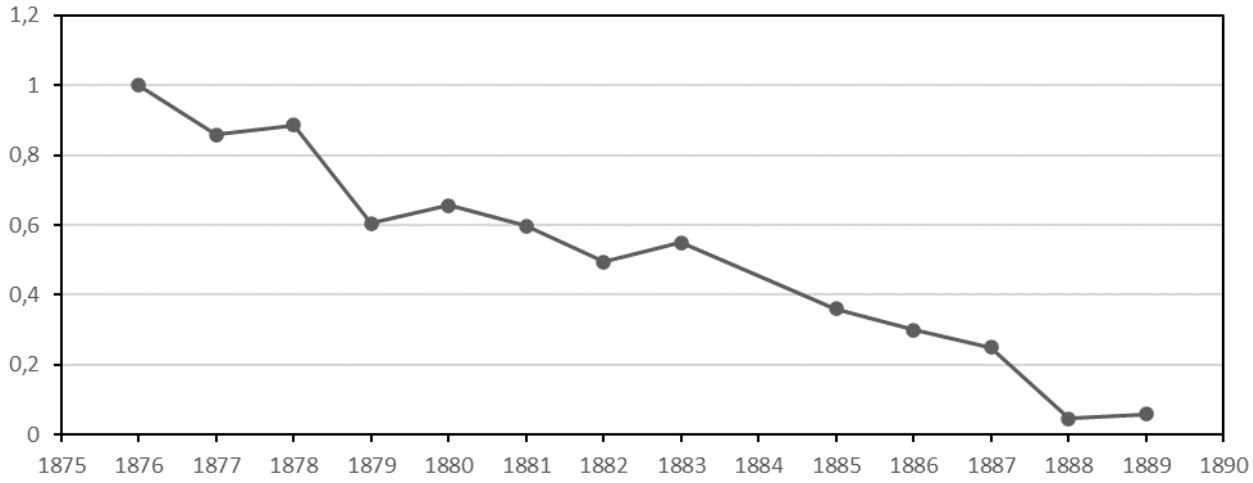
Table 2
Total production index (1876-79=1) of Canonica. 1876-1889

Period	Wheat 1876-1879=1	Oil 1876-1879=1	Wine 1876-1879=1
1880 – 1885	0,6	0,1	1,4
1887 – 1889	1,2	0,1	1,5

Reference: Own processing from: *Ass, Postunitario, Azienda la Canonica, amministrazione*.

The analyses carried out on the production of oil and wine have brought to light interesting elements that enrich what has already emerged from the literature (Galassi, 1986, 1989). The cereal crisis would have led to an increase in wine production and the resources released from this product would have increased expenditure on fertilizers, also promoting higher wheat productivity. To this must be added that from 1876 to 1889 there was also a decrease in the debt of the sharecroppers considering that it was measured in wheat (Biagioli, 2000). For this reason, a fixed-based index (1876=1) has been created (**Fig. 14**) that shows this decrease in detail. This is particularly relevant because the farmers were always heavily indebted to the landowner and therefore obliged to repay the debt with other types of services (such as improvement work in the fields). The crisis of the 1880s would also have led to improvements in living conditions considering the lowering of the value of the debt, which was not matched by a decrease in cereal production, this would have led the sharecroppers to invest in improving the farm (Biagioli, 1981).

Figure 14
Debt reduction of sharecroppers. Canonica 1876-1889. Annual Data



Reference: Own processing from: *Ass, Postunitario, Azienda la Canonica, amministrazione*.

As a last analysis, aggregate production was reconstructed, through a fixed-based index (1879-

1883=1), in the provinces of Siena and Florence and Tuscany to observe similarities or divergences with that of the *Canonica* (Galassi, 1989; MAIC various years see on Galassi). A fixed-based index (1879-1883=1) relating to wine production was also produced in order to see the development of this product during the crisis.

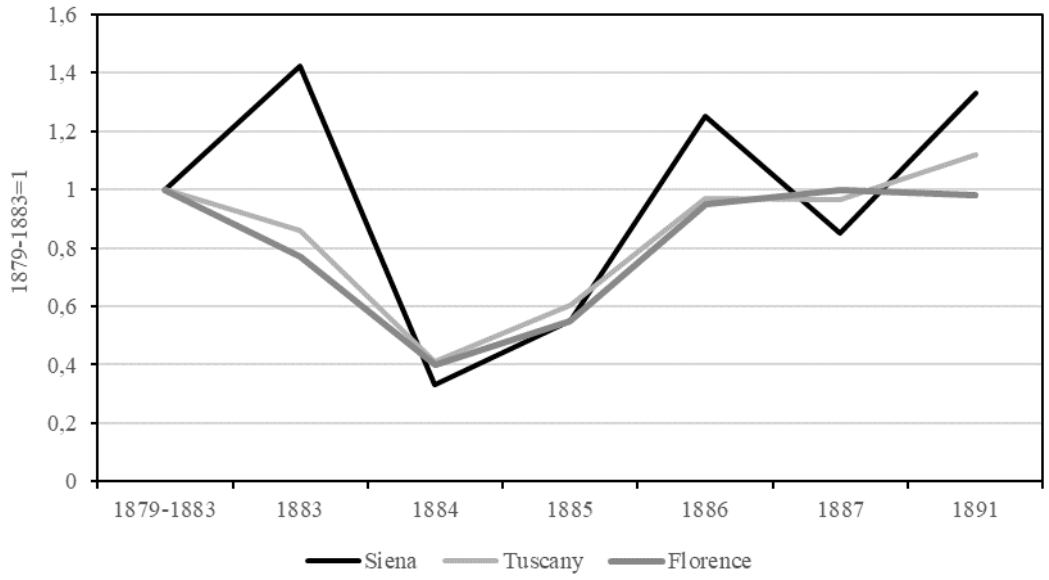
Table 3
Index of production (1879-1883=1) of wheat, oil and wine provinces of Siena and Florence and region of Tuscany 1879-1891

	Wheat 1879/83=1	Wheat 1879/83=1	Wheat 1879/83=1	Wine 1879/83=1	Wine 1879/83=1	Wine 1879/83=1	Oil 1879/83=1	Oil 1879/83=1	Oil 1879/83=1
Years	**Florence**	**Siena**	**Tuscany**	**Florence**	**Siena**	**Tuscany**	**Florence**	**Siena**	**Tuscany**
1883	0,7	1,1	1,0	0,8	1,4	0,9	0,5	0,6	0,4
1884	0,8	1,6	1,2	0,4	0,3	0,4	0,8	0,6	0,7
1885	0,7	0,9	1,0	0,5	0,6	0,6	0,4	0,5	0,4
1886	0,7	1,3	1,1	0,9	1,3	1,0	-	-	-
1887	0,9	1,1	1,0	1,0	0,9	1,0	0,4	0,6	0,4
1891	1,1	1,3	1,2	1,0	1,3	1,1	1,0	1,2	0,9

Reference: Own processing from: Galassi (1989), MAIC (various years)

In **table 3** it can be noticed that the province of Siena compared to Florence and the whole of Tuscany was the one that felt with less intensity the effects of the crisis. In Siena there was a substantial growth of wheat, wine and oil in particular in 1891. In 1887 there was a slight decrease in wine production but in 1886 this decrease was higher than in Florence and Tuscany. By looking at the development of wine production, this is even clearer. **Figure 15** shows a common trend in production in Florence, Tuscany and Siena. The latter, however, had significant peaks in 1883 and 1886. Even after protectionist measures came into force. Siena still configures itself as the reality showing a greater recovery in wine production after the tariffs of 1887.

Figure 15
Tuscany, Florence and Siena wine production index 1879-1891. (1879-1883=1)



Reference: Own processing from: Galassi (1989), MAIC (various years)

Conclusions

This chapter shows that the cereal crisis of 1880s was a period of growth for the *Canonica*, confirming results for Italy obtained by Fenoaltea (2006) at a macro level. Unlike most farms studied by Galassi (1986, 1989), wheat and wine production increased in Canonica during the cereal crisis. The increasing use of fertilizers in Canonica during the 1880s led to an improvement of grain yields as it emerged from the analyses related to the reuse of seeds and the yield of wheat by seed. Canonica, despite being on the border between the provinces of Siena and Florence, was more linked to Sienese production trend, as shown from the Galassi (1986, 1989)'s sample for this region.

The data on the settlement debt made it possible to verify how the crisis of the 1880s improved the living conditions of sharecroppers. The property decided to invest to improve production and

productivity showing significant dynamism of the farm.

These positive trend of the production of the Canonica could be due to the reduction in the size of the *poderi* that took place before Unification, which would have encouraged the improvement of the production and productivity of sharecropper families.

In conclusion, the idea of a backward Tuscany severally affected by the cereal crisis does not seem to be accepted by this study at a farm level (Georgetti 1974, Pazzagli 1979, Sereni 2016). The positive view by Biagioli (2000), Mirri (1970) and Galassi (1986, 1989) of an active sharecropping able to change theorized seems to be more correct.

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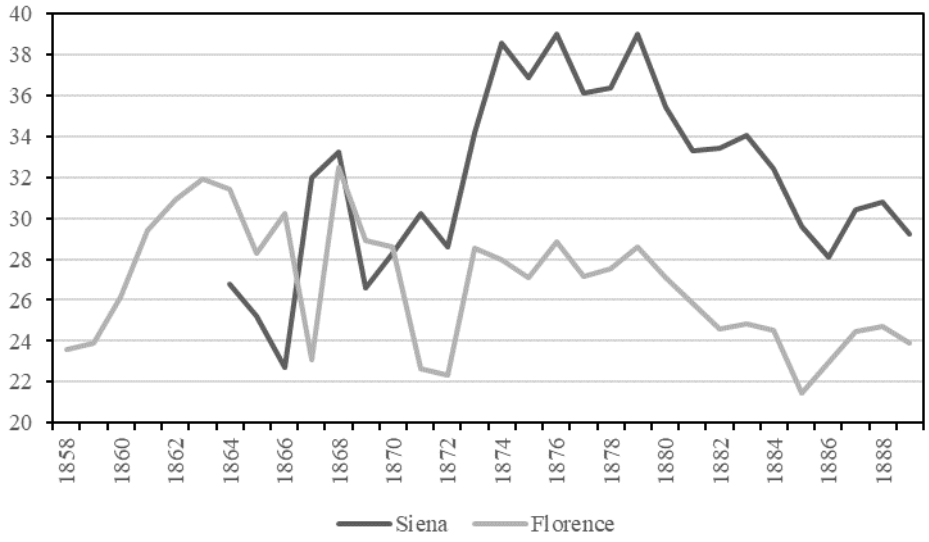
Appendix 1

Time series analysis of Siena agricultural products 1858-1889

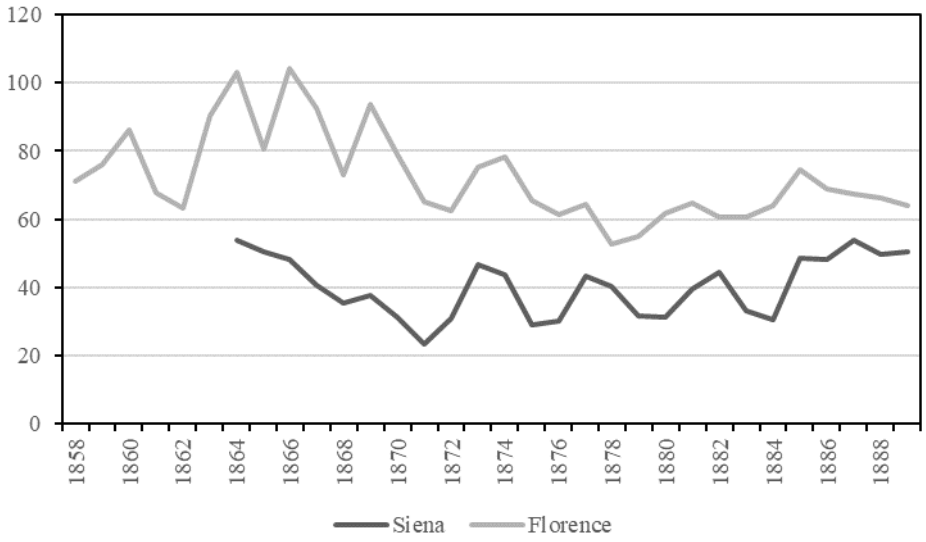
This section contains the analysis of the historical price series of agricultural products used for this study from 1858 to 1889. Two time series have been analyzed: one created by the author of this thesis with the data contained in the *Mercuriali* (MERC) of the *Camera di Commercio* of Siena from 1864 to 1889 and another already published (Bandettini, 1957) with the prices of Florence in order to make a comparison being both series obtained from the *Mercuriali*. This operation was considered useful since the Canonica's farm located on the border between Siena and Florence and therefore active in both markets. For the period from 1882 to 1889, the series will be observed on a weekly basis (Siena's prices) to identify in detail the fluctuation in the value of the agricultural products analyzed. The operation of rebuilding the price series was necessary to calculate a production value that corresponded more to the real one.

Figure 1
Wheat price Florence and Siena 1858-1889



Reference: Own processing from: MERC (1861-1889) ; Bandettini (1957). Notes: Prices adjusted for inflation (1911=1).

Figure 2
Wine price Florence and Siena 1858-1889



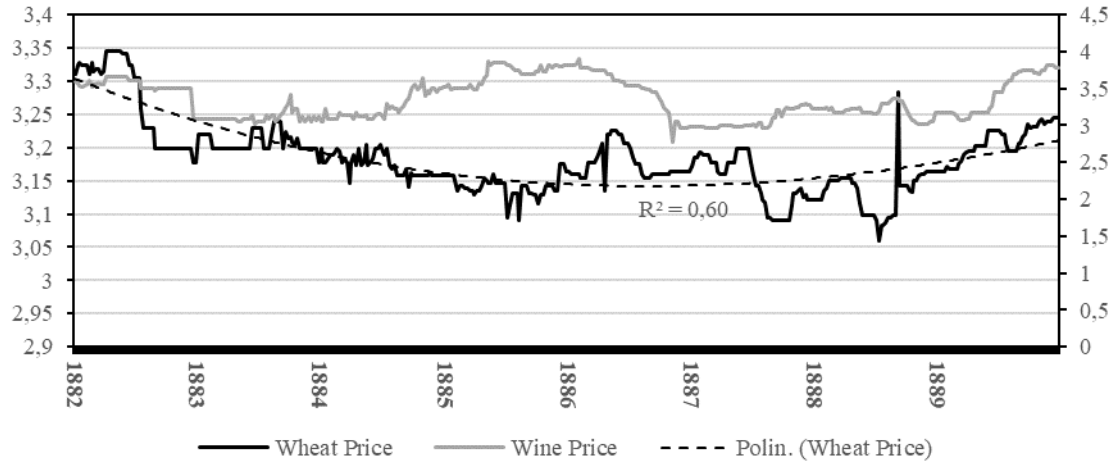
Reference: Own processing from: MERC (1861-1889) ; Bandettini (1957). Notes: Prices adjusted for inflation (1911=1).

Figure 3
Oil price Florence and Siena 1858-1889

Reference: Own processing from: MERC (1861-1889) ; Bandettini (1957). Notes: Prices adjusted for inflation (1911=1).

The price series of Siena and Florence have a certain homogeneity and a similar trend for wheat, oil and wine. In Florence the prices were higher than in Siena. With regard to wine, there are differences when between the 1860s and 1870s in Siena the price decreases more while in the 1880s it grows faster.

Figure 4
Weekly price wheat and wine Siena 1858-1889



Reference: Own processing from: MERC (1861-1889). Notes: Prices adjusted for inflation (1911=1).

The figure 5 shows how the prices of wheat and wine in the period 1885-1887 diverged, if the former decreased the second, suggesting, resuming the reasoning of Fenoaltea (2006), that the process of specialization started in the early 1870s seemed to stop because of the state policies for the protection of cereal production. From the series it is also possible to observe in detail, through the estimation of a polynomial trend, how the wheat series shows the clear signs of the application of protectionist policies of 1887, while the wine presents a divergent trend confirming what was said above.

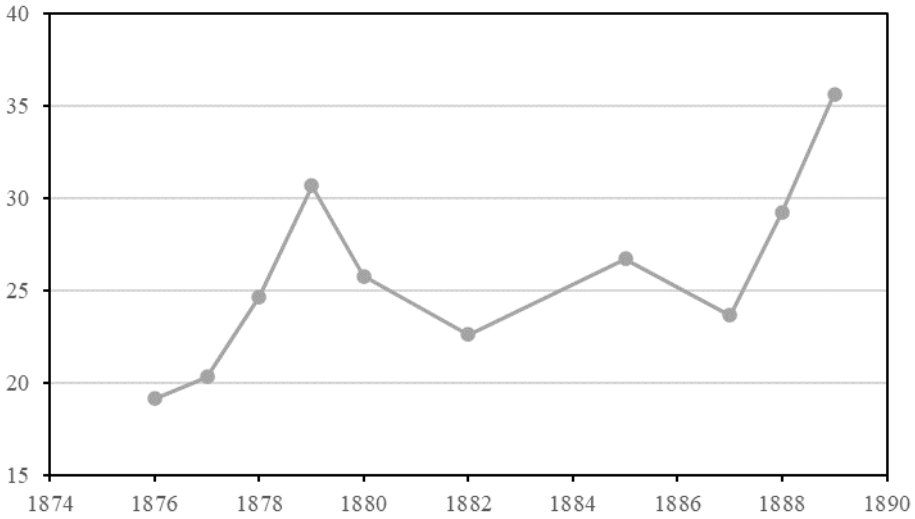
As a last analysis we report the trend of producer prices (1876-1889) of the Canonica's farm during the cereal crisis of the 1880s. This is to make a comparison with the market prices of Florence and Siena. The price of wheat (**Fig. 5**) shows a trend in line with the provincial prices of degrowth

during the crisis and growth after 1887. Wine (**Fig. 6**) and oil (**Fig. 7**) also show a trend in line with provincial prices.

Figure 5
Wheat Price Canonica 1876-1889

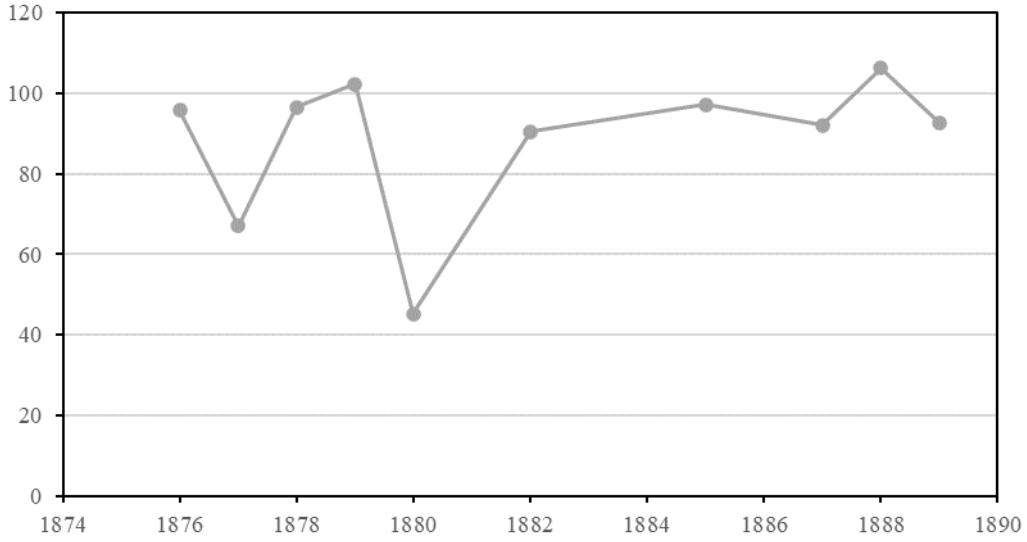
Reference: Own processing from: *Ass, Postunitario, Azienda la Canonica, amministrazione*.

Figure 6
Wine Price Canonica 1876-1889



Reference: Own processing from: *Ass, Postunitario, Azienda la Canonica, amministrazione*.

Figure 7
Oil Price Canonica 1876-1889



Reference: Own processing from: *Ass, Postunitario, Azienda la Canonica, amministrazione*.

Appendix II

Total production of *poderi* Canonica's farm 1858-1889

As already anticipated, the administration books presented a report based on the ancient Tuscan units of volume measurement, in this regard a conversion was necessary in order to be able to bring the values back to hectolitres for all products. In relation to the individual years, the production of all the production units belonging to the farm has been reconstructed. This section shows the quantities produced by wheat, oil and wine from the individual farms from 1858 to 1889 of the Canonica. The values are expressed in hectolitres.

WHEAT

n	Podere	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875
1	Bosco	48,60	43,00	46,05	48,85	46,29	46,78	39,22	51,89	51,28	45,19	56,52	38,83	48,97	26,56	36,54	42,15	69,92	64,32
2	Canonica	52,50	101,42	85,88	97,45	75,28	83,44	65,29	55,06	91,48	83,32	102,81	74,55	73,58	78,45	74,65	66,27	114,51	96,48
3	Cantone I	84,94	74,18	74,55	69,43	61,15	78,69	61,03	76,50	81,86	66,27	79,67	54,82	55,55	61,88	57,01	64,51	95,75	95,84
4	Cantone II	79,67	76,38	72,11	69,68	65,78	75,28	57,98	72,84	86,73	69,31	84,54	60,42	51,89	60,76	74,55	36,79	84,54	71,14
5	Casanuova	87,71	93,92	80,15	88,44	70,65	75,77	73,09	83,81	90,87	73,09	93,31	66,27	63,34	63,83	58,71	53,35	93,55	19,00
6	Calcinaia I	87,46	70,65	80,15	84,30	71,50	79,91	58,59	63,10	75,52	53,48	82,10	66,27	69,43	72,46	47,26	54,82	24,70	80,15
7	Capperi I	55,91	48,60	56,03	47,02	46,05	54,33	27,14	46,17	39,59	43,85	45,80	36,54	32,65	52,62	34,69	37,76	102,03	51,99
8	Capperi II	39,71	60,18	51,41	51,16	47,39	51,28	41,17	58,96	55,79	57,86	58,96	53,35	46,78	51,89	19,98	37,76	55,16	52,72
9	Capperi III	59,93	67,97	56,03	58,47	49,21	62,13	47,26	64,32	57,50	55,79	53,94	46,29	45,31	42,88	41,42	32,40	52,87	54,09
10	Casabassa	74,31	78,08	67,73	78,57	57,50	76,74	49,21	67,24	73,33	68,22								
11	Casabassa I											59,93	47,75	26,07	32,89	17,78	22,66	66,51	48,73
12	Casabassa II											35,08	23,39	24,22	25,68		14,72	35,81	33,86
13	Casale	27,04	20,83	27,16	31,79	25,34	15,59	29,60	30,94	36,30	22,41	24,85	6,33	20,95	17,30	13,64	11,94	20,95	10,96
14	Casarsa	84,30	80,28	75,52	86,73	62,13	77,60	61,15	82,71	83,93	64,56	80,25	66,12	59,93	82,83	60,18	73,67	110,85	27,38
15	Casalta	38,86	39,63	40,08	34,60	44,58	39,71	40,69	49,46	51,41	47,75	60,91	37,03	38,98	43,85	31,92	30,79	48,73	59,69
16	Corniolo	96,64	98,69	90,71	117,61	97,09	103,93	96,64	102,11	142,68	94,81	57,98	50,67	45,56	50,67	58,81	41,61	90,24	34,84
17	Fibbiana	114,63	91,36	103,30	113,77	89,90	111,46	74,18	110,12	151,42	127,66	114,02	88,44	40,05	73,09	50,67	48,34	85,76	55,89
18	Fonte														24,61	14,86	24,22	39,47	70,02
19	Fossato	51,65	50,43	44,58	42,15	43,24	49,94	26,31	48,60	43,37	41,30	38,35	27,77	25,82	38,01	29,82	24,85	50,92	56,77
20	Fraille	110,36	109,88	102,67	123,03	90,63	106,95	87,46	104,03	113,53	100,62	115,48	72,11	60,42	57,74	59,93	52,62	94,28	49,46

21	Fraille II													34,11	30,70	29,24	77,23	48,48	78,20
22	S. Gaud	20,34	18,88	22,66	25,09	14,74	20,46	15,35	20,95	23,88	20,95	19,98	11,94	10,72	14,13	9,01	9,26	14,13	39,96
23	Leccio I	32,52	30,94	46,17	46,53	27,77	31,55	18,88	31,06	51,89	56,77	54,09	34,11	40,44	33,86	27,53	21,68	60,91	14,13
24	Leccio II	42,27	47,63	58,11	58,11	57,50	46,17	45,07	29,24	42,15	44,22	60,42	19,00	39,96	38,98	27,04	24,36	48,73	48,97
25	Morzano	59,93	69,92	66,75	86,00	49,46	77,96	74,18	94,53	121,81	85,51	88,05	34,11	77,72	90,63	77,33	78,45	109,15	39,57
26	Mulinaccio	50,67	47,63	48,12	46,05	57,01	0,00	37,52	49,94	50,19	52,14	55,55	38,49	33,13	38,25	45,31	27,53	63,59	93,07
27	Murate I	176,39	173,34	150,32	183,94	129,98	152,02	113,41	147,27	148,61	143,01	168,59	89,17	84,30	93,07	50,04	32,89	113,53	41,42
28	Murate II	82,10	83,56	83,69	82,47	72,72	85,39	49,21	81,13	81,74	66,88	92,58	69,68	51,16	56,77	51,16	26,17	88,44	88,05
29	Murate III															47,26	39,47	74,55	16,57
30	Rasoia I	27,29	42,03	53,60	23,39	26,43	0,00	22,78	0,00	78,45	65,05	79,91	56,03	59,20	61,64	41,66	41,42	79,91	77,72
31	Rasoia II	25,46	24,00	23,88	29,24	0,00	0,00	0,00	0,00	0,00	35,33	42,39	29,97	24,12	16,81		27,14	18,52	89,90
32	Torre	20,95	20,71	23,39	27,04	19,73	21,44	19,49	22,41	24,00	25,70	22,41	24,12	18,03	42,39	17,88	14,37	25,58	22,75
33	Torrione	67,73	59,08	46,05	62,37	48,12	56,40	35,81	41,78	45,92	52,26								
34	Torrione I											43,37	21,44	32,65	27,77	24,12	36,54	63,34	68,70
35	Torrione II											18,76	45,80	13,98	70,65	31,28	8,77		9,60
36	Valle	85,03	81,86	0,00	99,89	63,47	83,81	64,56	78,94	95,75	70,41								
37	Valle I											77,23	57,98	69,43	24,85	45,66	51,41	99,50	98,67
38	Valle II											19,25	14,96	19,00	87,71	20,46	17,78	28,75	28,50
	TOT	1884,91	1905,07	1776,84	2013,16	1610,64	1764,75	1432,31	1765,12	2090,98	1833,71	2087,07	1463,77	1437,46	1686,20	1327,43	1305,70	2273,64	1889,10

n	**Podere**	**1876**	**1877**	**1879**	**1880**	**1881**	**1882**	**1883**	**1885**	**1886**	**1887**	**1888**	**1889**
1	Bosco	43,85	18,52	49,55	41,76	72,46	113,53	53,11	67,24	67,24	73,09	76,84	54,43
2	Canonica	65,78	84,78	101,11	60,66	89,17	99,89	84,15	91,95	91,85	115,24	98,28	82,10
3	Cantone I	51,36	69,43	109,39	53,84	77,96	83,32	66,75	55,30	84,54	88,92	95,50	74,55
4	Cantone II	41,90	54,57	71,97	41,90	67,97	99,16	55,55	66,51	66,51	84,05	77,23	65,05
5	Casanuova	66,27	67,73	80,88	44,10	67,58	113,29	71,97	75,28	75,28	90,48	92,09	67,97
6	Calcinaia I	42,39	44,19	69,68	50,92	88,29	135,80	75,52	117,43	119,38	115,97	108,02	97,70
7	Capperi I	27,04	44,83	53,35	26,07	50,28	57,50	50,43				115,48	88,19
8	Capperi II	28,75	40,44	57,84	38,35	54,33	107,20	37,28	126,69	126,69	49,21	57,01	
9	Capperi III	34,60	37,86	64,17	42,64	53,35	28,26	45,66	53,84	53,60	69,43		47,26

10	Casabassa												
11	Casabassa I	19,49	40,44	57,84	30,55	55,06			84,30	84,30		71,38	49,07
12	Casabassa II	15,84	28,50	35,91	13,98	26,31	110,46	45,66			75,28		
13	Casale	19,73	20,81	23,05	20,46	32,40		20,22	29,72	29,72	26,56	30,45	25,82
14	Casarsa	61,39	78,20	99,25	72,60	91,12	39,47	80,74	57,74	91,85	111,34	94,77	79,18
15	Casalta	36,30	49,70		21,29	36,30	95,75			77,47			
16	Corniolo	57,50	52,14	80,40	31,92	92,09	86,49	5,12	77,47	98,28	88,92	80,40	61,74
17	Fibbiana	48,97	42,15		42,73	73,58	63,34	58,32	98,28	98,28	93,31	90,48	75,28
18	Fonte	28,75	28,26		43,85	151,05	72,11	38,49	64,07	64,07	66,27	57,25	62,61
19	Fossato	41,90	62,86	79,91	56,28	66,75	99,74	50,19	74,55	74,55	75,04	7,16	60,66
20	Fraille	52,62	72,60	98,91	60,42	69,19	52,14	78,20	89,17	89,17	101,59	88,92	79,42
21	Fraille II	30,70	34,60	44,58	31,67	33,38	13,40	31,43	41,42	41,42	48,24	41,66	33,86
22	S. Gaud	9,75	9,01	4,14	10,09	20,95	45,56	9,26	11,21	11,21	13,89	14,62	11,69
23	Leccio I	30,70	34,11	40,93	30,55	59,69	50,43	28,02	29,24	29,24	32,89	46,78	36,40
24	Leccio II	32,16	29,72	44,58	33,96	61,39	110,36	38,74	46,05	46,14	46,78	14,13	42,73
25	Morzano	36,06	82,35	97,45	80,15	104,52	95,75	73,09	98,67	98,77	107,44	97,79	79,67
26	Mulinaccio	46,29	39,32	50,67	33,13	45,07	137,16	37,76	64,81	64,81	70,99	69,68	52,87
27	Murate I	50,67	73,58	105,73	48,73	89,17	101,11	64,32	97,45	97,45	58,23	85,27	69,43
28	Murate II	38,49	58,96	76,74	40,93	83,32	93,31	54,33	85,03	85,12	84,30	81,71	64,17
29	Murate III	11,69	14,62	65,63	33,62	85,76	115,97	48,73	76,50	76,50	75,04	69,92	55,79
30	Rasoia I	49,94	27,77	38,83	39,81	83,81	28,75	61,64	83,81	83,81	85,76	94,04	51,41
31	Rasoia II	28,99	13,50	72,46	19,34	31,18	27,29	44,10	37,03	37,03	33,62	34,60	25,68
32	Torre	13,89	52,14	64,81	18,03	27,77	65,54	16,81	26,31	26,31	32,16	10,48	22,41
33	Torrione												
34	Torrione I	40,44	15,59		44,83			65,29	69,53	69,53	67,73	73,43	55,55
35	Torrione II	6,58	19,98		7,16	75,52	91,12						
36	Valle												
37	Valle I	59,20	49,46		63,34	80,40	30,70	50,19	75,87	75,87	93,55	78,45	67,10
38	Valle II	19,25	18,03	27,53	16,42	19,73		23,63	28,50	28,50	32,99	30,70	25,58
	TOT	1289,23	1510,74	1867,32	1346,10	2216,92	2463,86	1564,68	2100,96	2264,48	2208,30	2084,54	1765,38

WINE

n	Podere	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875
1	Bosco	8,21	18,23	13,68	20,56	20,06	16,55	13,68	17,32	25,53	27,35	45,58	36,38	24,16	45,13	5,93	51,05	29,17	45,13
2	Canonica	19,92	22,34	31,77	56,98	71,11	63,82	51,97	60,03	59,03	70,20	91,26	96,27	52,88	80,23	0,00	26,44	60,17	57,98
3	Cantone I	14,36	14,36	7,66	0,00	4,79	0,00	0,00	0,00	9,57	0,00	100,28	57,21	35,37	34,19	0,00	25,53	41,03	55,61
4	Cantone II	20,19	53,33	34,64	52,42	71,57	71,11	62,91	67,46	86,15	79,32	76,72	131,97	54,70	81,73	0,00	44,22	71,57	74,53
5	Casanuova	22,97	35,33	22,34	32,36	43,08	35,10	33,28	44,67	64,27	54,70	66,19	75,21	39,20	58,17	0,00	34,64	49,69	60,63
6	Calcinaia I	21,15	41,94	21,88	33,28	47,41	29,86	17,32	27,35	41,71	44,67	45,13	69,97	62,91	66,19	0,00	34,19	74,67	70,20
7	Capperi I	12,76	21,65	15,95	17,78	32,36	22,56	23,93	34,64	39,66	83,42	0,00	0,00	38,97	47,64	7,29	37,38	75,67	56,07
8	Capperi II	8,89	28,72	21,97	19,15	32,36	31,36	28,76	51,97	61,54	41,03	86,29	45,58	64,96	74,30	0,00	56,52	95,73	79,32
9	Capperi III	19,46	88,43	21,79	21,88	41,94	42,39	38,97	49,73	62,91	53,79	63,82	53,33	42,85	43,12	0,00	11,40	49,69	39,66
10	Casabassa	20,28	51,87	24,11	43,30	72,48	48,77	45,58	63,82	91,17	51,97								
11	Casabassa I											56,75	57,66	34,42	50,14	13,22	17,09	25,53	29,17
12	Casabassa II											35,60	43,12	23,98	38,11	0,00	7,75	16,55	20,06
13	Casale	2,55	4,10	1,82	2,28	5,24	5,93	5,01	6,61	6,84	6,84	8,02	27,08	10,94	7,52	0,00	2,96	6,02	18,23
14	Casarsa	22,79	33,50	27,81	31,45	36,70	33,05	24,89	41,03	59,72	54,70	81,73	11,62	51,51	98,92	0,00	31,91	12,54	86,15
15	Casalta	11,72	6,29	16,91	20,97	15,50	16,41	24,39	52,19	47,41	48,32	54,25	96,27	38,52	60,17	0,00	5,93	80,00	27,08
16	Corniolo	16,41	19,37	17,23	25,07	32,59	50,32	32,36	20,06	33,28	38,29	50,14	51,51	21,15	53,79	0,00	14,13	23,34	49,19
17	Fibbiana	24,21	37,83	26,89	24,62	50,14	49,23	50,14	72,02	77,49	61,08	85,24	53,15	33,46	49,23	7,75	17,32	48,32	46,45
18	Fonte											0,00	54,25	22,56	19,83	0,00	6,38	20,06	27,81
19	Fossato	13,08	43,76	15,92	34,64	47,41	31,91	31,91	43,76	52,88	30,09	50,60	47,64	20,97	52,83	0,00	33,28	56,07	64,73
20	Fraille	48,77	63,36	52,42	58,35	75,67	58,80	49,78	65,64	91,17	78,86	116,33	122,58	42,07	61,08	0,00	24,62	76,58	49,23
21	Fraille II											6,02	5,15	31,54	49,23	0,00	2,28	30,09	30,31
22	S. Gaud	0,81	1,16	0,46	0,94	1,43	1,99	1,92	5,07	2,44	2,44	15,04	18,23	4,38	4,38	0,00	1,14	3,19	14,31
23	Leccio I	3,01	5,93	2,74	3,65	7,52	7,70	7,07	0,00	8,66	8,21	19,15	27,94	13,17	16,41	0,00	5,01	5,70	15,04
24	Leccio II	2,83	11,40	2,28	6,84	13,22	11,85	10,03	16,87	18,23	15,95	91,17	76,72	18,96	6,38	0,00	23,70	9,12	35,56
25	Morzano	19,83	30,09	16,87	83,42	41,48	39,66	41,03	56,52	68,38	53,33	70,20	78,95	33,28	75,21	0,00	17,32	46,04	59,72
26	Mulinaccio	4,79	25,75	15,50	22,34	0,00	0,00	32,14	58,80	47,86	63,82	135,38	109,40	55,48	81,73	0,00	5,47	54,25	45,13
27	Murate I	23,75	73,62	82,05	65,64	115,10	94,81	74,17	113,96	168,66	136,75	76,72	76,35	60,58	85,24	0,00	5,47	16,55	44,22
28	Murate II	11,12	41,03	22,79	39,66	68,15	50,14	49,69	91,17	88,43	76,58	49,46	41,94	51,65	37,38	0,00	3,19	48,32	37,83
29	Murate III											0,00	14,13	19,37	10,48	16,64	0,00	16,05	19,15

30	Rasoia I	16,27	20,28	7,29	15,50	0,00	0,00	9,12	0,00	40,11	25,53	12,54	18,69	8,07	51,51	0,00	3,65	10,48	15,50
31	Rasoia II	3,46	5,01	1,14	0,00	0,00	0,00	0,00	0,00	0,00	10,48	11,85	30,09	15,36	9,12	0,00	4,56	8,98	8,21
32	Torre	6,84	9,80	6,38	7,75	10,03	7,52	8,21	1,37	9,12	9,80	50,14	63,68	18,01	72,21	17,55	43,76	11,53	28,99
33	Torrione	22,61	40,02	82,51	41,48	36,47	30,54	5,47	23,25	49,26	36,01								
34	Torrione I											20,06	20,74	14,91	25,07	0,00	1,14	56,75	34,60
35	Torrione II											60,63	14,59	39,34	96,41	0,00	8,39	0,00	8,21
36	Valle	39,20	42,39	30,09	45,58	16,87	34,64	35,10	51,74	51,97	50,14								
37	Valle I											23,57	0,00	13,22	14,13	0,00	8,30	31,45	22,52
38	Valle II											13,04	0,00	0,00	0,00	0,00	22,06	18,69	11,08
	TOT	462,25	890,91	644,89	827,88	1010,66	886,05	808,80	1137,06	1463,44	1313,66	1768,89	1727,41	1112,89	1657,21	68,38	638,18	1279,54	1387,58

n	**Podere**	**1876**	**1877**	**1879**	**1880**	**1881**	**1882**	**1883**	**1885**	**1886**	**1887**	**1888**	**1889**
1	Bosco	28,03	23,48	45,58	20,06	40,11	77,40	72,34	31,32	31,32	46,72	46,36	46,36
2	Canonica	36,01	61,08	47,41	35,53	55,16	145,41	110,50	55,89	55,61	53,88	62,54	60,95
3	Cantone I	23,48	19,60	113,50	31,57	41,71	147,51	97,91	67,87	67,46	73,53	72,34	72,34
4	Cantone II	41,94	67,46	62,22	28,92	36,92	120,84	84,42	51,92	51,05	44,44	52,88	52,88
5	Casanuova	28,72	65,19	53,11	33,28	51,05	133,11	114,46	75,03	74,76	72,34	79,18	79,18
6	Calcinaia I	23,02	103,02	49,69	45,81	109,40	198,84	145,78	87,02	86,61	81,69	97,19	97,19
7	Capperi I	31,91	49,69	95,73	35,56	58,35	318,13	247,79	0,00	0,00	0,00	145,73	145,73
8	Capperi II	56,39	66,10	72,93	34,64	63,82	111,27	97,60	115,87	114,87	115,42	45,68	0,00
9	Capperi III	41,94	63,13	87,52	31,45	51,51	113,28	0,00	45,72	44,67	40,98	0,00	45,68
10	Casabassa												
11	Casabassa I	12,44	32,59	25,07	16,64	40,11	23,70	73,71	40,80	40,11	0,00	55,29	54,38
12	Casabassa II	12,31	11,85	7,29	9,57	8,66	0,00	25,89	0,00	0,00	41,85	0,00	0,00
13	Casale	4,10	27,35	18,69	4,01	8,66	179,78	0,00	8,93	7,29	17,91	15,91	15,91
14	Casarsa	62,68	32,36	56,98	46,95	69,29	0,00	0,00	69,83	69,29	95,04	96,23	97,14
15	Casalta	12,99	13,68	53,33	4,90	14,59	28,44	126,22	0,00	32,82	0,00	0,00	0,00
16	Corniolo	27,35	28,72	81,60	13,79	25,07	108,26	66,92	33,55	0,00	56,48	52,74	52,65
17	Fibbiana	24,62	42,85	47,41	15,04	41,03	80,55	71,29	37,65	36,47	53,47	56,66	56,66
18	Fonte	12,99	26,44	92,08	52,42	42,85	85,70	82,55	30,95	30,09	65,55	59,49	59,49

19	Fossato	26,44	72,93	56,52	42,85	45,13	89,25	64,05	35,10	34,64	36,33	44,17	44,17
20	Fraille	35,92	69,74	76,58	29,40	53,33	199,48	136,43	68,56	67,46	69,70	70,47	70,47
21	Fraille II	15,73	11,17	43,76	11,51	19,60	59,94	37,70	22,29	0,00	24,75	18,78	18,78
22	S. Gaud	2,28	3,65	24,62	1,50	3,65	10,58	3,56	2,10	1,82	6,38	9,12	9,12
23	Leccio I	3,56	8,43	40,57	5,47	7,98	31,41	25,48	10,12	10,03	21,20	19,19	19,05
24	Leccio II	7,29	41,48	10,48	21,65	13,68	43,53	37,01	15,27	14,59	26,53	27,85	27,85
25	Morzano	25,07	28,72	71,29	24,16	66,10	154,99	127,64	67,60	67,46	86,66	73,66	73,66
26	Mulinaccio	40,84	53,56	23,79	29,40	38,75	146,23	92,22	50,05	49,23	37,79	60,35	60,35
27	Murate I	18,05	38,75	72,71	17,39	28,72	127,41	71,52	42,35	41,03	43,40	57,53	57,53
28	Murate II	11,17	0,23	26,35	26,44	74,30	137,48	100,33	66,19	65,64	63,82	47,45	47,45
29	Murate III	25,30	0,46	10,48	13,90	31,45	90,26	76,63	36,06	34,64	37,79	36,06	35,19
30	Rasoia I	5,47	12,31	0,31	6,84	11,40	19,01	46,22	23,66	22,79	35,37	17,23	17,23
31	Rasoia II	3,01	21,65	0,13	11,85	6,84	29,54	26,71	12,22	10,94	19,69	20,60	20,51
32	Torre	3,78	10,35	19,41	16,98	21,42	16,18	29,99	11,81	10,94	22,61	66,64	66,92
33	Torrione												
34	Torrione I	12,49	10,94	0,44	13,90	40,57	62,86	93,77	38,66	38,29	67,65	0,00	0,00
35	Torrione II	10,94	30,54	25,64	0,00	0,00	0,00	0,00	0,00	48,32	0,00	0,00	0,00
36	Valle												
37	Valle I	24,16	10,44	12,24	16,71	30,09	87,70	77,90	49,28	0,00	42,71	42,30	42,21
38	Valle II	14,81	3,19	7,43	51,74	20,06	91,30	41,75	23,34	0,00	25,80	22,02	22,02
	TOT	767,22	1163,12	1532,90	801,85	1271,34	3269,38	2506,30	1327,00	1260,26	1527,48	1571,65	1569,05

OIL

n	Podere	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875
1	Bosco	0,80	0,00	1,00	1,50	0,00	2,21	0,59	0,67	0,00	2,72	2,19	1,04	0,63	0,63	0,23	0,02	1,88	3,68
2	Canonica	1,04	0,38	2,55	1,46	1,21	4,51	0,75	1,34	0,00	2,67	0,83	2,42	2,34	1,42	0,00	0,00	0,00	0,00
3	Cantone I	0,71	0,00	0,67	0,42	0,00	1,34	1,34	0,00	0,00	2,34	2,32	0,42	1,59	1,00	0,00	0,00	0,00	0,00
4	Cantone II	1,09	0,00	1,25	0,79	0,00	1,25	0,00	0,67	0,00	1,38	1,67	0,42	1,38	0,71	0,00	0,00	0,00	0,00
5	Casanuova	1,09	0,00	2,05	0,00	0,46	2,72	0,00	1,04	0,00	2,84	2,44	0,38	1,71	0,29	0,00	0,00	0,00	0,00
6	Calcinaia I	4,14	1,55	5,14	3,97	3,22	5,60	2,97	3,89	0,00	0,79	3,18	3,38	4,93	2,38	0,00	0,00	0,46	0,00
7	Capperi I	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,84	0,00	0,00	0,46	0,00	0,00	0,00	0,00	2,38
8	Capperi II	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,72
9	Capperi III	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
10	Casabassa	1,30	0,25	2,05	1,34	0,00	3,93	2,80	1,67	0,00	0,79								
11	Casabassa I											0,00	0,00	2,01	0,29	0,00	0,00	0,00	0,00
12	Casabassa II											1,30	3,72	2,17	0,25	0,00	0,00	0,00	0,00
13	Casale	2,80	1,59	5,85	1,84	1,34	7,44	0,67	2,51	1,34	2,09	0,00	1,59	4,85	1,17	2,76	0,00	0,00	2,55
14	Casarsa	4,26	0,38	4,60	2,26	3,64	4,05	2,47	3,30	0,00	3,09	1,61	2,21	5,68	2,97	0,00	0,00	3,43	1,76
15	Casalta	0,00	0,13	1,17	0,71	0,67	1,96	0,59	1,71	0,00	0,67	1,58	3,76	3,72	0,00	0,00	0,00	0,00	0,00
16	Corniolo	0,92	0,50	2,80	2,84	1,67	6,23	0,00	1,96	0,00	2,63	2,56	3,80	5,47	1,92	0,00	0,00	0,00	0,00
17	Fibbiana	10,66	2,42	13,66	2,84	3,38	16,88	2,51	10,61	0,00	7,44	1,14	0,50	4,51	1,67	6,52	0,04	0,00	0,00
18	Fonte											1,54	3,34	4,10	1,13	0,00	0,00	4,18	6,44
19	Fossato	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,38	0,00	0,00	0,00	0,00	0,00	3,28
20	Fraille	0,00	0,00	29,25	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,62	0,00	0,00	0,00	0,00	0,00	0,00	1,80
21	Fraille II											2,01	0,00	0,00	0,00	0,00	0,00	0,00	0,38
22	S. Gaud	5,52	3,01	6,48	8,02	1,21	18,39	2,63	10,99	0,00	6,64	0,93	5,56	10,78	3,05	13,33	0,04	4,26	0,00
23	Leccio I	3,51	4,28	6,64	4,76	2,13	9,78	1,34	0,00	0,00	6,18	1,95	3,22	4,76	0,75	6,94	0,54	3,80	0,00
24	Leccio II	3,26	2,70	2,67	5,93	3,64	11,07	3,89	5,18	0,00	5,31	1,14	3,22	8,11	2,93	9,53	0,21	6,69	0,00
25	Morzano	2,21	0,54	1,00	2,80	0,59	1,67	1,25	3,47	0,00	2,26	0,00	1,67	2,05	3,09	0,00	0,00	0,00	0,00
26	Mulinaccio	0,84	0,50	3,22	1,04	3,47	2,76	0,00	2,21	0,00	3,09	3,18	0,84	0,92	0,00	0,00	0,00	0,00	2,84
27	Murate I	0,84	0,50	3,22	1,04	3,47	2,76	0,00	2,21	0,00	3,09	2,60	0,00	5,35	0,00	0,92	0,00	0,00	4,18
28	Murate II	1,00	0,25	1,59	0,84	1,09	1,17	1,00	1,67	0,00	1,92	2,56	0,92	3,68	0,63	0,00	0,00	0,63	0,00
29	Murate III											0,87	3,01	0,84	0,00	0,00	0,00	1,13	0,00

30	Rasoia I	0,42	0,25	3,47	1,00	0,00	0,00	0,88	0,00	0,00	2,34	0,00	0,59	0,00	0,29	0,00	0,23	0,00	0,00
31	Rasoia II	1,46	0,95	0,88	0,00	0,00	0,00	0,00	0,00	0,00	2,59	0,00	0,63	2,01	2,01	1,80	0,00	0,00	0,00
32	Torre	1,46	0,69	3,64	1,04	1,34	5,31	0,00	3,13	0,00	8,90	0,00	0,78	0,00	0,42	0,00	0,00	0,00	0,00
33	Torrione	0,71	0,04	0,42	0,00	0,00	0,75	0,00	0,00	0,00	0,00								
34	Torrione I											0,00	0,00	0,00	0,13	0,00	0,00	0,00	0,00
35	Torrione II											0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
36	Valle	0,59	0,08	0,71	0,00	0,00	0,42	0,00	1,07	0,46	0,00								
37	Valle I											0,00	0,00	0,00	0,46	0,00	0,00	0,00	0,00
38	Valle II											0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Tot	50,69	20,99	105,97	46,47	32,51	112,20	25,66	59,32	1,80	72,62	38,21	50,80	84,03	29,58	42,02	1,09	26,45	31,99

ESSAY 3

EFFECTS OF ECONOMIC SHOCKS IN SIENA AGRICULTURE AT A MUNICIPAL SCALE (1880-1929).

Abstract

This chapter looks at the effects of economic shocks on agriculture in the province of Siena, a region with a large agricultural sector and a predominance of sharecropping. The study is based with original and homogeneous data at a municipal level from 1884 to 1929. Before the 1880s, wheat accounted for a large part of the cultivated area of Siena, vines were grown mainly in promiscuous cultivation, and olive trees were widespread across the province. The economic shocks that occurred during 1880-1929 resulted in a shift of production from cereals to wine, showing than landowners and sharecroppers responded to the cereal crisis. By 1929 the arrival of phylloxera to the Chianti region temporarily reversed the expansion of wine in Siena. This chapter shows that Siena was the province of Tuscany with the highest number of agricultural technicians in the region and the use fertilizer per hectare increased after the 1920s.

Key Words

Siena – Agriculture – Sharecropping – Shocks – Production

Introduction

This study looks at the evolution of agricultural production in the province of Siena between 1880 and 1929 by using data at a municipal level that is available in the archive of the *Camera di Commercio* of Siena. This data has allowed to study reactions of the agricultural producers to economic and political shocks, including the crisis of the 1880s, World War I, the *Biennio Rosso,* fascism and the *Battaglia del Grano.*

This paper examines the hypothesis by Fenoaltea (2006) or Simpson (1999) that crisis and public policies, such as protectionist, resulted in a change in the distribution of crops in Southern European countries. In the case of Italy, this chapter will conclude that changes in relative prices between the 1880s and 1929 led to a decline of wheat and a rise of wine in the province of Siena.

Availability of data at a municipal level for a long-term period makes the Siena case particularly interesting given its large agricultural sector and the prevalence of sharecropping. During this period, structural changes were slow in Siena as compared to other Tuscan provinces. The urbanization rate in Siena was 48% in 1881, compared to 55% in Tuscany. Fifty years later, in 1931, the urbanization rate in Siena continued to be around 50%, while in Tuscany it had grown to 69%. On the other hand, it is estimated that at the beginning of the 19th century sharecropping was widespread in Tuscany (Rogari, 2009). By 1930, the province of Siena had highest number of sharecropping contracts (61% of total agricultural workers were sharecroppers, as compared to 49% in Tuscany). Considering the long length of sharecropping contracts in Siena, as noted below, these percentages can be representative for the entire period under study. The term sharecropping refers to the between the lessor, or landowner, and the tenant, or a peasant, called mezzadro (from now sharecropper), for the cultivation of agricultural land that included an annexed dwelling commonly called *podere*. Sharecroppers had a privileged position over laborers, because they assumed entrepreneurial responsibilities and risks in production. Sharecroppers were protected by landowners and received the land to be cultivated for many years (INEA, 1931). Contracts usually

lasted for two or three generations. Moreover, in a historical period when access to credit for rural workers was difficult, sharecroppers could borrow from landowners. All the annual operations related to the farm were recorded in the *Libretto Colonico* (Biagioli, 2000). The sharecropper received, at least as far as Tuscany is concerned, half the production of the farm. In years when the quality of the grain produced was good, the owner could decide to buy grain of lower quality to give to the sharecropper and sell all the production of the farm to obtain a greater profit. The sharecropper would still have been entitled to a share identical to that produced but of lower quality (Biagioli, 2000).

Physiocrats had already criticized *metayage* and considered that it should be replaced by capitalist forms of agrarian production. In the 20th century the idea of sharecropping as a backward institution was supported by Marshall (1927). Sharecropping found a renew interest again in the 1970s with the studies by Cheung (1969) and Stiglitz (1974). Recently, scholars have looked at the different forms of sharecropping in Europe, and have closely analyzed this contract (Hoffman, 1984; Epstein, 1984; Carmona and Simpson, 1999, 2007; Ackerberg and Botticini, 2000, 2002). Italian literature has traditionally believed that sharecropping slowed down agricultural progress in Tuscany (Giorgetti, 1974-1977; Pazzagli, 1979; Sereni, 2016). Some other scholars consider that Tuscan sharecropping was not a static institution and it presented elements of progress (Biagioli, 1970; Mirri, 1970; Galassi, 1986, 1989).Given the dominance of sharecropping in Siena, it becomes very relevant to observe how economic and political shocks affected agricultural production in the region. In fact, authors such as Galassi (1986-1992), Gallassi and Cohen (1994) and Bertini (2001) have considered that Tuscan, and in particular Sienese, sharecropping was far from being static during this period.

Scholars have studied Tuscan sharecropping at a *fattoria* level (Cianferoni, 1973; Biagioli, 2000), especially. However, Cohen and Federico (2001) argued that the sample of *fattorie* was too small to lead to generalizable conclusions. The possibility of using municipal data, only available for Siena, will allow to contribute to the discussion on the Tuscan sharecropping from another

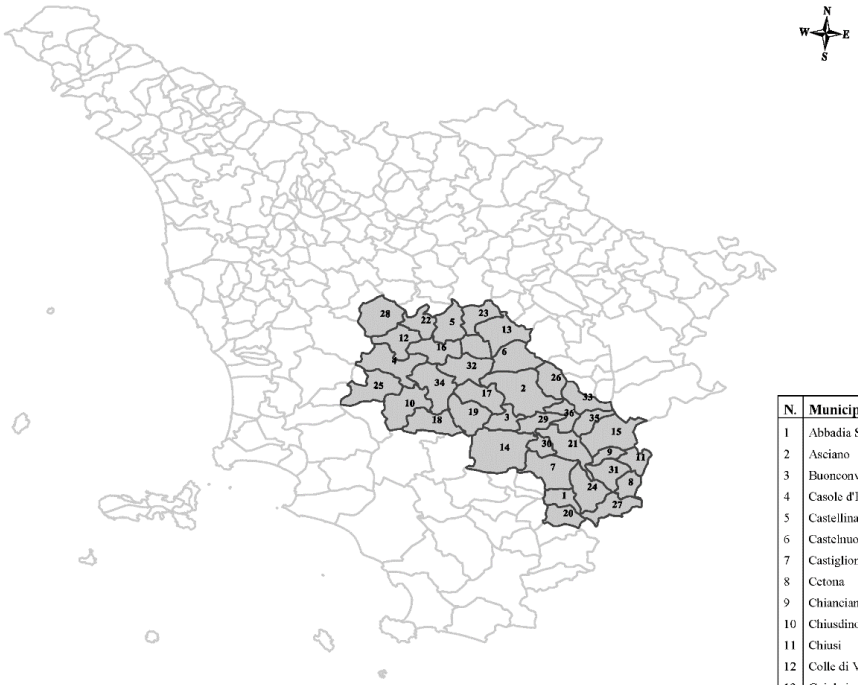
perspective than that of the *fattoria*. The study was carried out using maps with the aim at identifying persistence or changes in the cultivation of different crops.

This article is organized as follows. First section describes the agricultural structure of the province of Siena. Second section reviews literature on the long-term evolution of the Italian agriculture. Third section describes sources and methodology. Fourth section analyzes aggregated data of the Siena province. Fifth section studies data at a municipal level. Finally, last section concludes.

I. The territorial and agrarian structure of the province of Siena

The province of Siena is located in Southern Tuscany. Medium and low hills occupy over 80% of the land what makes the region good suited for the cultivation of specialized crops, such as vine and olive trees. The province in divided in 36 municipalities and it is one of the few provinces that did not have significant changes in municipal borders during the period between 1880 and 1929. This makes Siena a particularly interesting case study because it is possible to observe long-term persistency or changes over homogeneous units. **Figure 1** shows the geographical position of the province in the Tuscany and locates its 36 municipalities. The province of Siena is divided into 8 agricultural areas in the censuses. In this chapter, the original designation of each of the 8 areas has been renamed according to its predominant crop.

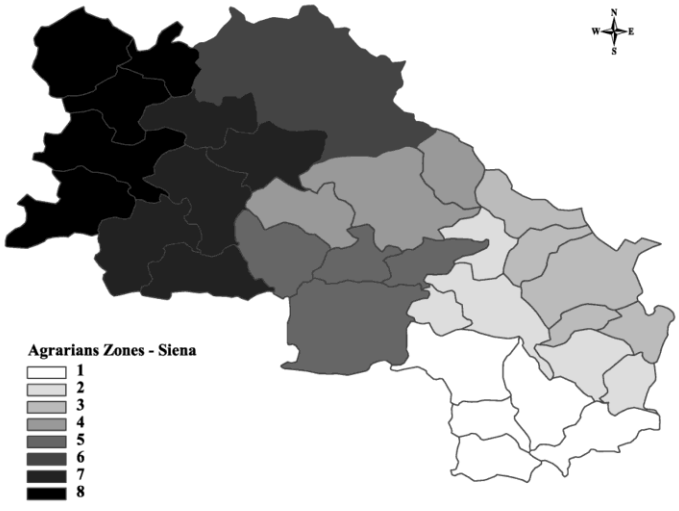
Figure 1
Municipalities in the province of Siena



N.	Municipality	N.	Municipality
1	Abbadia San Salvatore	19	Murlo
2	Asciano	20	Piancastagnaio
3	Buonconvento	21	Pienza
4	Casole d'Elsa	22	Poggibonsi
5	Castellina In Chianti	23	Radda in Chianti
6	Castelnuovo Berardenga	24	Radicofani
7	Castiglione d'Orcia	25	Radicondoli
8	Cetona	26	Rapolano Terme
9	Chianciano Terme	27	San Casciano dei Bagni
10	Chiusdino	28	San Gimignano
11	Chiusi	29	San Giovanni d'Asso
12	Colle di Val d'Elsa	30	San Quirico d'Orcia
13	Gaiole in Chianti	31	Sarteano
14	Montalcino	32	Siena
15	Montepulciano	33	Sinalunga
16	Monteriggioni	34	Sovicille
17	Monteroni d'Arbia	35	Torrita di Siena
18	Monticiano	36	Trequanda

Notes: Own processing with GIS technology.

Figure 2
Agricultural regions of Siena



N.	Agrarians Zones	Municipality (Number)
1	Media Montagna dell'Amiata	1-7-20-24-27
2	Colline di Montepulciano	8-21-30-31-36
3	Colle-Piano della Chiana	9-11-15-33-35
4	Colle-Piano dell'Ombrone e dell'Arbia	2-17-26
5	Colle-Piano dell'Ombrone e dell'Asso	3-14-19-29
6	Colline del Chianti	5-6-13-23
7	Colline Senesi	10-16-18-32-34
8	Colle-Piano della Val d'Elsa	4-12-22-25-28

Notes: Own processing with GIS technology.

The division into eight agricultural areas makes possible to aggregate municipalities according to similar characteristics (in terms of climate, soil and crops). The morphological and crop characteristics of the eight agricultural regions of the province of Siena are the following (the percentage values in parenthesis represent the share of the area over the province's total for 1929 are shown in parenthesis):

1. Meadow and pasture area (Mountains area). The region is located in the south of the province and includes all the municipalities of the mountain area. Soil is predominantly clay and pebbled. Agriculture was not particularly developed here compared to other areas, and it is mostly formed by bare arable land and meadows and pastures (47%); mercury mining was important (BCAS, 1884).

2. Quality olive oil area (Colline di Montepulciano). The region is located in the south of the province and includes the municipalities around the area of Montepulciano, the soils were clayey and calcareous. The area was well suited for the production of olive oil and wine (8% of the total in Siena). About 8% of Sienese cattle and equines were present in this region.

3. Cereal and wine mixed crops (Val di Chiana). The region is located in the south of the province and includes the municipalities of Val di Chiana and also those of Montepulciano. Soils are sandy and the area over was subjected to several reclamation operations. Important arable land with vines and olive tress (21,4% of the total in Siena). The area is also important for the production of wine, especially in Montepulciano. Most of the Sienese cattle was concentrated in this area, especially in *Chianina*.

4. Cereals area – (Crete Senesi). The region is located in the center of the province. It is commonly called *Crete Senesi*. It is considered as the wheat belt of the province. Sienese wheat production was mainly concentrated in this area. In the area, the presence of cattle and equines accounted for 11%and 5%, respectively.

5. Wine area – (Montalcino). The region is located in the south of the province. Important for the presence of Montalcino, Brunello's area, and for the production of wine. The production of wheat and arable land is also significant. There was a high percentage of cattle (11%) and equines (8%) in the area.

6. Quality wine – (Chianti). The region is located in the north of the province. Steep soils often require the use of terracing. The galley becomes a good surface for screws. It is commonly the area of greatest production of quality wine. Brolio Castle, known worldwide for wine production, is located here. Compared to the other regions, the incidence of livestock was low.

7. Mixed crops (Siena). The region is located in the center of the province, the city of Siena is located here. Good presence of simple arable land and with specialized crops. In the area of the Municipality of Sovicille, there were reclaimed areas. In the region there was a high incidence of cattle (16%) and also equines (21%).

8. Oil, legumes and wine mixed crops (Val d'Elsa). This region is located in the North-West and was characterized by the presence of arable land with vines and olive trees (19%), production of oil and wine. High incidence of cattle (16%) and equines (20%).

During the period under study, the province of Siena had an agrarian structure based on the typical crops of Tuscan sharecropping: wheat, oil and wine. Most of the reclamation operations (wetland recovery or alluvial operations) had already been carried out by 1880s, although a few continued even in the early 20th century. Between 1910 and 1929 the agricultural surface in the Siena province remained almost constant (**Table 1**). Promiscuous (or mixed crops) arable land grew by 4%, with the highest growth rate for cereal and wine mixed crops[1]. Decrease in productive area only occurred in the cereal area (*Crete Senesi*) and in the area of quality wine (Chianti). The first, despite being the cereal zone of the province, recorded a significant increase in its unproductive area. In Chianti, decline was due to an increase in other crops. Confirmations would be found in the growth of the mixed crops cultivation of the vine between 1923-28 and 1929 of 221 hectares.

[1] From now on, in order to standardize the figures for 1910 and 1929, the agricultural area of promiscuous arable land will be recorded by the sum of the hectares of the following crops: wheat, maize, other cereals (oats, rye and barley), legumes, potatoes and olive trees.

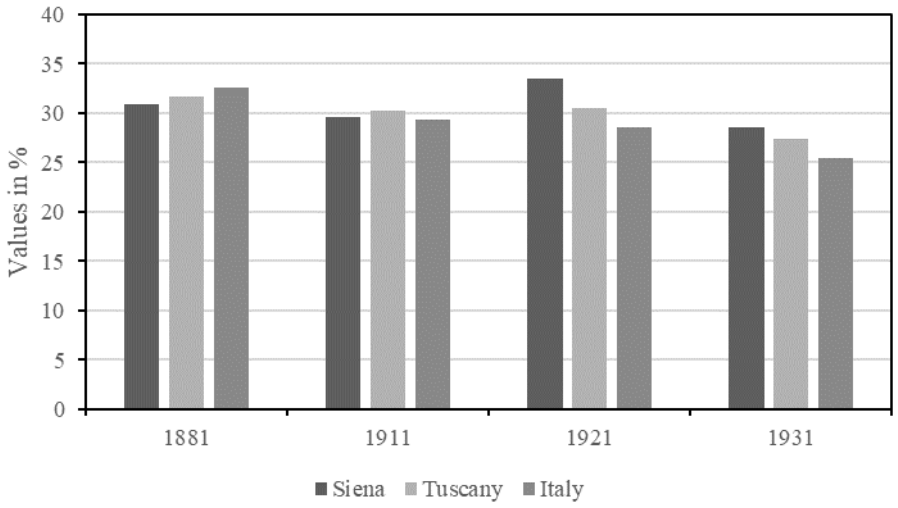
Table 1
Changes in cultivated area in the province of Siena (1910-1929)

	1910			1929		
	Total Agrarians surface	**Promiscuous crops**	**Percentage Promiscuos crops on total agrarians surface**	**Total Agrarians surface**	**Promiscuous crops**	**Percentage Promiscuos crops on total agrarians surface**
Reg. Agr	**Hectares**	**Hectares**	**%**	**Hectares**	**Hectares**	**%**
Meadow and pasture area (Mountains area)	40.344	12.987	32	46.058	14.596	32
Quality oil area (Colline di Montepulciano)	34.862	19.179	55	34.857	20.645	59
Cereal and wine mixed crops (Val di Chiana)	36.284	22.719	63	34.937	29.359	84
Cereals area (Crete Senesi)	38.550	17.859	46	37.457	15.620	42
Wine area (Montalcino)	46.847	15.383	33	46.268	19.893	43
Quality wine (Chianti)	45.518	27.959	61	46.377	21.640	47
Mixed crops All products (Siena)	58.594	25.944	44	58.716	26.572	45
Oil, legumes and Wines mixed crops (Val d'Elsa)	59.924	27.597	46	56.640	27.885	49
Province	**360.923**	**169.627**	**47**	**361.310**	**176.210**	**49**

Reference: BCAS. (1910); ISTAT. (1929)

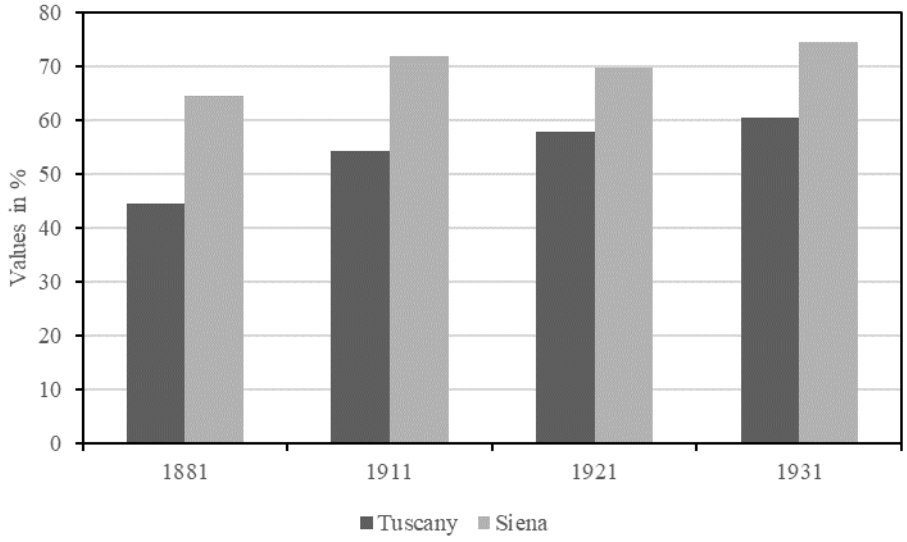
Agricultural population accounted for more than half of active population and about 30% of total population1881 (**Fig. 3**). The importance of agriculture, however, led to a delay in the process of industrialization in Siena. In 1911, only 2% of the province's population was employed in industry, while this share reached 8% in Tuscany (ISTAT, 1914). In 1927, active population engaged in industry reached 8%, while in Tuscany accounted for 19% of all population (ISTAT, 1928). **Figure 3** shows that the share of the agricultural population in 1881 in Siena was similar to that in Tuscany and Italy but the trend shifted beginning in from 1921 when the share of the agricultural population of Siena becomes higher than that of Tuscany and Italy, which is confirmed by 1931 figures.

Figure 3
Share of the agricultural population on the total population: Italy, Tuscany and Siena (1881-1931)



Reference. ISTAT. (1881, 1911, 1921, 1931); Vitali. (1971).

Figure 4
Share of sharecroppers in total agricultural active population: Tuscany and Siena (1881-1931)



Reference. ISTAT. (1881, 1911, 1921, 1931).

Figure 4 shows that the share of sharecroppers in the total number of agricultural workers was much higher in the province of Siena than in Tuscany for the period under study. In Siena there is a slight decrease in 1921, when in the number of landowners rose from 3.527 in 1911 to 6.321 with an annual growth of 6%. This is a significant increase considering that in 1881 there were 3.369.

The presence of a high number of makes Siena a significant example to study the effects of economic shocks between the 19th and 20th centuries.

II. Literature review

The 1880s crisis

Between the late 1870s and early 1880s, Europe was invaded by the cheap U.S. and Russian grains, resulting in a significant fall in prices in all European markets. In Italy, the price of wheat fell from 30 to 20 lire per quintal between 1880 and 1887 and imports increased from 2,3 to 10,2 million quintals (Galassi and Cohen, 1992). Simpson (1999:6) argued that cereal freed up resources to increase dairy products in northern European countries, but not in countries such as Italy and Spain. In Italy case, Fenoaltea (2020) considered this period cannot be considered a moment of crisis (Fenoaltea, 2020), which coincides with Einaudi (1973) and Pareto (1959) appreciations. Fenoaltea (1993) considered that the fall in wheat prices released resources to promote the development of specialized crops and. Despite cereals imports increased significantly (Federico, 1988), per capita food consumption declined by 8% (Barbieri, 1961), which this would have increased poverty in a predominantly subsistence economy (Toniolo, 1988). However, Fenoaltea (1993) considered that the fall in consumption of primary goods was offset by the increase in consumer goods. While Luzzato (1968) pointed to the profound crisis of Italian agriculture caused by the arrival of American cereals in European markets, Romeo (2008) highlighted that Italian agriculture underwent significant structural changes. Fenoaltea (2006) found that wages of agricultural workers in Lombardy increased in the 1880s, and they show a high correlation to industrial wages. The upward trend of agricultural wages coincides with the results by some recent studies on living standards in Italy (Vecchi, 2011, Vecchi and Felice, 2015). absolute poverty decreased from 35% to 31% for the Centre-North of Italy. In the South and in the Islands the incidence of poverty increased from 38% to 42% (Felice, 2013). Federico (2003) noted that between 1875 and 1895 the cumulative

rate of growth of gross marketable production increased by 1%, which contrasts with the slight decrease shown by the ISTAT-Fuà (1956) series.

On the contrary, other scholars pointed to the 1880s as years of a severe crisis in Italian agriculture. Pescosolido (2015) considers the cereal crisis favored a decrease in food consumption due to the decrease in the price of wheat. According to Zamagni (1993), the crisis resulted in social and political unrest in the rural area, as well as an important migratory flow to cities. Castronovo (2013) also considered that the 1880s crisis caused an increase in poverty among agricultural workers leading to an increase in agricultural emigrants from 99.000 to 205.000 between 1878 and 1887.

The cereal crisis also led to important structural changes. Toniolo (1988) argued that the crisis led to a change in the relative price of wheat favoring a real agricultural exchange rate for other crops, such as fodder, hemp and rice in the Po Valley and citrus fruits, vines and olive trees in the South. This is confirmed by Porisini's (1971), who considered that yields of cereals per hectare declined because the best soils were destined to other crops. Ciocca (2007) shows that in first years of the crisis there were a significant increase in the annual GDP growth rate, so the crisis was only felt later. Frascani (2018) considered that it is essential to shift focus towards local changes, opening up new research perspectives. Cohen and Federico (2001) recently showed how the model structured by Fenoaltea (2006) present problems in particular with regard to the relationship between the nominal wage of agricultural workers and the price of wheat. The increase in price of wheat would have encouraged an increase in the migratory movement. While eliminating the wheat duty, wages would only rise by 2,2% per year (Federico and O'Rourke, 2020).

Giolittian period (1903-1914)

During the Giolittian period (1903-1914), agriculture started to grow. O'Brien and Toniolo (1987) estimated an annual growth rate of the value of agricultural production of about 5%. According to Toniolo (1988), agricultural development advanced as a result of the reclamation practices and mechanization. Liberal governments introduced several land reclamation initiatives that led to a 5% increase of hectares in Italy.

Between 1891 and 1911 agricultural output significantly increased, in particular the production of certain specialized products such as citrus fruits (+117% lemons; +77% oranges), potato (+131%) and rice (+55%). Products such as wheat (+31%), corn (+37%) and wine (+61%) also showed a remarkedly positive increase, while the production of olive oil with declined (-12%). This expansion can be explained by some improvement measures that shifted Siena from an extensive to an intensive agriculture. Some of these improvements were related to reclamation operations, which aimed at recovering land for agricultural production. Some operations were directly carried out by public administration and others by the owners (connected in the Consortia) In 1897, 697.561 hectares were reclaimed, 44% of which had been completed.

A slow process of mechanization also began during the Giolittian period (1903-1914). The Ministry of Agriculture estimated that before the War, 33.000 plows had been imported from Germany (1 in every 200 hectares), 1.200 harvesters (1 in every 6.000 hectares of 1916), 2.000 harvesting machines (1 in every 4.000 hectares) from France, Germany and the USA (ISTAT, 1916:154). It is estimated that Italian plough production stood at around 3.300 units, still a small quantity. The data confirm that this first wave of mechanization was based mainly on plows. It was needed to wait until the 1920s for the greater diffusion of other specialized machines. Furthermore, the value of imports of farm machinery decreased by 36% in 1910-1913, although started to increase again

during wartime[2]. The use of fertilizers also decreased in the period before World War I. From 1911-1913 to 1914, the use of phosphates decreased by 11% and that of potassium by 89%. The process of agricultural take-off stopped before and during wartime. Toniolo (1998) estimated that production in 1914-1918 was almost similar to that of the previous five years.

Biennio Rosso and Battaglia del Grano

The years following World War I, as pointed out by Serpieri (1930), were difficult for Italian agriculture particularly during the *Biennio Rosso* which brought rural unrest, agrarian strikes and occupation of land. Unrest was to be controlled with the rise to power of fascism starting in 1922. After World War I falling prices led to the adoption of protectionist policies (Nützenadel, 2001). However, decline in production led to a higher dependency on imports. In 1925, 40 billion lire of wheat were purchased from abroad corresponding to about half of the Italy's trade deficit. Moreover, exports decreased, mainly because products "Made in Italy", highly demanded by Italian immigrants abroad, started to be produced overseas (Preti, 1973). Dependency on grain imports led to the launch of the *battaglia del grano* to meet food needs. Fascist *ruraliste* policies were introduced to increase production. According to Galassi and Cohen (1992), protectionist policies significantly reduced exports, but policies to support cereal production led to a drastic reduction in the production of crops such as wine, in which Italy had a comparative advantage (Cohen, 1979; Galassi and Cohen, 1992).

[2] The quantity that can be used has been calculated as follows (Y+I-M). Y (domestic production); I (Imports) and M (Exports). The trade balance, for the years under review, is always negative because most fertilizers were imported. Reference: ISTAT (1916:153)

III. Data and methodology

The difficulty of finding homogeneous municipal quantitative data for different historical periods has made local long-term studies very difficult. As far as the province of Siena is concerned, it has been possible to reconstruct homogeneous series of prices at a provincial level and production of the main agricultural goods at both provincial and municipal level from the 1880s to 1929.[3]Values of the 8 agricultural regions of Siena in 1918 have also been collected, allowing to observe the effects of World War I. Data for the period 1923-28 and 1929 was found in the *Catasto Agrario* of 1929. Data for 1884 and 1910 is the most important contribution of this chapter and was compiled in the *Camera di Commercio* of Siena, including a volume containing the production of the main agricultural products for all the municipalities of the province in 1884. Data for 1910 was taken from the *Catasto Agrario* of 1910 (Valenti, 1911), which was never published. Only the volumes of Piedmont, Lombardy, Umbria, Marche and Lazio are available. The volume of Tuscany was never published (ISTAT, 1929: XII), but Siena volume was found in the archive of the Camera di Commercio of Siena. The following table shows the data collected for each year, specifying for each variable whether they are aggregate (provincial) or municipal values.

[3] In order to be able to observe the effects of the cereal crisis in aggregate production, data from 1878 (ISTAT, 1878) were also included.

Table 2
Availability of data by year (in bold, municipal data)

Year	Production	Agr. Suface	K-L	Price Mercuriali Prices Siena 1884-1929.
1884	**Wheat, Wine, Oil, Fodder, Legumes, Fruits (m) (f)**	Wheat, Wine, Oil, Fodder, Legumes, Fruits. (p) (a)	Livestock: horses, mules (m) (b) and cattle (p) (c) – Labor Force (p) (a)	Wheat, Wine, Oil, Fodder, Legumes, Fruits (p) (e)
1910	**Wheat, Natural Fodder, Oil*, Wine*, Legumes, Artificial Fodder, Corn, Other Cereal (Barley, Rye, Oat), Potatoes, Sugar Beet. (m) (f)**	**Wheat, Natural Fodder, Olive Tree, Legumes, Artificial Fodder, Corn, Other Cereal (Barley, Rye, Oat), Potatoes, Sugar Beet. (m) (f)**	**Livestock: horses, mules and cattle (m)** (g) – Labor Force (p) (a)	Wheat, Wine, Oil, Fodder, Legumes, Fruits (p) (e)
1918	Wheat, Oil, Wine, Corn, Potatoes, Legumes, Oat, Other Cereal (Rye, Barley), Sugar Beet. (z) (f)	No data	Livestock: horses, mules and cattle (p) (h) – Labor Force (a)	Wheat, Wine, Oil, Fodder, Legumes, Fruits (p) (e)
1923-28	**Wheat, Natural Fodder, Oil*, Wine*, Legumes, Artificial Fodder, Corn, Other Cereal (Barley, Rye, Oat), Potatoes, Sugar Beet. (m) (i)**	**Wheat, Natural Fodder, Olive Tree, Legumes, Artificial Fodder, Corn, Other Cereal (Barley, Rye, Oat), Potatoes, Sugar Beet. (m) (i)**	Livestock: horses, mules and cattle (p) (h) – Labor Force (a) (d)	Wheat, Wine, Oil, Fodder, Legumes, Fruits (p) (e)
1929	**Wheat, Natural Fodder, Oil, Wine, Legumes, Artificial Fodder, Corn, Other Cereal (Barley, Rye, Oat), Potatoes, Sugar Beet. (m) (i)**	**Wheat, Natural Fodder, Olive Tree, Legumes, Artificial Fodder, Corn, Other Cereal (Barley, Rye, Oat), Potatoes, Sugar Beet. (m) (i)**	Livestock: horses, and cattle (m) (i) – Labor Force (m) (a, i)	Wheat, Wine, Oil, Fodder, Legumes, Fruits (p) (e)

Notes:

Data Level:
(m) Municipal data
(p) Provincial data
(z) Agrarians Zones

References:
(a) Census (1878, 1911, 1921, 1931)
(b) Census Livestock 1876
(c) Census Livestock 1881
(g) Census Livestock 1908
(f) Bollettino Statistico Camera di Commercio di Siena (1884-1919)
(e) Mercurial Prices Siena 1884-1929.
(h) Census Livestock 1918
(i) Catasto Agrario 1929

Other: *estimated values.

IV. Inputs and agricultural production in Siena at a provincial level in 1884-1929.

This section reconstructs the evolution of agricultural production and input factors in Siena at a provincial level. Input factors include land, labor, and capital (fertilizers and machinery). The analysis is focused on crops for which data is available every year: wheat, corn, other cereals[4], legumes[5], potatoes, olive trees and vines[6]. Data on agricultural area for 1884 is unavailable, so that figures of 1878 were used (ISTAT, 1878). Figures on agricultural area for 1910 were found at the *Camera di Commercio* of Siena (BCAS, 1910), and for 1923-28 and 1929 at the *Censimento Agrario* (ISTAT, 1935). However, this data is not available for 1918. In 1878 the cultivated area, with the products mentioned above, was lower than in the following years. More than 100.000 hectares were recovered since then through reclamation interventions (**Table 2**). By 1880 more than 70.000 hectares were uncultivated (Mazzini, 1882). **Table 2** shows a decreasing trend of wheat production area, a growth of vines and an increase in olive trees from 1910 to 1923/28.The other products have remained substantially stable since 1910.

Table 2
Distribution of crops in the province of Siena (1878-1929), in hectares and as a share of total area.

	1878	1910	1923-28	1929	1878	1910	1923-28	1929
Crops	**Hect**	**Hect**	**Hect**	**Hect**	**%**	**%**	**%**	**%**
Wheat	60.098	76.024	71.220	76.294	44	28	28	30
Corn	13.591	15.777	8.916	8.905	10	6	4	3
Other Cereals	5.332	6.829	7.443	6.495	4	2	3	3
Legumes	5.381	14.477	20.274	20.229	4	5	8	8
Potatos	747	1.784	2.720	1.967	1	1	1	1
Grapes	38.700	103.700	80.482	80.558	28	38	32	32
Olive Tree	13.402	54.736	59.276	60.250	10	20	24	24
Tot	137.251	273.327	250.331	254.698	100	100	100	100

Reference: ISTAT (1878: 1929); BCAS (1910).

[4] Other cereals include oats, barley and rye. This union was necessary because in the 1910 bulletin the crops are indicated in a single heading.
[5] All legumes have been included in a single category because in the 1884 and 1910 series they are aggregated.
[6] For vine, data for 1917 was taken from the Italian Wine Yearbook.

The evolution of the labor factor was reconstructed using data contained from censuses (ISTAT, 1881, 1911, 1921, 1931). The agricultural population was divided in 6 categories (**Table 3-4**). **Table 3** shows that the agricultural population grew from 1881 to 1921 with an average annual growth rate of 1% (almost twice than that in Tuscany). This growth rate was higher than that of the total population over the same period, confirming that the province still had a predominant agricultural specialization. Between 1921 and 1931 there was a reversal in this trend. Agricultural population declined by -1% annually. Similarly, number of workers per 100 hectares shows an increasing trend from 1881 to 1921 and then a decline until 1931 (**Table 4**).

Table 3
Evolution of agricultural workers in the province of Siena (1881-1931), by type

	1881	1911	1921	1931	1881	1911	1921	1931
Category	**N.**	**N.**	**N.**	**N.**	**%**	**%**	**%**	**%**
Landowners[a]	3.369	3.527	6.321	7.176	5	5	8	10
Sharecroppers	41.342	52.112	58.554	55.968	65	72	70	75
Usufructuary	98	24	11	665	0	0	0	1
Agrarian Agents	657	704	880	909	1	1	1	1
Paesants	5.411	1.182	2.622	1.868	8	2	3	2
Day Laborer	13.140	14.956	15.620	8.432	21	21	19	11
Tot	64.017	72.505	84.008	75.018	100	100	100	100

Reference: Own processing from: ISTAT (1881;1911;1921;1931). Notes: [a] Landowners refers to farmers who conducted their own land.

Table 4
Evolution of agricultural population per 100 hectares in the province of Siena in 1881-1931, by type

Category	**1881**	**1911**	**1921**	**1931**
	N/100ha	**N/100ha**	**N/100ha**	**N/100ha**
Landowners	2	3	5	5
Sharecroppers	30	38	43	41
Usufructuary	0	0	0	0
Agrarian Agents	0	1	1	1
Paesants	4	1	2	1
Day Laborer	10	11	11	6
Total	47	53	61	55

Reference: Elaborazione propria da ISTAT (1881;1911;1921;1931).

The share of landowners on the total agricultural population increased from 1881 to 1921, and then remained constant until 1931. Throughout the period 1910 to 1923/28. The share of landowners grew by 2% per year, more than in Tuscany (+1%), indicating a certain movement in the land market even in a province with a high incidence of sharecropping. In 1929 the landowners accounted for 36% in Siena, while reached 44% in all Tuscan provinces, (ISTAT, 1935).

As pointed out by Serpieri (1930), the increase in land sales probably resulted from the rising agricultural prices after World War I. The most widespread category was sharecroppers, which grew by more than 10% between 1881 and 1911. This was probably the result of the reclamation operations that allowed to recover land of large properties for new sharecropper families, even more if we consider that the contract (although it was formally one year length) tended to have a long duration and that even passed from generation to generation. This guaranteed a form of economic stability for the family (Ascheri and Dani, 2011). The share of peasants increased since the World War I (from 2% to 3%) and dropped (from 3% to 2%) in the following period. The percentage of laborers decreased significantly between 1911 and 1931 (from 21% to 11%). Laborers accounted for a small share of the total agricultural workers, as compared to that of Tuscany. As mentioned above, the economic structure of the Siena province was based mainly on sharecropping [7]. The percentage of agrarian technical remained constant over time. The number of agrarian agents per 1,000 hectares decreases over time: 5 in 1881, 3 in 1911 and 4 respectively in 1929.

On a provincial scale, it has been possible to reconstruct number of livestock (BCAS; 1930). **Table 5** shows that livestock decreased by about 1% per year between 1876 and 1908, to start growing again since then. Number of livestock has been estimated at a provincial scale for all years under study (BCAS; 1930). Much has been said about the reduction of livestock during the World War I which would have put agriculture in crisis. The largest decreases occurred for horses (-3% per year)

[7] Between 1881 and 1921 the share of daily workers in the province of Siena was about 6% and in Tuscany it ranged between 20 and 30%. In 1931 in Siena the number decreased again to 3,21%. In Tuscany, too, there was a substantial decrease to 13,10%. However, this was more subdued than Siena in terms of the rate of change: Siena (-48,40%); Tuscany (-36,36%).

while for cattle it was just 0,32% per year. These numbers are not so significant to talk about crisis. This is confirmed, particularly for cattle per hectare (**Table 6**), which remained constant between 1908 and 1918. Between 1918 and 1930, cattle grew by 2% per year. The share of working cattle for the province of Siena and the whole of Tuscany was reported for the period from 1810-20 to 1930 (Pazzagli, 1979).

Table 5
Evolution of working livestock in the province of Siena (1875-1930), in number of heads and percentage of the total

	1875	**1881**	**1908**	**1918**	**1930**	**1875**	**1881**	**1908**	**1918**	**1930**
Category	**N.**	**N.**	**N.**	**N.**	**N.**	**%**	**%**	**%**	**%**	**%**
Horses	4.065	-	4.699	3.567	3.757	7	-	8	7	5
Donkeys	5.027	6.821	7.299	7.229	5.041	8	14	13	13	7
Mules	386	-	842	842	692	1	-	1	2	1
Cattles	50.739	41.845	44.838	43.146	65.254	84	86	78	79	87
Tot.	60.217	48.666	57.678	54.784	74.744	100	100	100	100	100

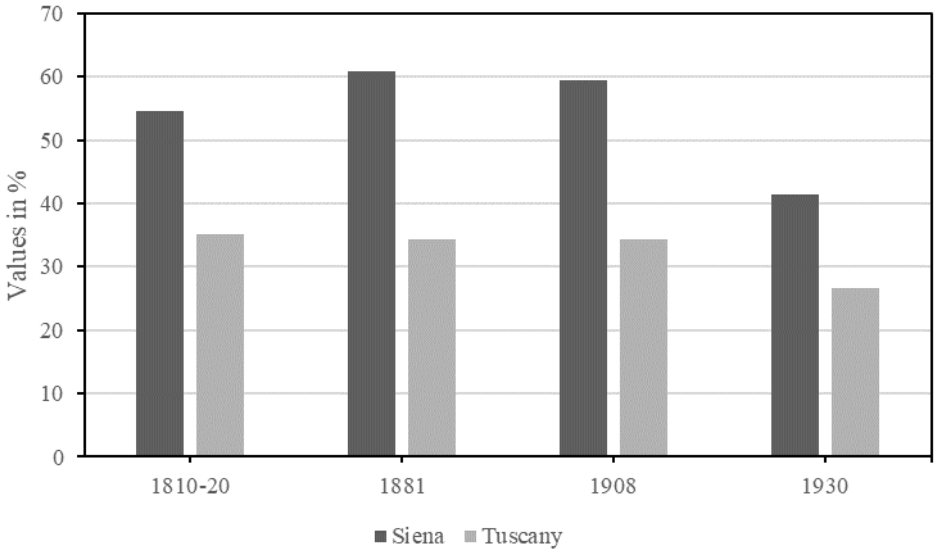
Reference: Own processing from: BCAS (1930); ISTAT (1938). Notes: in 1881 horses and donkeys were not detected. (a) As far as 1930 is based on the Bulletin of the *Camera di Commercio*, the figures are reliable. The table shows the final ones recorded by the 1930 Census of Agriculture. The absolute value of the *Camera di Commercio* of Siena differs from the definitive value of 4,200 total units.

Table 6
Livestock per 100 hectares in the province of Siena (1876-1930), in number of heads per 100 hectares

	1875	1881	1908	1918	1930
Category	N/100ha	N/100ha	N/100ha	N/100ha	N/100ha
Horses	3	-	2	1	1
Donkeys	4	5	3	3	2
Mules	0	-	0	0	0
Cattles	37	30	16	16	24
Tot.	**44**	**35**	**21**	**20**	**27**

Reference: Own processing from BCAS (1930); ISTAT (1938).

Figure 5
Share of plough oxes on total cattle, in Tuscany and Siena (1881-1931)



Reference: Elaborazione propria da: Pazzagli (1979); Istat (1936).

Figure 5 shows that between the early 19th century and the 1880s, there was an increase in the share of working livestock on the total, although decreased in absolute terms by about 1.000 units. Figures stabilized between 1881 and 1908 and then decreased by 1931 to reach values of 1881. One striking aspect is that the share of working livestock in the province of Siena was almost twice than the regional share. By shifting the focus to the territorial distribution of working livestock, it was possible to go beyond the data collected by Pazzagli (1979), enriching them also for 1881 (ISTAT, 1878) and 1910 (BCAS, 1910)[8]. In 1810-20 there were 17 heads per Km^2, which could correspond to the average size of 2 -3 farms. In 1881, there were 19 heads per Km^2. In 1908, this figure dropped to 10 and remains the same by 1930. The latter value is the same as that of Tuscany and is lower than that of Florence (14) or Pistoia (19).

The *Consorzio Agrario* of Siena which played a significant role in the process of development of Sienese agriculture (Bertini, 2001). Between the end of the 19th and the 1930s, activity of the

[8] For the reconstruction of the territorial dimension, Pazzagli's dimension was used for 1810-20 and for the following years the agricultural area of the crops previously analyzed was used because it was considered exhaustive of the sharecropping areas: wheat, corn, other cereals, legumes, potatoes, vines and olive trees.

Consorzio Agrario expanded. Membership increased on an exponential rate. In 1911, the share of members on total agricultural population was 28%, reaching in 1921 54%, and 99.9% in 1931 (this growth in landowner membership was probably caused by the important role that the consortium had in the Sienese economy during fascism). This would suggest that the *Consorzio* had a central role in Sienese agriculture. Sales of the *Consorzio* (**Figure 6**) grew decisively from 1902 to 1932 with some slight decreases during the World War I and the *Biennio Rosso* During the 1920s, growth of sales in constant lire was substantially higher. The profits show a significant decline in times of crisis, particularly during the World War I during which the consortium strongly intervened to support of agriculture (Bertini, 2001; Zanibelli, 2019). An index of improvement of expenditure reported by the the *Consorzio Agrario'* budgets has been reconstructed for the period 1880-1885 and shown in **Figure 7**. (BCAS, 1887)[9]. **Figure 7** shows how expenditure on agricultural improvement by the *Consorzio Agrario* increased during the cereal crisis of the 1880s. What emerged from this additional analysis is in line with the high number of agricultural technicians in the province of Siena (1929) compared to other Tuscan provinces.

[9] The index consists of expenditure to promote: the agricultural economy; experimental crops, agricultural mechanics; viticulture, olive growing and the dairy industry; the improvement of livestock; the spread of agricultural education and fertilizers.

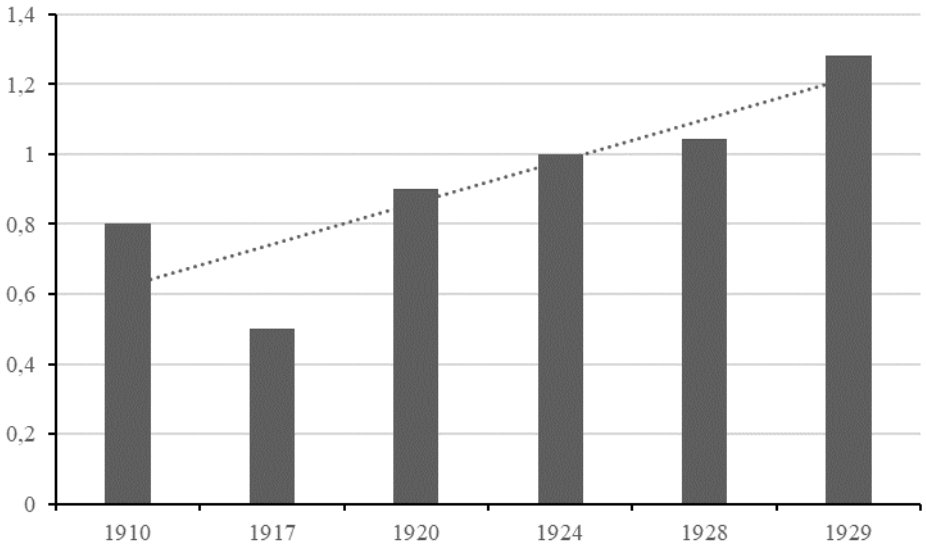
Figure 6
Sales (fertilizers, machinery and seeds and other materials) and profits of the *Consorzio Agrario* of Siena (1902-1932). Values in constant lire.

Reference: Elaborazione propria da: BCAS (1930). Notes: the values are real (1938=1). The Bank of Italy's deflator for agriculture was used.

Figure 7
Index of expenditure (constant lire) of the *Consorzio Agrario* of Siena in 1880-1885 (1880=100).

Reference: Own processing from: BCAS. (1887). Notes: the index is made with real monetary values (1938=1). The Bank of Italy's deflator for agriculture was used.

Figure 8
Evolution of fertilizers in the province of Siena (1910-1929), in 100 kg per hectare



Reference: Own processing from: ISTAT (1929: XV).

Siena also had the highest number of agricultural technicians per holding, as compared to that of Tuscany (ISTAT, 1935). In 1929, this ratio was 1 to 26, while in Tuscany was 1 in every 50 holdings. This despite the large number of sharecropping farms. The dynamism in the Sienese agricultural sector can be confirmed by the importance of the local *Cattedra Ambulante di Agricoltura* (1901) and the *Consorzio Agrario* of Siena. After that of Siena, other *Consorzi* were funded in other regions, such a as Colle Val D'elsa and Montepulciano (Garavini, 1928).

As reported in the *Catasto Agrario* (ISTAT, 1929: XV), the use of fertilizers accounted for 0,8 quintals per hectare before the World War I, while declined to 0,50 quintals in 1917. **Figure 8** shows a rising use of manure per hectare (cultivated area) between 1910 and 1929, with an annual growth rate of 5%. In 1929, Siena had 1,38 quintals of fertilizers per hectare, similar to that in Pisa, and higher than in Florence (0,87). It is important to specify that the specialized cultivation of the vine was 3% of the total culture in the province of Siena. In these years there had not yet been a change in the cultivation. Most of the vines were mixed crops. This made the use of fertilizers important considering that the other crop was wheat (BCAS, 1930).

In order to measure the evolution of mechanization in Siena, data on sales of agricultural vehicles by the *Consorzio Agrario* of Siena since the early 20th century and that by the *Catasto Agrario* of 1929 have been used. **Table 7** shows the evolution of agricultural mechanization between 1925 and 1930. Machinery per hectare grew by 5% per year. Ploughs had grown from 3500 to 6025 from 1925 to 1930 with a year-on-year growth rate of 11%.While the province of Siena had 2 ploughs per 100 hectares, Pisa had 4 and Massa Carrara 2. The flat form of the province of Pisa made it easier to introduce agricultural machinery. The growth rate of harrows was related to that of fertilizers because this tool was also used for fertilization and the value is almost similar, between 24 and 28%. This would make it possible to envisage rationalization in the processes of growth of production factors. Through the sales data of the *Consorzio Agrario* it was possible to reconstruct the growth rate in the value of machinery sales (constant values) by the institution from early 1902 to 1921. Three periods of 1902-1913, 1914-1918 and 1919-1921 were taken. In the first period the value was 412.216Lire in the second of 882.676Lire and in the third of 1.185.016Lire.

Table 7
Agricultural mechanization in the province of Siena (1925-1930)

Products	**1925**	**1930**	**Machinery for 100 hectares 1925**	**Machinery for 100 hectares 1930**	**Var%1925-30 Per hectare**
Harrows	15.500	19.345	6	8	4
Seeders	110	779	0	0	-
Lawn mowers	1.100	2.379	0	1	-
Scourers	690	850	0	0	-
Total	**19.325**	**25.283**	**8**	**10**	**5**

Reference: Elaborazione propria da ISTAT (1929:XV).

Market prices of the agricultural products were calculated using the mercurial prices of the province of Siena (from now MERC) and adjusted for inflation through the Bank of Italy's agricultural deflator (1938=1). During World War I cereal prices were regulated by the government in order to

halt their exponential growth (**Table 8;** Zanibelli, 2019). Looking at the years of the cereal crisis (Fig. 9) we can see that the price of wine had exceeded that of wheat, in particular in 1884 an exponential decrease in the relative price begins, the effects of which can be seen on aggregate wine production for the year 1884. This caused an increase in wine production. At that time the international demand for Italian wine also increased due to the arrival of philloxera in France. (BCAS, 1884). Shifting attention to the early 20th century (**Fig. 10**), the protectionist tariff (1887) had not substantially changed the relationship between the two goods. The situation changed radically after the outbreak of World War I. Beginning in 1919 until the rise of fascism the relative price was favorable to wine. The *Battaglia del Grano* interrupted this trend with a sharp growth of the relative price of wheat/wine. This only started to decline beginning in1927 when Chianti wine started to be promoted by the provincial authorities. Following the legislative measure of 1924 to protect quality wines[10], the Consortium for Chianti Wine was born, and the *Camera di Commercio* of Siena launched initiatives to support quality wine such as an exhibition of typical Italian wines in 1933. There were 828 wine exhibitors, 166 types of wines and 65 provinces were represented. The exhibition was visited by 144.000 people (BCAS, 1951).

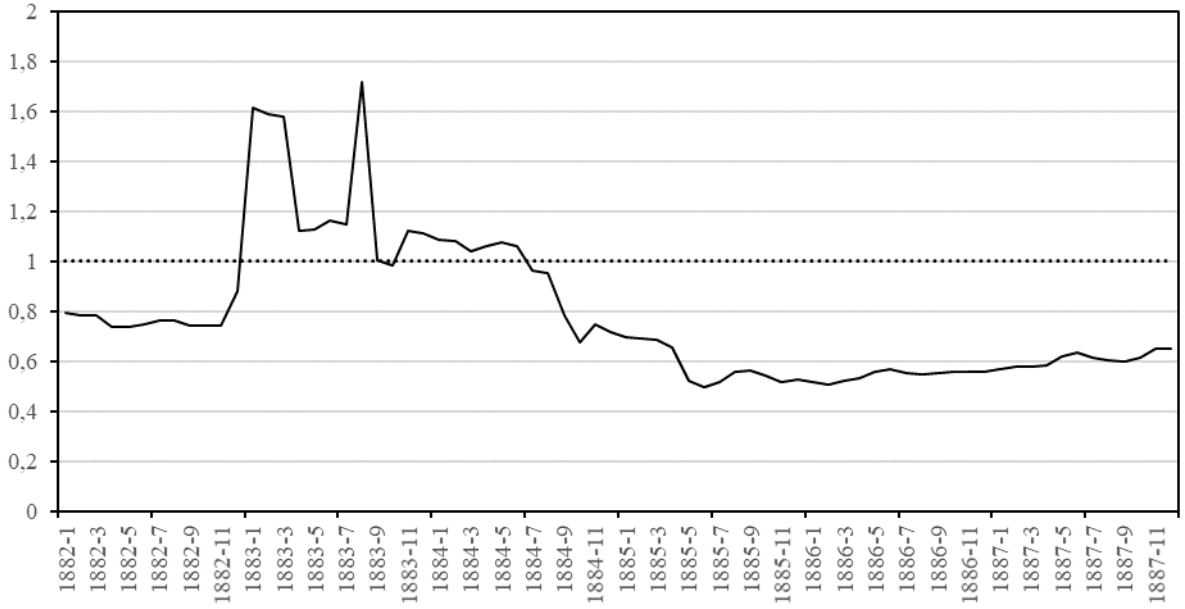
Table 8
Fixed prices of major agricultural products during World War I in the province of Siena (1916-1917)

Year	Month	Date	Provvedimento	Price (Lire*100Kg)
1916	March	11	Dec. Luogotenenziale n. 247	Wheat (40)
1916	June	23	Dec. Ministero della Guerra,	Wheat (36). Per le requisizioni militari.
1916	September	30	Dec. Ministero della Guerra	Corn (29); Rye, Barley (30); Oat (29)
1917	March	9	Ord. Commissario Generale dei Consumi	Oil (300)
1917	April	4	Ord. Commissario Generale dei Consumi	Oil (310)
1917	February	15	Ministero Interno e Agricolture, Commissariato Consumi	Wheat (48,50)
1917	June	23	Commissario Generale dei Consumi	WhitePotatos(15); Yellow Potatos (17)
1917	August	11	Commissario Generale dei Consumi	Fave (43)
1917	August	21	Commissario Generale dei Consumi	Beans (130)

[10] R.D. n. 497, 7 march 1924.

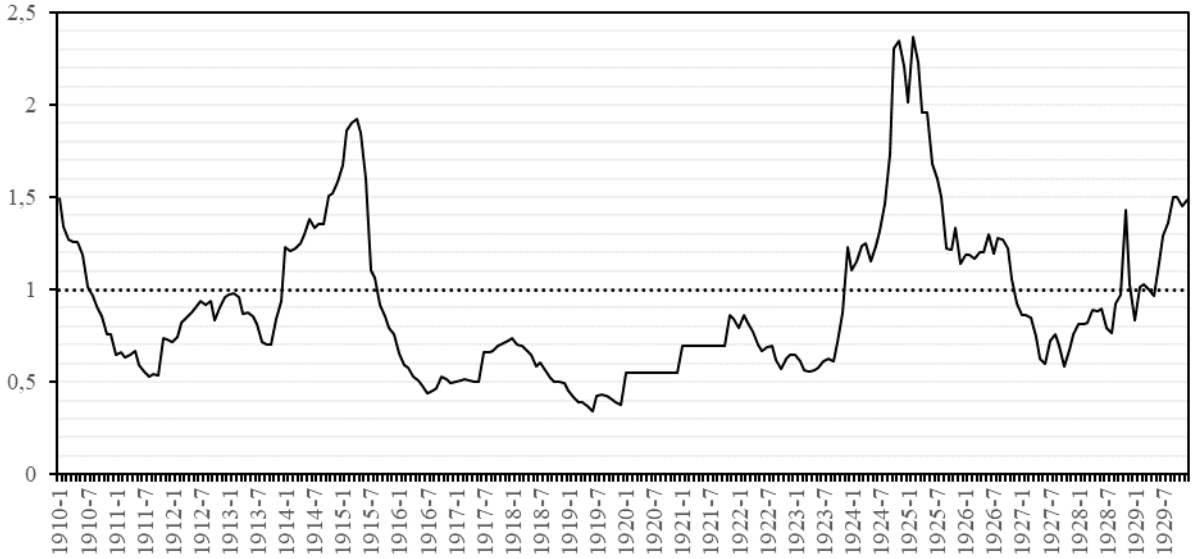
1917	August	29	Commissario Generale dei Consumi	Rye, Barley (43); Corn, Oat (36)
1917	October	4	Commissario Generale dei Consumi	Fave (54)
1917	October	20	Commissario Generale dei Consumi	Oil (350)

Figure 9
Monthly wheat/wine relative price. Province of Siena (1882-1887)



Reference: Own processing from: MERC (1882-1887).

Figure 10
Monthly wheat/wine relative price. Province of Siena (1910-1929)



Reference: Own processing from: MERC (1910-1929).

Figure 11
main markets of quality Siena wine exports (1932)

Reference: Own processing from: BCAS (1932).

Table 9 shows that from the late 1870s to the early 1880s, cereal production sharply fell while production of wine almost doubled from 500.000 quintals in 1879 to over 900.000 in 1884. Official statistics show that the production of wine grew in all the municipalities of the province and this resulted from the rising demand for wine in the international market as a result of the effects of phylloxera in France (BCAS, 1884). Demand from Italian regional markets was also important (Galassi, 1986). From 1874 to 1884, the production of wine grew in 30 of the 36 provincial municipalities. Output especially grew in Montalcino, Radda in Chianti and Rapolano Terme.

In the period between 1923 and 1928, thanks also to the *Battaglia del Grano* there was a growth in cereals production but also in wine. In 1929 the effects of the world crisis can be seen in a decrease in wine, although from 1928 the Province of Sienese was hit hard by phylloxera (BCAS, 1930), and

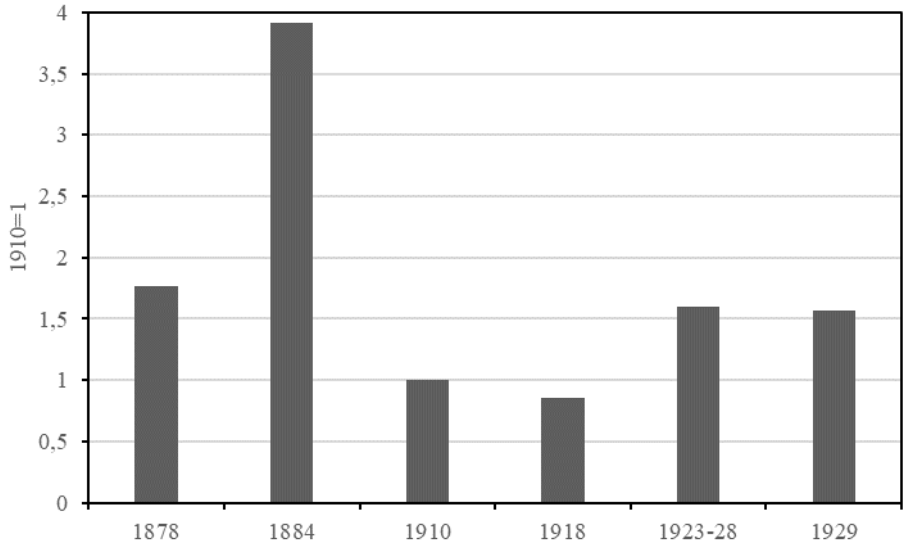
other products while wheat continued to grow but at a slower pace than in the period 1910-1929. Factor productivity is also higher than in 1910 but lower than in 1923-28.

Table 9
Evolution of agricultural production in the province of Siena. Quantity (1879-1929)

	Cereal[a]	Oil	Wine	Legumes
Year	**1=100Kg**	**1=100Kg**	**1=100L**	**1=100Kg**
1878	894.244	35.424	493.560	49.840
1884	832.051	41.011	945.977	124.292
1910	807.789	4.808	357.100	112.361
1918	546.080	35.951	505.914	59.600
1923-28	962.583	35.743	812.221	192.932
1929	996.076	27.655	739.097	181.252

Reference: Own processing from: ISTAT (1878, 1929); BCAS (1884, 1910, 1918). Notes: [a] Cereals contains: wheat, corn, rye, barley and oats. Legumes: all legumes available in different years.

Figure 12
Index of the value of agricultural production (1910=1). Province of Siena (1910-1929)

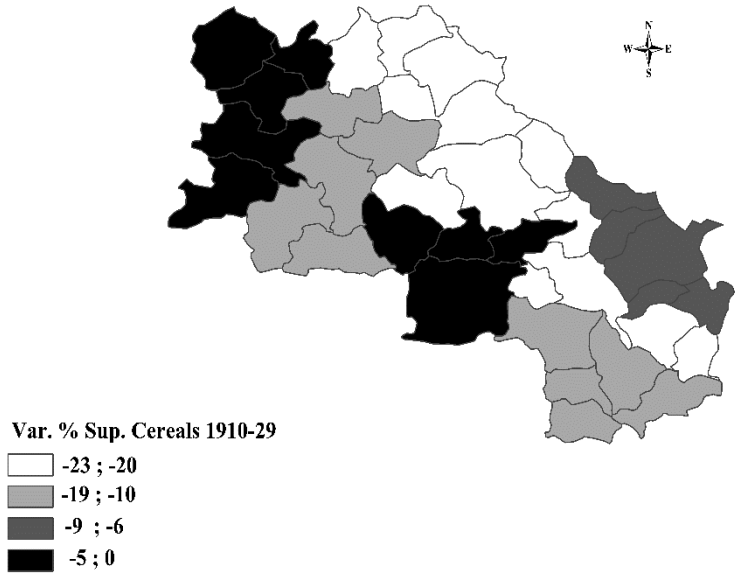


Reference: Own processing from: ISTAT (1878, 1929); BCAS (1884, 1910, 1918).

V. Spatial analysis of agricultural production and input factors in the province of Siena (1884-1929).

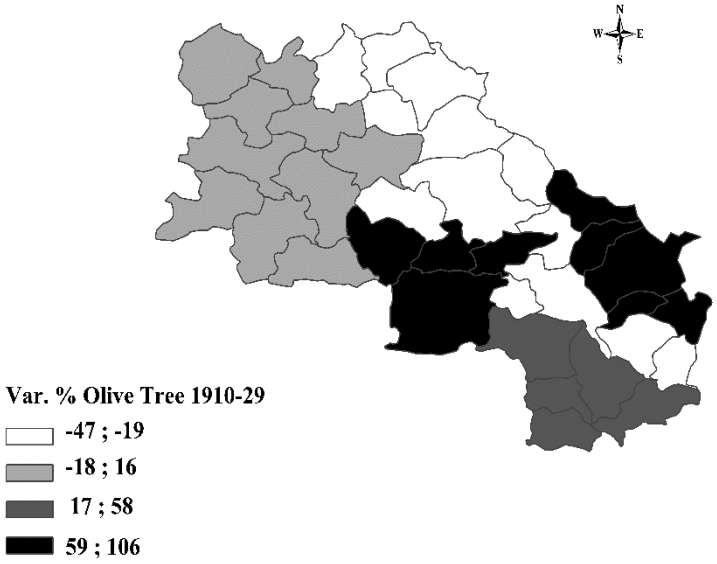
This section studies the evolution of the area and the value of production in the eight agricultural areas of the province of Siena. As shown in **Figure 13, t**he cultivated area of cereals decreased between 1910 and 1929, especially in Chianti and *Crete Senesi*, the "wheat belt" of the province (. In 1929 the *Battaglia del Grano* had resulted in a reduction of the area of cereals and an increase in yields per hectare. Olive oil area fell in the northern areas but increased in the Montalcino wine-growing area and in the area of quality oil (Colline di Montepulciano) which will become highly specialized in oil production (**Fig. 14**). Legumes accounted for a small share of the provincial agricultural area (between 4 and 5%), but they grew in all eight agricultural areas of the province, especially in the polyculture area of the Val d'Elsa (**Fig. 15**).

Figure 13
Decrease in cereals area in the province of Siena 1910-29 (values in %)



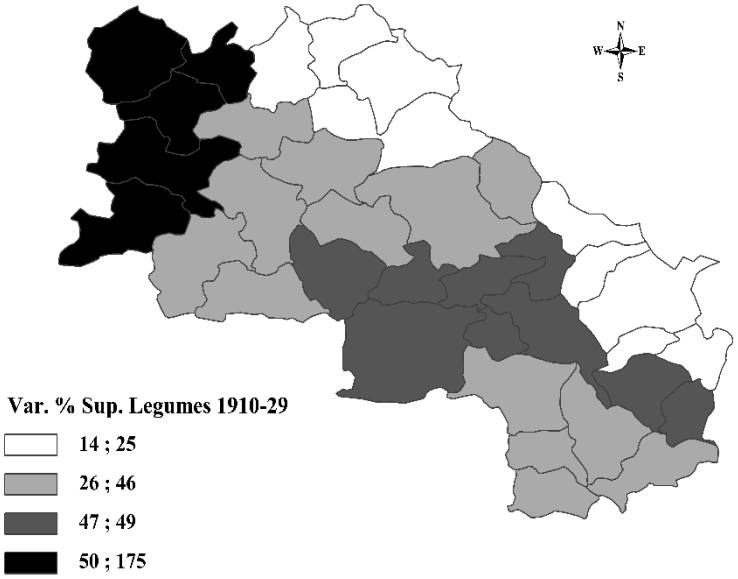
Reference: BCAS (1910); ISTAT (1929)

Figure 14
Increase in the area of olive trees in the province of Siena 1910-29 (values in %)



Reference: BCAS (1910); ISTAT (1929)

Figure 15
Increase in the area of legumes in the province of Siena 1910-1929 (values in %)

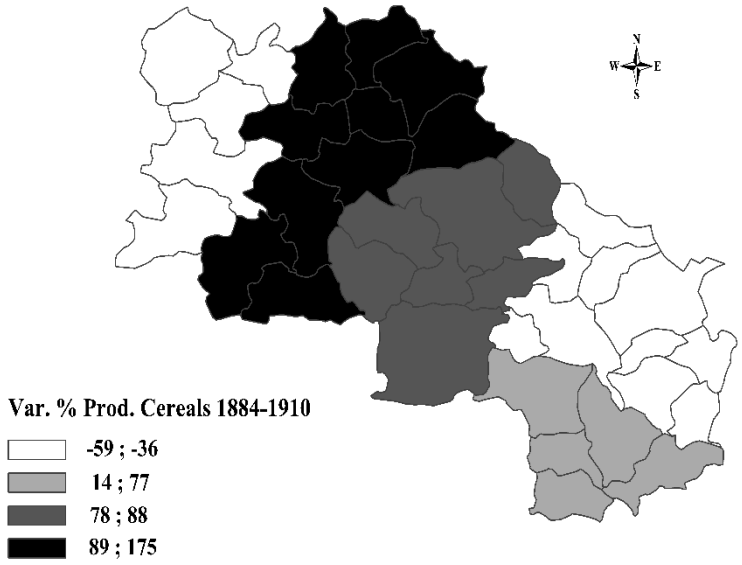


Reference: BCAS (1910); ISTAT (1929)

Value of production in 1884-1910 and 1910-1918

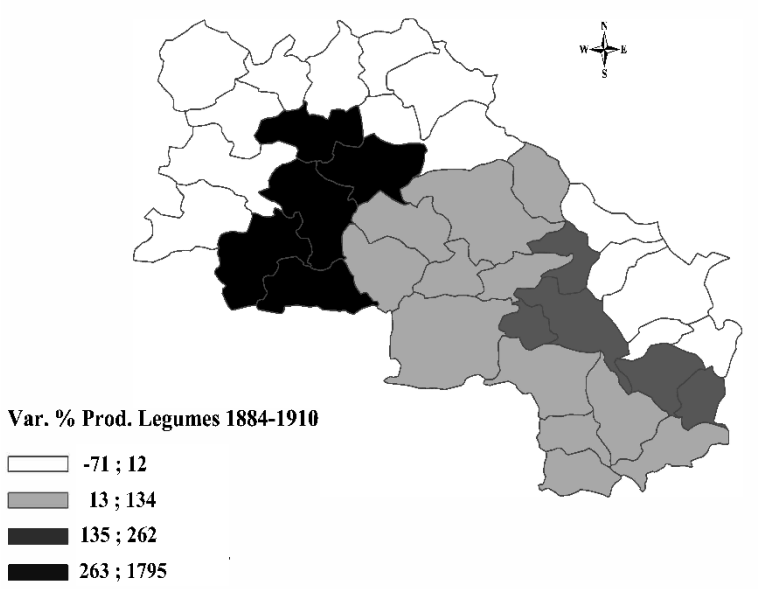
The introduction of protectionism in 1887 led to an increase in cereal production. In 1884-1910, it declined only in the region of Val d'Elsa, but strongly grew in all other provinces, especially in wine regions, such as Chianti (BCAS, 1910). During the first decade of the twentieth century Italian agriculture grew at an annual rate of 2% (Galassi and Cohen, 1992). However, in Siena the growth of agricultural production, in terms of quantity and value, was lower than in 1884, as a consequence of the severe reduction in wine production. During World War I, production of cereals decrease, particularly because of the regulation of prices by the state. The area of production dropped by between -50% and -70%. On the other hand, olive oil production, especially in areas of quality oil, Chianti, the polyculture area of the Val d'Elsa and the meadow and pasture area (Mountains area). In 1910-1918, legume surface decreased in all areas, except the area of quality oil and the wine-growing area of Montepulciano and Chianti. During this period, the highest reduction of cereals occurred in the center of the province, particularly around the urban center of Siena, and in the *Crete Senesi* where most of the grain production of the province was located.

Figure 16
Increase in the value of cereals production in the province of Siena 1884-1910 (values in %in %)



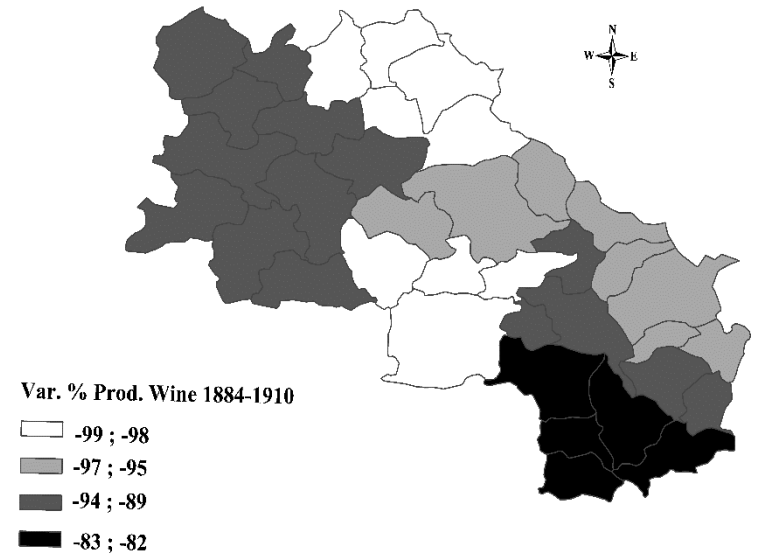
Reference: BCAS (1884, 1910)

Figure 17
Increase in the value of oil production in the province of Siena 1884-1910 (values in %)



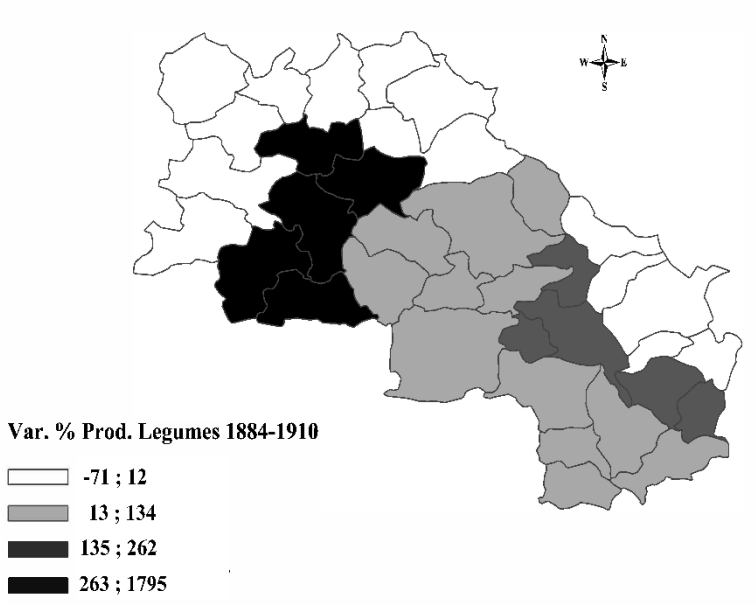
Reference: BCAS (1884,1910)

Figure 18
Decrease in the value of wine production in the province of Siena 1884-1910 (values in %)



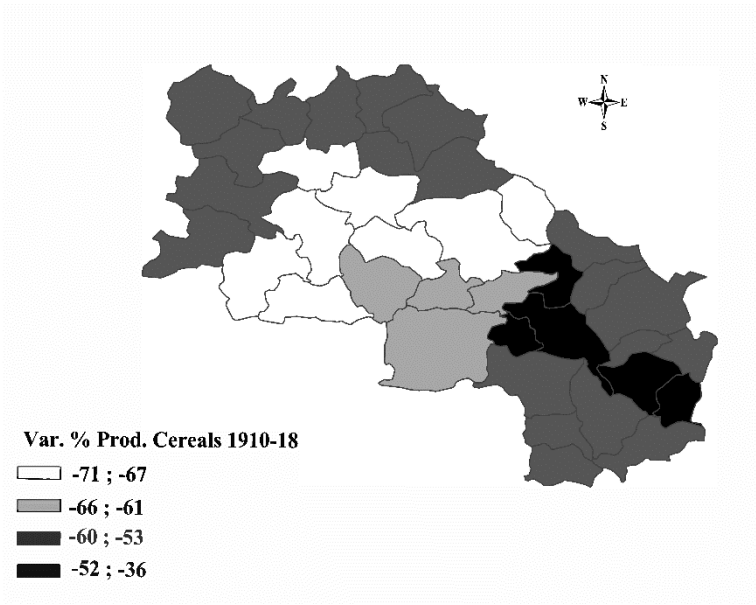
Reference: BCAS (1884, 1910)

Figure 19
Increase in the value of legumes production in the province of Siena 1884-1910 (values in%)



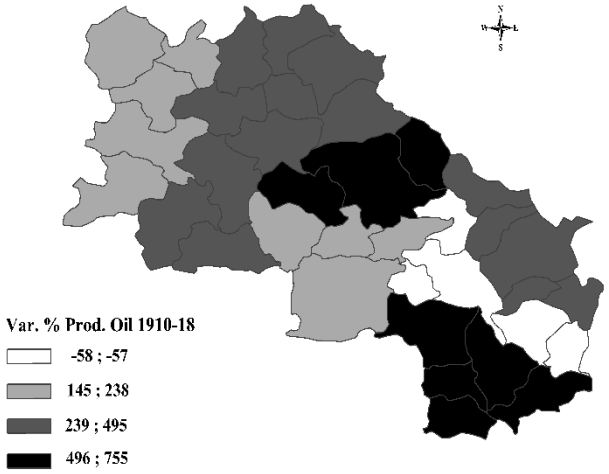
Reference: BCAS (1884, 1910)

Figure 20
Decrease in the value of cereals production in the province of Siena 1910-1918 (values in %)



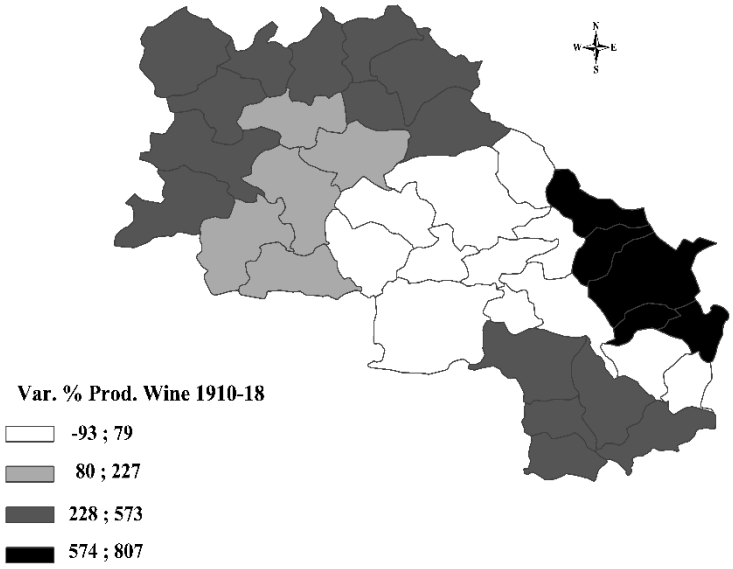
Reference: BCAS (1910, 1918)

Figure 21
Increase in the value of oil production in the province of Siena 1910-1918 (values in %)



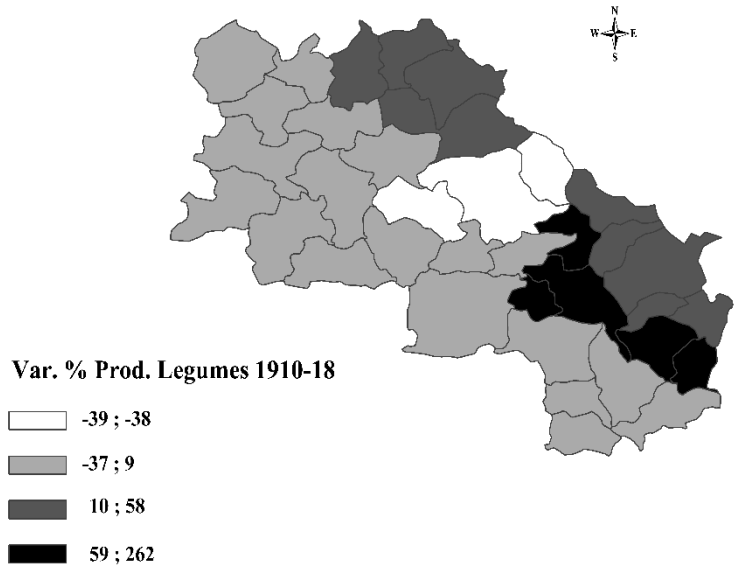
Reference: BCAS (1910, 1918)

Figure 22
Increase in the value of wine production in the province of Siena 1910-1918 (values in %)



Reference: BCAS (1910, 1918)

Figure 23
Increase in the value of legumes production in the province of Siena 1910-1918 (values in %)



Reference: BCAS (1910, 1918)

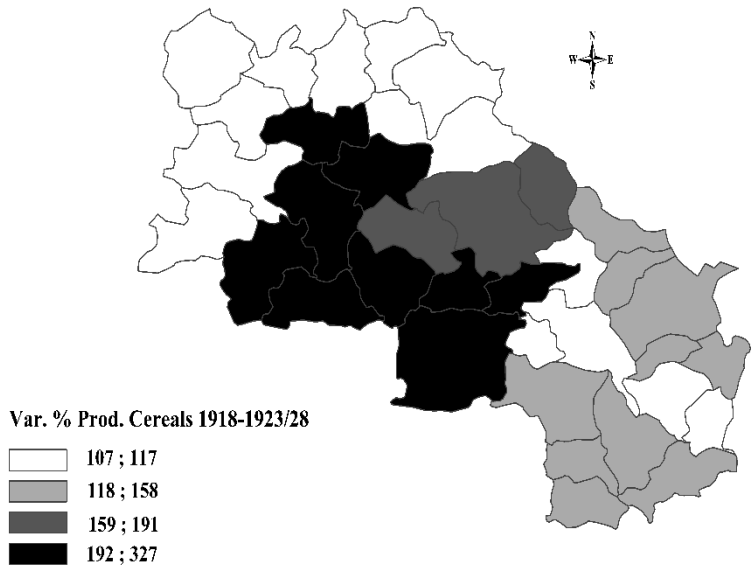
Value of production in 1918-1923/28

In the period from the end of the First World War to 1928, events such as the *Biennio Rosso* and the rise of fascism radically changed Italian society and its rural sector. Agriculture turned again to cereals which showed significant and very homogeneous growth rates all over the province. These were the years of the *Battaglia del Grano* which aimed to increase yields. Other products also grew although at lower rates, in particular in the areas of the Center-North of the province. During 1918-1923/28, the value of Chianti wine did not significantly increase mainly because the decline of Italian and international demand. In fact, the percentage of Italian wine exports in the world total fell from 10% in 1910-19 to 7% in 1920-29 (Anderson Ky et al., 2017).

Value of production in 1923/28-1929

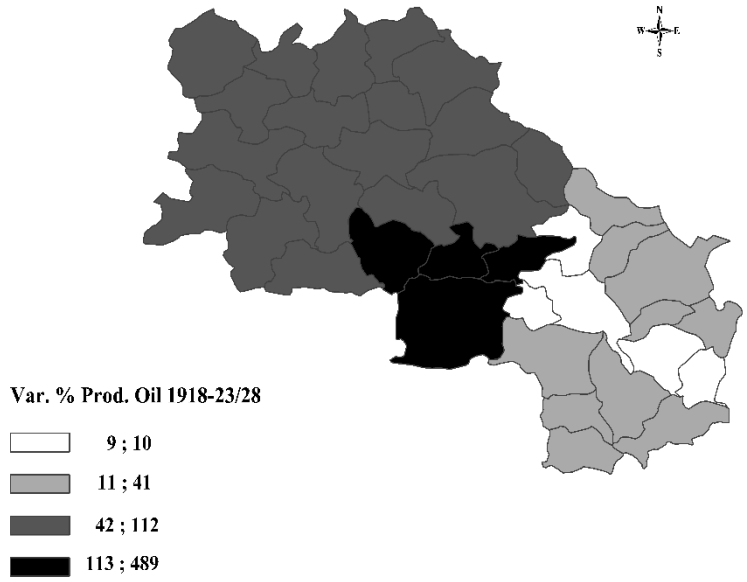
The crisis of 1929 was felt very much by Sienese agriculture. The value of production of cereals declined in all regions between -30% to -8%, except for cereals in the Val d'Elsa where growth rates were positive. Oil and wine show even higher percentages of decrease. The decline of wine resulted from the fall in prices and the expansion of phylloxera. In 1928 the municipalities damaged the most for the plague were Castellina in Chianti, Poggibonsi, San Gimignano, Colle Val d'Elsa, Abbadia San Salvatore and Montalcino. Subsequently, phylloxera spread very quickly across the province hitting 24 municipalities out of 36 of the provinces. Legumes were the only product that grew throughout the province.

Figure 24
Increase in the value of cereals production in the province of Siena 1918-1923/28 (values in %)



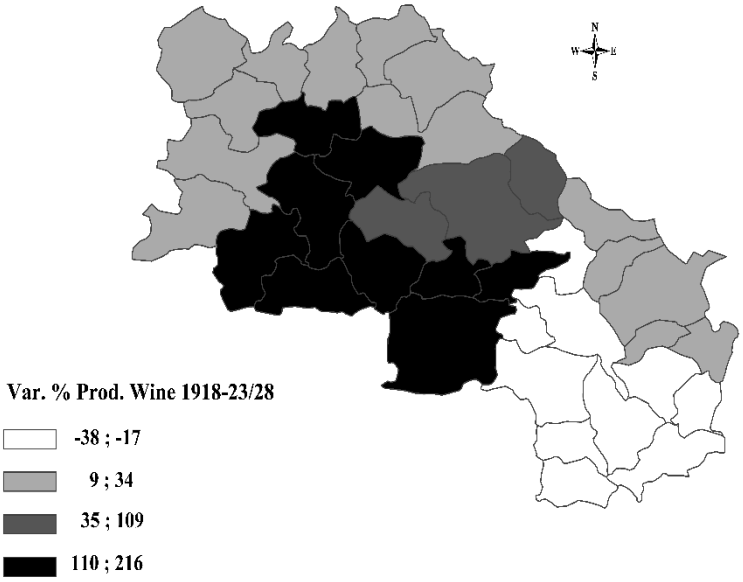
Reference: BCAS (1918); ISTAT (1929)

Figure 25
Increase in the value of oil production in the province of Siena 1918-1923/28 (values in %)



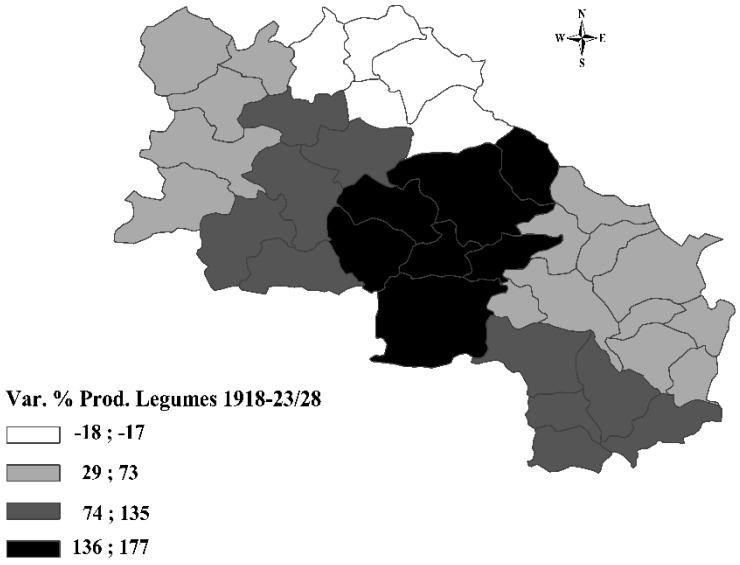
Reference: BCAS (1918); ISTAT (1929)

Figure 26
Increase in the value of wine production in Siena 1918-1923/28 (values in %)



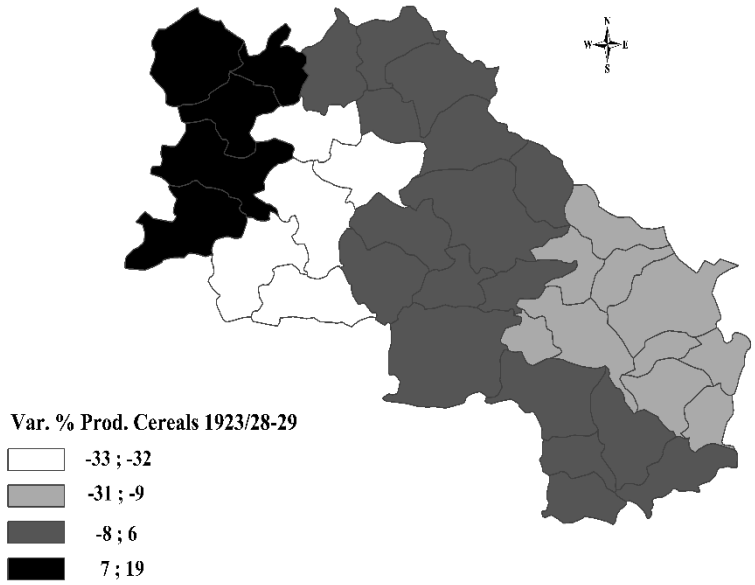
Reference: BCAS (1918); ISTAT (1929)

Figure 27
Increase in the value of legumes production in Siena 1918-1923/28
(values in %)



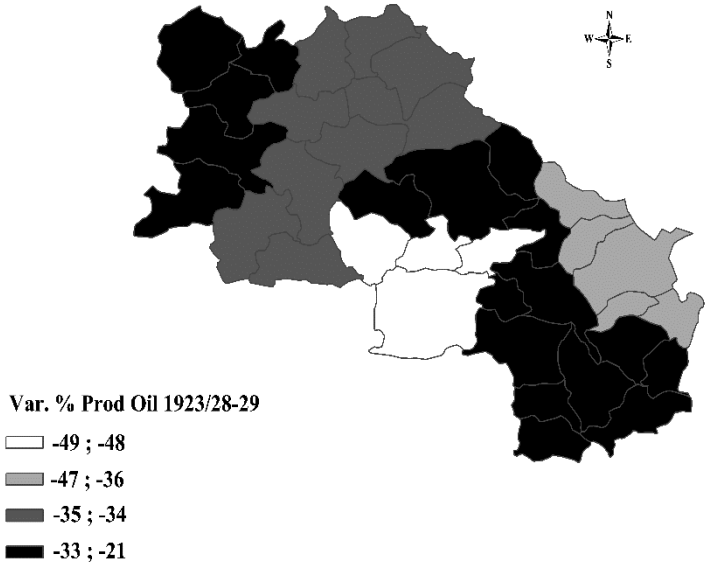
Reference: BCAS (1918); ISTAT (1929)

Figure 28
Decrease in the value of cereals production in the province of Siena 1923/28-1929
(values in %)



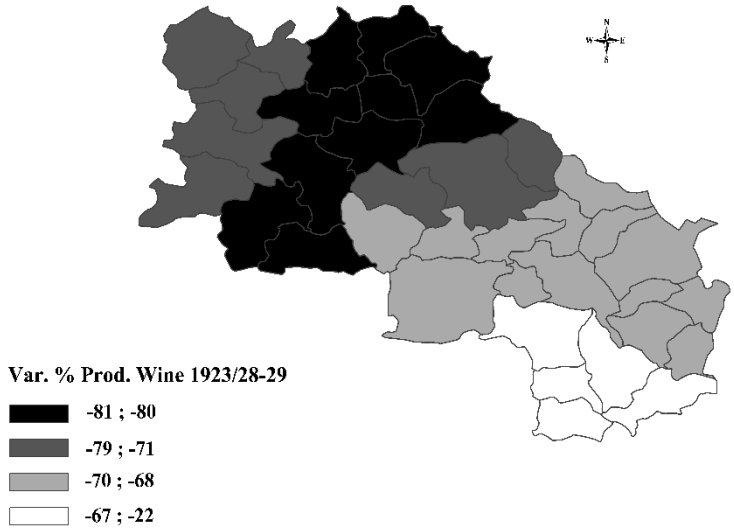
Reference: ISTAT (1929)

Figure 29
Decrease in the value of oil production in the province of Siena 1923/28-1929 (values in %)



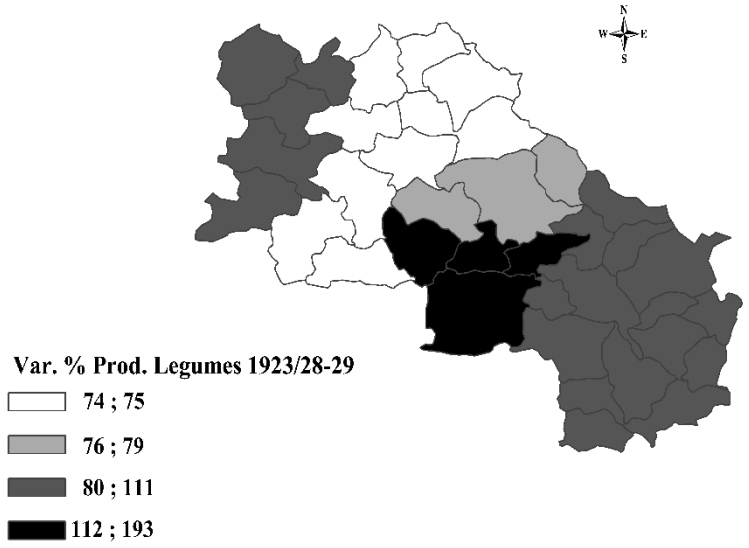
Reference: ISTAT (1929)

Figure 30
Decrease in the value of wine production in the province of Siena 1923/28-1929 (values in %)



Reference: ISTAT (1929)

Figure 31
Increase in the value of legumes production in the province of Siena 1923/28-1929 (values in %)



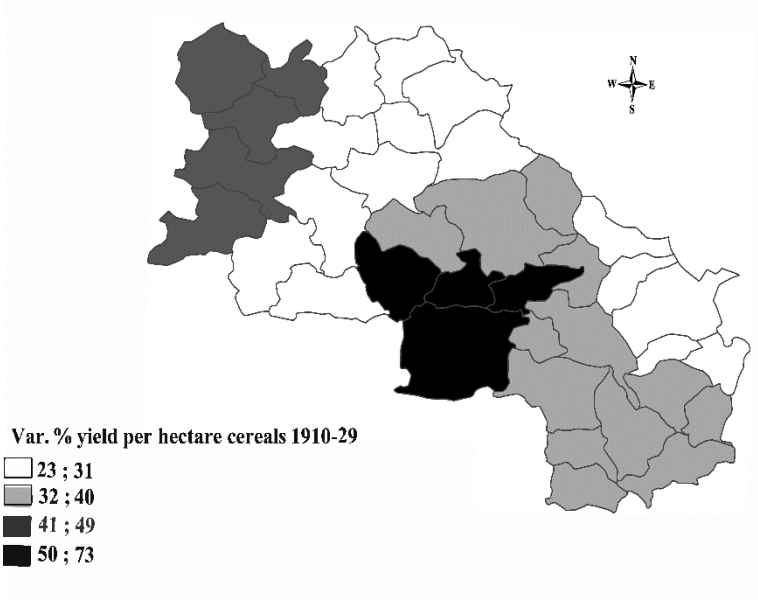
Reference: ISTAT (1929)

Changes in yields per hectare 1910-1929

Production per hectare was calculated for cereals and legumes *Battaglia del Grano* from 1910 to 1929, but not for oil and wine because of la lack of data. As we have seen these were the years of the *Battaglia del Grano*. In the province of Siena, yields of cereals increased significantly, partly because of the *Battaglia del Grano* that had started in 1925 (**Fig. 32**). Policies to support of cereal production resulted in the relaunch of the agricultural sector in the mountain area, where agriculture was depressed. The growth of yields per hectare, however, may not be related to that of the surface. It has emerged that in some areas such as Lombardy and Puglia there was a positive relationship between yield per hectare and the incidence of the area cultivated with wheat. On the contrary, as far as Tuscany is concerned, this phenomenon has not been detected (Ricci and Zanibelli, 2019). The decrease was mainly due to the case of Asciano where part of the grain crop left room for

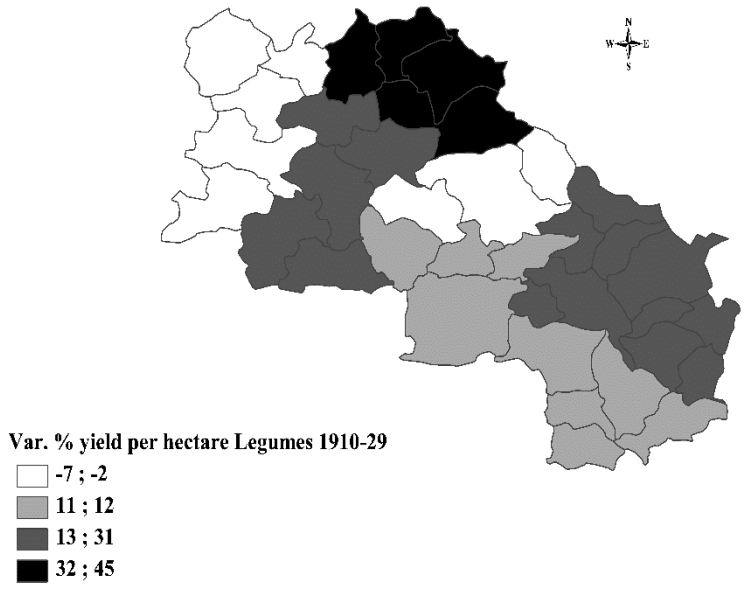
fodder that grew significantly. Even yields per hectare of legumes grew significantly in all areas except the mixed-growing area of the Val d'Elsa and in the cereals area of the *Crete Senesi*.

Figure 32
Increase in cereals production per hectare in the province of Siena 1910-1929 (values in %)



Reference: BCAS (1910); ISTAT (1929)

Figure 33
Increase in legumes production per hectare in the province of Siena 1910-1929 (values in %)

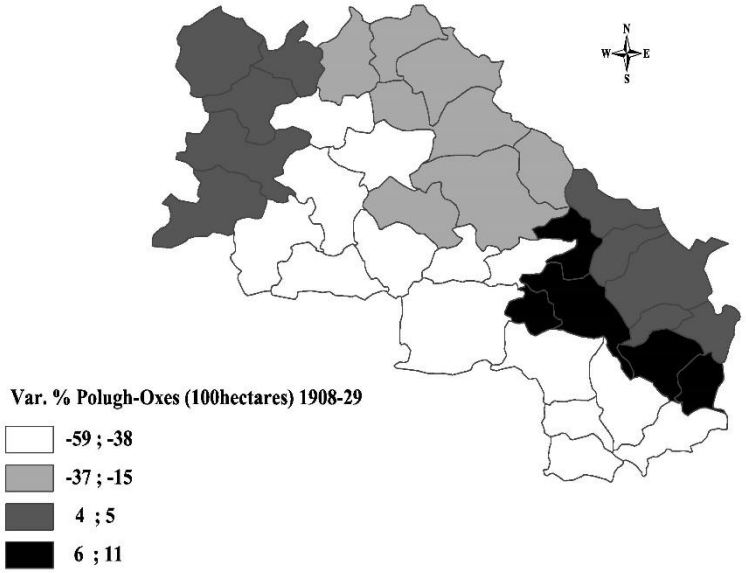


Reference: BCAS (1910); ISTAT (1929)

The factors of production 1884-1929

Between 1910 and 1929, the growth of working livestock was mainly concentrated in Southern Siena, especially in the area of poor agriculture (mountains area) and the central areas (**Fig. 34**). In the North, excluding of the Val d'Elsa, there was a substantial decrease in livestock per hectare. Between 1884 and 1929, productivity of livestock grew more in the southern area of the province, especially in the wine area (Montalcino) (**Table 12 and Fig. 35**). **Figure 35** shows that the relationship between working livestock per hectare and the value of production per hectare by municipality in 1910 and 1929 is highly significant. On the other hand, **Figure 36** shows that both livestock per hectare and the value of production per hectare grew in 13 out of 36 municipalities grew between 1910 and 1929, especially in Montepulciano (area of Nobile wine), Gaiole in Chianti and Castellina in Chianti). Also, in Torrita (quality oil area) and several municipalities in the Val d'Elsa specialized in legumes, but not in the cereals area or in the Mountain area. In **Figure 36**, the horizontal line represents the average value of the percentage change in production per hectare between 1910 and 1929, and the vertical line represents the average value of the percentage change in plough-oxes per hectare between 1910 and 1929. **Figures 35** shows that the relationship between plough-oxes per 100 hectares and the value of production per 100 hectares is highly significant, especially in 1929, showing a strong push towards mechanization since 1925 (ISTAT, 1929).

Figure 34
Evolution of the plough-oxes per 100 hectares. Province of Siena 1908-1929 (values in %)



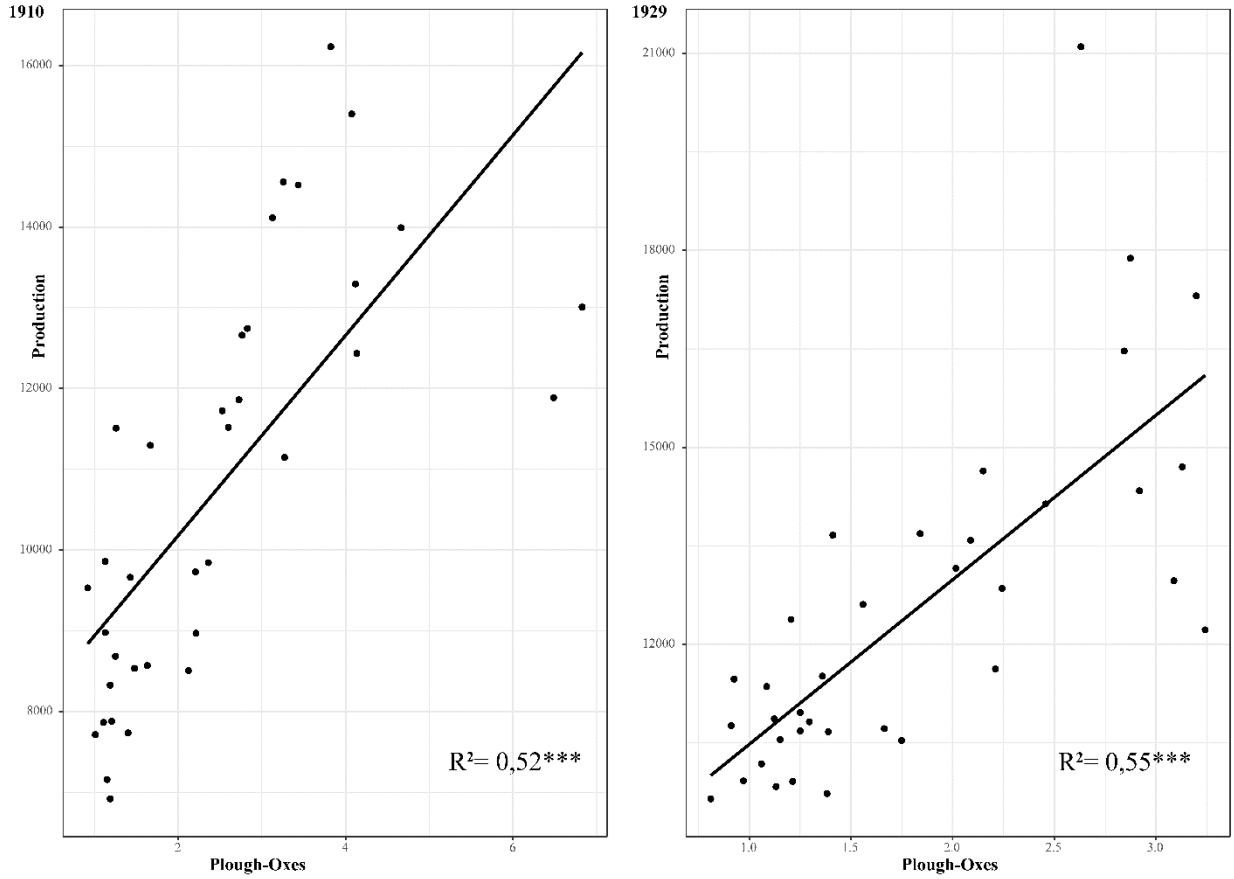
Reference: ISTAT (1908, 1929)

Table 12
Livestock productivity on the value of production in agricultural areas of the Province of Siena 1884-1929 (1910=1)

Agriarians Zones	1884 (1910=1)	1929 (1910=1)
Meadow and pasture area (Mountains area)	2,37	1,74
Quality oil area (Colline di Montepulciano)	3,24	1,04
Cereals and wine mixed crops (Val di Chiana)	4,70	1,19
Cereals area – (Crete Senesi)	6,54	1,33
Wine area – (Montalcino)	20,22	2,75
Quality wine – (Chianti)	5,42	1,45
Mixed crops. All products (Siena)	1,12	2,14
Oil legumes and wine mixed crops (Val d'Elsa)	2,70	1,39

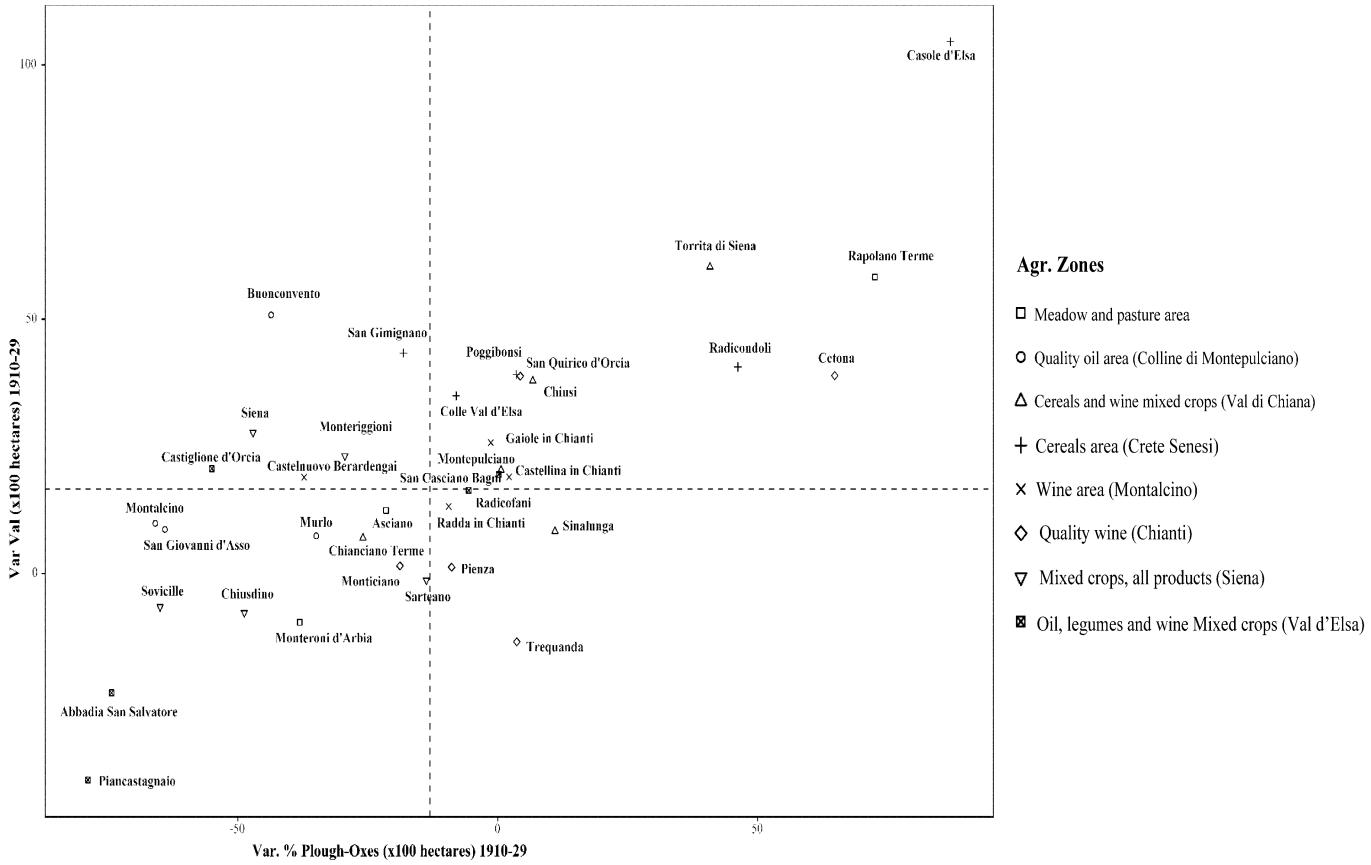
Reference: BCAS (1884, 1910, 1918); ISTAT (1881, 1908, 1929).

Figures 35
Relationship between the value of total production per hectare and plough-oxes per hectare



Reference: BCAS (1910); ISTAT (1908, 1929); Note: Liv. Sig. *** p < 0.001; ** p < 0.01; * p < 0.05. Each point in the chart represents a municipality.

Figure 36
Relationship between the percentage change in the value of production per hectare and the percentage change per hectare of working livestock 1910-1929



Reference: BCAS (1910); ISTAT (1908, 1929)

Conclusions

This chapter has contributed to the discussion of the long-term evolution of agriculture in the province of Siena. The analysis was based on municipal data, which is not available for most Italian provinces. Data of 1884 and that corresponding to *Catasto Agrario* of 1910 was never published for other Tuscan provinces. These had made possible to calculate the cultivated area and the total and per hectare production of a number of crops at a municipal level, allowing a long-term analysis from the late 19th century to 1929.

Important conclusions have been drawn. Production data shows that Siena was able to decisively respond to the falling prices of cereals in the 1880s, by shifting to the production of wine. This was also the result of the higher demand for Italian wine abroad, due to the expansion of phylloxera in France. This finding coincides with the Galassi (1989)'s conclusions about the growth of wine production in Southern Tuscany during this period. The pessimistic view of an immobile sharecropping unable to respond to economic, social and political changes (Giorgetti, 1974,1977; Pazzagli, 1979; Sereni, 2016) does not seem entirely convincing. The introduction of the protectionist tariff in 1887 favored a return to wheat production of Sienese agriculture and a decline in the value of wine produced.

World War I did not cause a severe decline of production and productivity in the province of Siena, as already highlighted by Zanibelli (2019). The *Consorzio Agrario*, together with the City Council and *Monte dei Paschi*, introduced policies to support agriculture during wartime. Even more, the *Consorzio* guaranteed a *pax bellica* between landowners and peasants. The 1920s were a period of substantial growth of both cereals and wine in Siena. Together with the *Battaglia del Grano*, local authorities (*Camera di Commercio* and *Consorzio Agrario*) launched initiatives to promote specialization in quality wine, such as the creation of institutions to promote and protect the "Chianti" and the "Nobile" of Montepulciano.

Trying to estimate whether most of quality wine was produced by sharecroppers, it was noted that sharecropping was prevalent in the Chianti region in 1929 (72% of total holdings), and in Montepulciano (60%)

By 1938, there were only 2 cooperative wineries producing 0,2% of all wine (ISTAT, 1940). This indicates that quality of wine was produced in sharecropping farms, and the entire production cycle was concentrated within the *Fattoria* system. In 1929, the fall in agricultural prices and the impact of phylloxera was significantly felt favoring a gradual return to cereals.

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FINAL CONCLUSIONS

The present PhD research thesis, through an exclusive use of unpublished archival sources, has made it possible to examine key aspects of the agrarian history in Southern Tuscany (with particular reference to essay 3) in the period spanning the second half of the 19th century to the late 1920s.

The methodological approach, based on a synthesis of qualitative and quantitative methods, has brought into light interesting results regarding production, productivity and price regime in a Tuscan sharecropping territory These results have allowed to support the research outcomes by Giuliana Biagioli and Francesco Galassi. The specific research area intends to look at sharecropping as a dynamic phenomenon, rather than something framed within set categories that would necessarily make it an example of inefficiency. In such a perspective, it is not useful to compare the realities in sharecropping with those characterized by other forms of agricultural specialization (for example high farming).

Essay 1 has highlighted how protectionist policies led to a slowdown in the agricultural growth process beginning in the 1870s and 1880s. All this would confirm how the arrival of cereals from America had encouraged an increasing production of reversal process in specialized crops, thus favoring the start of a growth process that would lead to an anticipation of the agricultural take-off of at 20 years later (Giolitti period).

Essay 2 confirms for a sharecropping territory the results obtained in the previous contribution about a shift from wheat to wine occurred in the period from 1870s to 1880s. The analyses of the Canonica's farm reveals how the cereal crisis of 1880s resulted in an increase in the production of wine. The case of Canonica is interesting because gains from the sale of wine were invested in fertilization, which improved yields of wheat. The growth of wheat production in Canonica is also important because it had not been detected on the sample studied by Galassi except for a farm located in the province of Siena. The analysis of the aggregated data at the provincial level allows to support how the province of Siena reacts better to the crisis than other regions of Tuscany.

Essay 3 considers the Sienese agriculture was able to promptly respond to the economic shock from 1880s to 1929. This study estimates agricultural production at a municipal scale (36 municipalities) of the province of Siena from 1884 to 1929. This was possible thanks to the use of unpublished sources at the archive of the *Camera di Commercio* of Siena.

Results indicate that the province of Siena significantly increased the production of wine during the cereal crisis of the 1880s, in particular in those areas specialized in the production of wine such as Chianti, the Montepulciano area ("Nobile" wine) and that of Montalcino ("Brunello). The study also concludes that Siena was the province with the largest number of agricultural technicians per hectare and a very intensive use of fertilizers per hectare as compared to the other provinces. This in part resulted from the activity of the *Consorzio Agrario* that had a privileged position over the Sienese agriculture and allocated inputs to producers. Efficient institutions such as the *Consorzio*, the *Monte dei Paschi* and the *Camera di Commercio* help to the good performance of Sienese agriculture from 1880 to 1929.

The results reported on the present research allow us to hypothesize how it would be interesting to study different sharecropping forms in Italy rather than comparing these with other agrarian production forms. Such a research based on small production units and regional analysis would make possible to increase knowledge about sharecropping using.

Finally, this study aims to be the starting point of further research on the evolution of the territories of Tuscany and central Italy. To this must also be added the prospect of realizing the time series of prices, on a monthly basis, of agricultural products of the province of Siena from unification to fascism in order to be able to study the evolution of supply and demand in the agricultural sector in the long term. Last, but not least for importance, the present study aims at being a starting point for further research on observe the evolution of the Tuscan and central Italy’s territories.