

# DIRECT MEASURES OF COMPETITION AND ITALIAN INDUSTRY PERFORMANCE IN THE LONG RUN

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*Preliminary and incomplete*

This study moves from the following questions: what are the indexes that gauge the degree of competition and that can be computed for the Italian case in the long run? What are the effects of competition on firms' performance? The paper tries to answer these questions through a reconstruction of domestic and international "direct" measures of competition. After a review of existing studies on Italy, we propose different indicators (indices of concentration, mark-up, import penetration ratios) obtained from joint stock companies' balance sheets collected by Assonime for the period 1900-1970. Then we perform a regression-based correlation analysis to examine the relationships between the degree of competition and firms' economic performance. Furthermore, we measure the possible causal impact of a change in competition on firms' markups using as a case study the sugar industry between the two World Wars.

**Keywords:** Competition

**JEL:** D40

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## 1. Introduction

A huge literature has investigated how market structure affects the innovative activity performed by firms, their economic performance and consumer welfare. The sign of these relationships is an issue that is not completely settled and maybe a unique theoretical solution does not exist: the answer lies in the empirical facts that could differ substantially on the basis of a series of factors (like the type of product/sector, its maturity, its technological features, its demand elasticity). This work intends explore how did these relationships worked in the Italian economic history and investigate the effects that competition had on some performance and efficiency indicators.

Competition is a crucial mechanism that affects the growth of an economic system, of a sector, of a firm. From a theoretical point of view, it can be a driver of productivity, feeding efficiency, stimulating innovation (Arrow, 1962). In the Schumpeterian tradition, however, a certain degree of monopoly can ensure the necessary protection for the entrepreneur, lowering the degree of uncertainty and favoring the investment activity. On the other hand, as said, an excessive protection from competitive pressures may be harmful with respect to efficiency (e.g., fueling a *managerial slack*).<sup>2</sup> Long time has passed since the early contribution of Schumpeter (1942) and Arrow (1962), however, no general consensus has emerged: “*Any kind of relationship appears to be theoretically possible*” (Peneder and Worter, 2011, p.2).

Recently, the (neo) Schumpeterian synthesis links competition and productivity through innovation, in a non-monotonic shape depending, among others, on the technological rivalry and on the distance from the technological frontier (Aghion and Griffith, 2005; Aghion et al, 2005 and 2009).

This study focuses on the measurement of the degree of competition and on the consequences in terms of firms’ performance in the Italian economic history. In particular, in the following paragraph we review the studies that have investigated the issue of competition in history (for the Italian case but also internationally), examining in particular the quantitative evidence provided. Next, we use data on Joint Stock Companies surveyed by Credito Italiano - Assonime (and collected in the electronic archive Imita: see par. 3 for a detailed description) and

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<sup>2</sup> The neo-Schumpeterian approach proposes an inverted-U shape between competition and productivity. Increasing competition from low levels stimulates innovation and productivity that, by contrast, would be discouraged if the increase in competition happens when its degree is already high (Aghion and Griffith, 2005; Aghion et al, 2005 and 2009).

we reconstruct direct indicators of competition for 10 branches of manufacturing industry from the beginning of the twentieth century to the end of the sixties.

In paragraph 3 we also compute indexes that gauge foreign competition (import penetration ratios) and perform a first descriptive analysis of the different competition indicators.

Using the indexes and the data described so far, paragraphs 4 and 5 present a quantitative analysis. In particular, in paragraph 4 some regression-based correlation analysis are conducted in order to investigate the relationship between the degree of competition and firms' performance. Then, in paragraph 5 we present a case study based on the sugar industry in which we try to identify the causal effect that a variation in the competitive pressure had on firms' markups. Some final remarks conclude the study.

## *2. Competition: theory and empirical studies on Italy's economic history*

Competition is undoubtedly one of the central topics of the economic thought (see Gigliobianco and Giorgiantonio, 2014). Theoretical analysis of the links between competition and growth (see Brandolini and Ciapanna, 2014) lie at the heart of the allocative efficiency propositions in competitive equilibrium formulated by Adam Smith and formalized in the first Fundamental Theorem of Welfare Economics<sup>3</sup>. Compared to these approaches, this study focuses more on the so-called “productive efficiency” and in this context, the theme of the competition can be placed at the center of a dense network of mechanisms that influence the prosperity of economic systems.

The effects of competition on productivity and on economic growth go through two main channels, one static and one dynamic (Vickers, 1995; Nickel 1996).

From the static point of view, the concept of productive efficiency refers to a situation in which a company or an industry operate on the frontier of production possibilities, at the minimum average cost, getting the maximum performance from a given set of input.

In this sense we can divide:

- a. *Within firm effects*: competition places pressure on the managers of firms to increase internal efficiency (x-efficiency). This highlights the importance of competition

enforcement to ensure that firms and their managers are subject to the rigor of the market (Holstrom 1982; Hart, 1983; Schmidt, 1997 with bankruptcy threat; Nickell, 1996).

- *Between firms effect*: competition ensures that higher productivity firms increase their market share at the expense of the less productive. These low productivity firms may then exit the market, and are replaced by higher productivity firms (Hopenhayn, 1992)<sup>4</sup>.

A further aspect is related to dynamic efficiency and is related to the rate at which firms reduce their real costs or improve their product quality over time: it refers, essentially, to a competition induced innovative process. Innovation increases dynamic efficiency and productivity through technological improvements of production processes, or the creation of new products (Schumpeter, 1942). In many cases competitive pressures can fuel the innovative activity<sup>5</sup>. Figure 1 below tries to sum up the links described.

Many empirical studies focus on the relationship between regulatory arrangements and productivity, a topic that has recently gained momentum especially with the studies promoted by the OECD (see for example Arnold et al, 2011; Nicoletti and Scarpetta, 2003). Many analysis followed on similar topics, like the works on the relationship between macroeconomic changes in regulation and productivity (e.g. Blanchard and Giavazzi, 1991); the studies on competition and employment (for example, Viviano, 2008); the investigations on pro-competitive effects of trade (e.g. Melitz and Ottaviano, 2008; Bugamelli et al., 2010; Lamorgese, Linarello, Warzinsky, 2014). For a review of the literature on the different indicators used to measure the degree of

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<sup>3</sup>Vickers (1995), p. 1: “At competitive equilibrium in an economy that has markets for all relevant commodities, and firms and households that treat prices as given, there is Pareto efficiency that is, resources are allocated in such a way that no-one can be made better off without others becoming worse off”.

<sup>4</sup> There are robust empirical evidences of these processes and their effects on productivity related to the entry/exit dynamics (Geroski, 1991). The most recent literature refers to the competition induced selection processes that take place among firms with heterogeneous productivity levels: “competition moves market shares toward more efficient producers, forcing the exit of low efficient producers and also raising the bar that any potential entrant must meet to enter” (left-truncated productivity distribution: see Syverson, 2011; Melitz, 2003; Melitz and Ottaviano 2008).

<sup>5</sup> The relation between competition and innovation revolves around three main effects:

a. the discouragement effect (Schumpeter, 1942): high competition can be detrimental to innovation. The rapid disappearance of ex-post rents from innovation, discourages ex-ante the innovative activity;

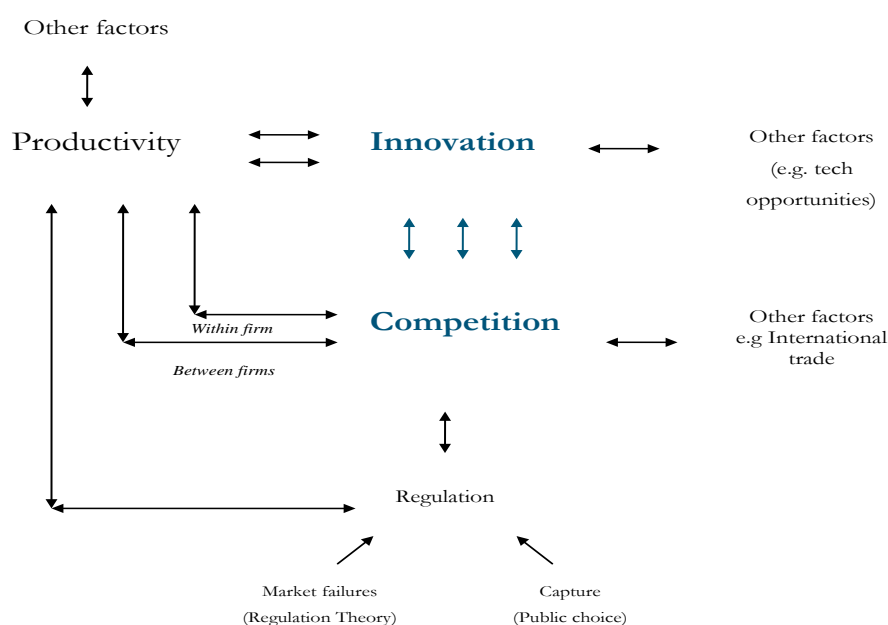
b. the replacement effect: Arrow (1962), points out that the monopolist has less incentive to innovate than the firm in competition. The monopolist would replace a rent that already has while the firm under a regime of competition would not displace any monopoly profit and would gain the full return of innovation ;

c. potential or actual competition can induce an incumbent leader to react to the competition threat and to innovate in order to maintain its leadership. This incentive (escape competition effect) would not work be if the leader were too protected (Aghion et al, 2005).

competition, others have already done excellent reviews (e.g. Ciapanna and Brandolini, 2014; Boone, 2008a and 2008b, Gomellini, 2012) .

In summary, the key question is still the same: more competition stimulates or hinders economic growth?

**Figure 2.1 Competition**



Nowadays the question seems of utmost importance (not only) for Italy because at least two well-known reasons. First, increased competition through the liberalization of industry and services are identified as the main structural policies to be pursued to foster the growth (e.g. Barone and Cingano, 2011; Sestito and Torrini, 2012). Second, there is also the need for a thorough understanding of the impact that globalization and the rise of international competition had and will have on our economy (e.g. Fabiani, Bugamelli, Sette, 2010; Gomellini, 2014).

Most of the studies that have examined the issue of competition in Italian economic history and focused on the measurement concentration in the industrial sector can be improved in several aspects. Those studies are often not supported by appropriate reconstructions and quantitative analyses; they are based on benchmark years (vs. time series); do not perform any cross-checking with other indicators; often are not supported by qualitative and sectorial analyses.

In the Fifties and in the Sixties, the idea underlying the analysis of concentration was not so much to measure the degree of competition but to investigate the economic power of big firms, i.e., the extent to which the economy was influenced and controlled by these firms; the influence of specific groups on political power; the processes of "capture" and the resulting distortions in resource allocation.

Battilossi (1999) carries out a review of the studies for Italian case, tracing the evolution of the meaning of concentration, analyzing different measurement schemes (cfr. Brandolini and Ciapanna, 2014).<sup>6</sup>

Summing up the results for the Italian case, a few years after the Centennial of Italy's unification (1861), a Parliamentary commission on competition stressed the "almost total lack of studies, surveys, and research on the structure of production [...] on the restrictions on competition operating in Italy" (Proceedings of the Parliamentary Committee for the Inquiry into the limits of competition in the economy, Rome, 1965, Report to the House of Representatives, p. 20-21), as well as the fragility of the scientific literature and the paucity of studies on the subject (Battilossi, p. 283). This was in part the result of a historically grounded cultural tradition in which the liberal approach had a minor role, a situation that crystallized after World War II (Battilossi 1996, p.285; on the issue of competition culture: Gigliobianco and Giorgiantonio, 2014).

Although there are of course distinguished scholars who focused their analyses on the issue of market structure and competition (Sylos Labini, Napoleoni, Lombardini), few research centers actually specialized on competition (e.g., the Ceris in Turin) a theme that was certainly crowded out, at least in the post WWII period, by the attention put on other country-specific topics, like SMEs, industrial districts, extraordinary intervention in favor of the South (*Mezzogiorno*).

Following Battilossi (1996), for a long time, the main, if not sole study on concentration in Italy was represented by the work of Zamagni (1978) on industrialization and regional imbalances in Italy in the Giolittian age. It was heavily based on a previous study written by Vinci (1919) and focused only on 1911. Zamagni calculated a Gini index (total asset) for some firms operating in in the so-called modern sectors (Automotive, Steel, Chemical): it showed a high degree of industrial concentration.

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<sup>6</sup>The author emphasizes aspects such as the transition from a structuralist conception to a behavioral analysis of the competition. Moreover, he highlights the variety of factors affecting concentration: "Indicators such as the market share of one (or more) companies are regarded as" the spider in the complex web drawn by a multitude of factors - technological innovation, product differentiation, creation of barriers to entry ... "(p. 281), Battilossi, (1999)

These results were disputed by Federico, Giannetti e Toninelli (1994). These authors analyzed the concentration of Italian industry between 1907 and 1940, calculating an Herfindahl-Hirschman index (HH) using the stock of capital. They show a modest level of concentration for three benchmark years (1911, 1927, 1936), not only for the traditional sectors but also for the modern and heavy industries (chemicals, steel, mechanical, electromechanical, transportation). Mining, petroleum, rubber and synthetic fibers represented an exception.

Dynamically, the low levels of initial concentration were followed by a strong upward trend in the indicators until the mid-twenties (due to the surge of large companies favored by the First World War). Subsequently, from the mid-twenties and 1936, again with some exceptions (electricity and gas, chemical), the indices HH showed a substantial stability with a tendency to decrease. In particular, the manufacturing sector, due to the development of consortium agreements, the high foreign protection, the regulation related to investment authorizations induced a crystallization. Thus, the unexpected "finding of substantial non-existence of a general trend of increase in industry concentration in the period between the two wars" (Battilossi, p. 290).

Moreover, this process contributed to the widening of a size gap of the Italian firms; it also deepened the dualism of the Italian industrial system (Bonelli, 1978 ; Cafagna, 1990; Frederick, 1994): on one hand "heavy" sectors concentrated in few large enterprises supported by the state and the banking system; on the other hand, "light" sectors based on small firms, product diversification, niche markets, imitation and adaptation of technologies (Antonelli and Barbiellini Amidei, 2011). Actually, the increase in the weight of larger firms in this period from 36 to 42 per cent, measured as a share of total capital, is entirely linked to the changes in the electricity sector. In synthesis, the interwar period shapes the industrial system: one can find already in that period the characters of the future industrial system that the economic miracle will help to strengthen.

Boni and Gros Pietro (1967) conducted a study based on 1951 and 1961 industrial censuses. The authors use a variety of indicators such as the concentration ratio (using the so called " $C_x$ " index which, using the chosen variable, measures the weight of the first  $x$  companies on the whole market). A further indicator used is the Oligopolistic Intensity, i.e., the percentage of firms needed to achieve the 80 per cent of sectorial employment. Their work gives evidence to the prevalence of small and medium enterprises in the Italian industry, and accounts for the gap size that Italy shows with respect to other European countries. The study confirms also the prevalence of low levels of industrial concentration until the beginning of the sixties.

Sector size ranking do not change in the decade 1951-1961: more concentrated industries are the same as twenty-five years earlier. Contrary, there is a reduction in the average size of enterprises. The size gap (major/minor firms) widens in particular in the sectors of chemicals and transportation equipments. A bigger internal and external demand, promotes the birth of new firms of smaller size and this results in a compensative force of the concentration process triggered by increasing capitalistic intensity, and in the displacement of the accumulation process towards modern industries.

Thus, summing up, these works seem to support the idea that in the first sixty years of the Twentieth century, Italian industrial development was characterized by the low diffusion of oligopolistic practices and by a low content of monopolistic power of big firms. In foreign trade, however, the Fifties are the decade in which we assist to an increase in the international specialization in products typically associated to scale economies and big firms (see Gomellini and Pianta, 2007).

Analyses performed with a disaggregation of data can draw a different picture. In the sectorial analysis carried out by Battara (1965) realized for the Parliamentary Commission on Competition, he studies industrial concentration disaggregating sectors in products (e.g. 5 products for the chemical) in benchmark years. Differently from other studies, he found that between the 30s and 60s various sectors had a very high concentration: chemical and sugar sector in the Thirties, the cement industry in the Sixties (where six companies had 73 percent of production) and the steel industry as well.

More recently, Giannetti and Vasta (2003) perform a new analysis on the topic. They, again, after a review of previous studies on competition in Italy, show how different interpretations can arise from the heterogeneity of the data used: e.g., census data in Boni and Gros Pietro (1974); number of employees in Zamagni (1978); balance sheet data in Vinci (1918), Saibante (1926), Giannetti , Federico and Toninelli (1994). Furthermore, the variety of indexes used makes different results less comparable (Gini index, C concentration ratios, the Herfindahl-Hirschman index). Finally, areas and periods investigated are often not comparable.

Nonetheless, summing up the studies based on benchmark years, at least some turning points for concentration emerge. The first, in the mid-twenties when major mergers were done. These were the years of the success for large companies such as Fiat, Montecatini, SNIA, Pirelli, large electrical groups. After a short turnaround in the Fifties, the 60s and the 70s still are seasons of increasing concentration (due to the growth of large public and private companies and to



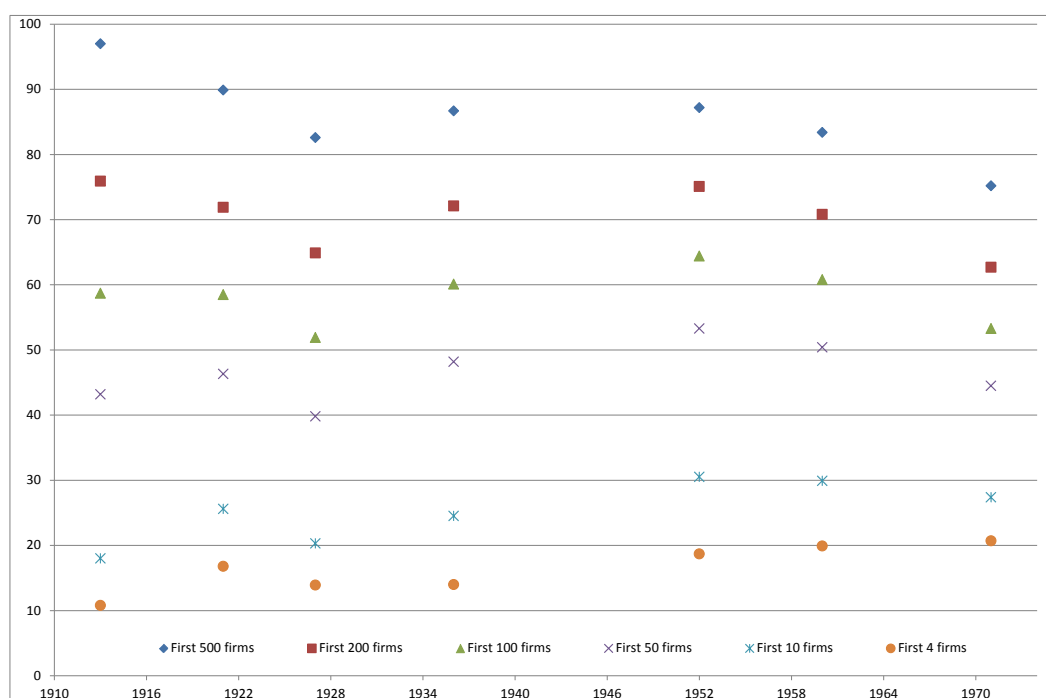
specific factors linked to different sectors: the nationalization of electricity, the increase in the relative weight of large oligopolistic industries such as metallurgy, chemicals, rubber, transports).

From the mid-70s to mid-80s, the processes of rationalization, specialization, demerger, reorganization and decentralization of production in Italy led to a decrease in concentration. According with the Mediobanca database, a sample of 1176 major Italian companies, between 1976 and 1986 their weight fell in terms of value added from 33.0 to 26.7 per cent of the total. Since the 80s, however, the major changes (the crisis of the Fordist model, the development of differentiated products, the decentralization of production, the process of internationalization of firms) progressively made the concentration indexes less suitable to measure the degree of competition.

Giannetti and Vasta (2003; they uses the same data source we use in the present work, with some differences: see below, par. 3) calculate C4 indexes of concentration using thresholds useful to define a sector as monopolistic (when C4 is greater than 60 percent); semi-competitive (C4 is between 40 and 59 percent) or competitive if the index is below 40 percent.

Furthermore, they calculated the weight of the first 4, 10, 50, 100, 200, 500 enterprises (total assets) of the entire sample of firms in the database and calculate the indexes for seven benchmark years.

**Figure 2.2 Competition in Italy**



Between 1913 and 1927 the indexes constructed with a larger number of companies show a decreasing trend until the (economic) turn of the fascism in the second half of the twenties. The indicators constructed with a smaller number of firms at the numerator (in particular C4 ) show an increase in concentration in the first phase marked by the Great War 1913-1921. Almost all indexes indicate an overall increase in concentration between 1927 and 1952 (except for the C4 that between 1927 and 1936 slightly drops). Again, in the fifties and sixties, the two groups of indexes diverged: the concentration would significantly decrease according to the indexes constructed with a greater number of enterprises, and moderately grows according to C4 and C10.

The synthesis that the authors propose to explain these dynamics is the following: in the Sixties there has been a sharp increase in competition, mainly supported by the entry of new enterprises. This process, fueled also by international opening occurred however to a greater extent at the intermediate levels of the pyramid size than at its apex. *The golden age of Italian capitalism is therefore a period in which ... the proliferation opportunities through competition is compatible with* (Giannetti and Vasta, 2003 p. 53).

All in all, according to Giannetti and Vasta, the concentration in the whole Italian manufacturing is "well within the conditions of competition". In terms of dynamics (extrapolated from benchmark years) they find an increase in concentration between 1913 and 1921; a slight reduction in the period between the two world wars; an increase from 1936 to 1951 and then a further moderate increase in 1960 and 1971.

However, a more disaggregated analysis further qualifies this evidences. In particular, the Italian manufacturing industry as a whole records low values for the C4 index. However, if we look at individual sectors, the picture radically changes. 7 out of 14 sectors exhibit high values of the indicator: they can be considered as monopolistic sectors on the eve of the First World War. The rubber industry is the most concentrated from 1913 onwards; the index computed for the sector of transport equipment increases in the second half of the twentieth century, whereas the concentration in petroleum products, very high at the beginning of the century, gradually decreased.

The degree of concentration is definitely inversely correlated with the degree of sectorial breakdown. For example, the sector of electrical and optical equipment shows a trend towards greater competition after the Second World War. However, using a finer sectorial breakdown, it

shows a clear persistence of high concentration after the Second World War. More generally, what emerges is that only a minority of areas that are part of the manufacture are competitive<sup>7</sup>.

Using sectorial breakdowns, concentration indices seems low for more traditional sectors while the concentration appears much higher in those sectors where scale economies are important (higher barriers to entry). The transport equipment sector records a sustained growth of concentration, contrary to what takes place for the sectors of machinery, electrical and optical equipment. So, a finer breakdown “reduces” the recorded degree of competition raising the value of the indicators.

Many investigations focused on the measurement of competition in other countries and on the British case. In particular, Crafts (2011) examined the role that competition had on the productivity of the British industrial system from the late nineteenth to the early twenty-first century. The involution of product market competition seems to have played a crucial role in defining the so-called "British relative economic decline" from WWI to the seventies. Since 1970, *"stronger competition has been a key ingredient in ending relative economic decline"* (p. 1)

Hannah and Jay (1977) argued that the British industry in 1914 was deeply transformed with respect to the past: "from a disaggregated structure of predominantly small competing firms, to a concentrated structure dominated by large and often monopolistic corporations." Before 1914, he estimated that the largest 100 companies in the UK produced only 15 per cent of total output. International protection was also low (measured by the ratio of revenues from import duties over total imports stood at 3%: O'Rourke, 2000)

In the interwar period, there was a significant increase in market power. In 1935, the share of the product of the top 100 enterprises had reached 23 per cent of the total, with a market share of manufacturing goods produced by firms belonging to a cartel equal to 29 percent.

A variable used to signal the degree of competition is represented by the markup, proxied by an index of price-cost margin. It showed an increase of 3.8 percentage points in all sectors (0.563 to 0.601) during the period 1924- in 1935. In productive areas identified by Mercer as those under a cartel control, the increase was 9.0 per cent. At the same time the coal cartel increased the price – cost margin of 13.8 percentage points.

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<sup>7</sup> The authors also focus on the role of industrial groups, whose identification has an important role in determining the actual degree of competition in the economy. The "consolidated" concentration indicator grows considerably.

For the golden age, 1950-1970, Philips (1971) develops indexes of concentration on the basis of the number of employees to 1963 and carries out a breakdown into 78 sectors, showing for Italy concentration levels comparable to France, lower than the UK but higher than in Germany.

For the United State, the Historical Statistics Millennial Edition report a C50 concentration indicator, calculated as the share of value added of the top 50 enterprises, equal in 1963 to 25 percent (33 percent in the index for the top 100).

As far as Europe is concerned, the EEC Commission produced a Report on Competition Policy at the end of the Eighties performing an investigation on restrictive business practices and oligopolistic intensities on the basis of an analysis related to over three hundred markets, with 750 case studies in the main countries of the European Community (160 in Italy). The picture that emerges for the Seventies is that of a downward trend in the average size of enterprises, combined with a stability of high levels of concentration. A strong market power also emerges: cases of single-firm dominance are rare, but there is a trend towards a high oligopolistic intensity ( $C4 > 80$ ). The latter seems to be a common European trend.

### *3) Gauging the degree of competition: data and direct measurement*

The aim of this section is to reconstruct time series, from the early '900 to the 1970s, of several indicators of competition. The level of analysis is sectorial, but data are at firm level, which will also allow us (in the following paragraphs) to analyze the relationships between indicators of competitive pressures and indicators of firms performance using micro data.

Our dataset consists of an unbalanced panel of yearly balance sheet data and sectorial data for 863 Italian manufacturing firms belonging to 10 industries over the period 1900-1971.

To analyze the competitive pressures of the Italian manufacturing industry in the long run we focused on 10 sectors characterized by a relative homogeneity of the products: three traditional industries, "Cotton", "Paper" and "Bricks and building materials"; four high capital intensive sectors, "Metallurgy", "Glass", "Sugar" and "Cement"; three branches of manufacturing relatively more modern and innovative, "Electrical Components", "Rubber" and "Artificial textile fibers".

Our branches of manufacturing represented in mid 1930s about 20% of total industry in terms of nominal capital of the joint stock companies (approximately the same figure in terms of

value added; calculations based on Carreras and Felice 2012), over 40% in terms of number of JSCs.

The balance sheet data were collected from yearbooks (*Annuari*) containing financial data of the Italian joint stock companies (*Società per Azioni, SpA*), collected by the Credito Italiano (a prominent universal bank) from 1907 to 1925, and from 1928 to 1984 by the Association of Italian Joint stock companies (*Assonime*), mainly accessible as digitalized information in the electronic archive IMITA (Italian Companies Database-*Imprese Italiane Database*).<sup>8</sup> The richness of information in these precious yearbooks is quite unique; the *Annuari* (whose preparation has been for twenty years the main task of the Research Department of the second Italian bank) were for many years of the last century the main guide for businessmen and scholars of finance.<sup>9</sup>

This source has the advantage of providing information on a wide range of issues regarding the economic performance of firms and the markets in which they operate, over a very long time span on a yearly basis. Apart from providing indicators of firms' economic characteristics and performance, it allows us to construct an extensive set of variables to proxy for competitive pressure (as well as other side variables that we use to perform robustness analysis).

Our data source offers individual annual balance sheet for all joint stock companies above a quite low threshold (see below), as well summary tables with data aggregated at sectorial level covering the period since 1906 to 1980s.<sup>10</sup> The data in the source are various items from balance sheets. There is also a section in which are presented information on the firms' history and the composition of corporate bodies.

For our 10 manufacturing industries we have collected:

- The balance sheet of the individual 40 major firms (in terms of nominal capital size) for each year in the time period of interest, so as to have an almost complete representation of our 10 industries (always in terms of nominal capital and in 8 out of 10 cases in terms of number of firms);<sup>11</sup>

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<sup>8</sup> Credito Italiano, "Notizie statistiche sulle principali società italiane per azioni", various years; Assonime, "Notizie statistiche. Società Italiane per Azioni", various years; Imprese Italiane Database-Imita.db, see Vasta (2006).

<sup>9</sup> Coltorti (2011, p. 5). See also Fornengo (1941) and Vasta (2003).

<sup>10</sup> Up to mid-1960s the sectorial summary tables were published in the *Annuari*, later on a new series of statistical booklet gathered several tables of statistical information on Italian joint stock companies.

<sup>11</sup> We downloaded the balance sheet from the historical IMITA archive, after having selected from the sectorial lists published in the *Annuari*, for each industry of interest, the major firms sorted according to the amount of capital. Having selected the top 40 firms in the manufacturing sectors of interest, we included in our dataset almost all the

- The aggregate sectorial balance sheet data for all years in the time period of interest (collecting them from the summary tables contained in the *Annuari*).<sup>12</sup>

For each firm (and the 10 industries) we have information on: nominal capital, total assets, fixed assets, inventories, securities and shareholdings, funds and credits, bonds, other debts, sinking funds, reserves, profits and losses, dividends; date of constitution, place of registered office, business sector. The industry category assignment which we use for our dataset's firms is based on the original coeval *Annuari* assignment, so as to assure a historically sensible picture of the considered industries.

Table 3.1 reports some information on our dataset in terms of number of firms and observations, and on the average size of firms (total assets and gross fixed capital in real terms), broken down into their 10 industries and in the different sub-periods.

The Yearbooks were a frequently repeated census of Italian SPA by industry, all joint stock companies with more than a specific nominal capital threshold were included. Since the Yearbooks were produced every two or three years and in each edition new firms were included (and dismissed) with the same sampling criteria, the set of firms covered remained highly representative of the Italian manufacturing sectors over time.<sup>13</sup>

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Spa (above the minimum threshold of nominal capital) contained in the relevant *Annuari* for 8 branches for most of the years: in particular for the branches of Cement, Artificial textile fibers, Rubber, Sugar, Electrical Components, but also for Glass, Bricks and (less) Paper. Were instead covered only half of the companies for Metallurgy and a quarter for the Cotton industry.

<sup>12</sup> Each yearbook, with frequency initially biannual and then triennial (since 1925), contained information for individual companies and for the different sectors (in the summary tables) on an extended time window, from a minimum of 4 years to over 15 years back. The collection and downloading of individual firms data and sectorial data from ten *Annuari* and from the electronic archive Imita, has allowed us to cover an extended period of time, between 1908 and 1971. Credito Italiano, "Notizie statistiche sulle principali società italiane per azioni", 1912, Credito Italiano, "Notizie statistiche. Società Italiane per Azioni", 1922, 1925; Assonime, "Notizie statistiche. Società Italiane per Azioni", 1934, 1937, 1940, 1953, 1958, 1961, 1964; Assonime, "Repertorio delle società italiane per azioni", 1967 (1970, 1973); Imita.db (<http://imitadb.unisi.it>, last access 30 luglio 2014).

<sup>13</sup> A caveat when using this source is that a minimum capital (expressed in nominal terms) was the criterion for the inclusion of the companies in the Yearbook. The threshold was raised over time to account for inflation (especially following world War II) and for the increase in the number of JS companies even of modest size (especially since the mid-50s). However, we cautiously considered this feature and we believe that it does not weaken the data base that we have reconstructed. In particular, the yearbooks selected by us in order to cover the first period 1908-1939, all used the same threshold of one million lire (equal, for the 1912 Yearbook, to nearly four million Euro in 2013 prices, and equal, for the yearbooks of the 1920s and 30s, to about one million Euro); applying this threshold, the *Annuari* selected a number of Spa growing from 800 in 1912 to over 3000 of the 1920s to about 4300 in the 1930s. After the Second World War, the threshold of the minimum capital was initially raised to account for the increased price level (10 million in the 1953 Yearbook, equal to approximately 160,000 Euro in 2013 prices) and then it was increased (to 50 million in 1958 and 100 million in 1964, equal to 700,000 and 1 million euro at 2013 prices respectively) to face the boom of small Spa; applying these thresholds, the *Annuari* selected a number of approximately 6000 Spa in the 1950s-mid 60s.

**Table 3.1 – Italian Industrial Firms Dataset (numbers and values in Italian Lira, 2010 prices)**

industry	Years									
	1908-1965		1908-1918		1919-1925		1926-1939		1948-1965	
	Observations	Companies	mean k-assets	mean k-fixed cap.	mean k-assets	mean k-fixed cap.	mean k-assets	mean k-fixed cap.	mean k-assets	mean k-fixed cap.
PAPER	1340	52	25.979.356	11.111.834	24.853.645	6.237.297	50.430.360	23.272.585	132.800.000	84.657.998
CEMENT	1820	137	25.668.385	14.982.801	19.959.428	8.409.887	37.055.401	22.065.084	103.300.000	72.304.723
COTTON	2002	61	89.112.264	32.817.391	76.297.523	11.847.512	92.266.393	26.559.387	188.800.000	105.400.000
ARTIFICIAL TEXTILE FIBERS	728	53	64.845.272	27.588.059	200.700.000	63.205.452	218.700.000	124.500.000	352.200.000	225.200.000
RUBBER	656	51	110.500.000	18.128.789	119.300.000	23.273.162	200.200.000	42.508.348	244.600.000	108.700.000
BRICKS	2570	221	14.281.194	8.339.472	6.337.136	2.724.031	8.024.199	4.163.199	20.743.026	11.997.695
ELECTRICAL COMPONENTS	1562	104	40.179.175	14.472.196	36.846.596	7.818.564	55.066.277	13.623.334	57.580.555	22.252.195
METALLURGY	1216	51	168.000.000	62.837.087	194.700.000	50.519.009	262.200.000	132.700.000	1.000.000.000	618.500.000
GLASS	1292	77	20.736.880	8.643.894	12.345.599	2.919.975	25.228.282	13.252.529	61.406.897	40.381.123
SUGAR	1009	55	76.674.838	22.823.567	66.599.077	14.656.902	139.600.000	75.213.843	270.500.000	155.700.000
TOTAL	14195	862	63.597.736	22.174.509	75.793.900	19.161.179	108.877.091	47.785.831	243.193.048	144.509.373

The Annuari's coverage with respect to the universe of Italian corporation was very high overall, obviously with large differences between sectors (in relation to their dimensional structure). As a whole, the weight of the companies surveyed in the Annuari in terms of nominal capital in relation to total Italian SpA was 80% in 1913, more than 90% in the following decades, up to a maximum of 97% in 1952 and 1960 (still more than 93% in 1972; Vasta, 2006).<sup>14</sup> In terms of number of joint stock companies, the representativeness of the Yearbook, although at lower levels, it is still significant, with 40% of the total SpA in 1913, 36% in 1927, between 20 and 25% in the subsequent decades up to the early 1970s(). Looking at the industrial sector, the Annuari's coverage was high in terms of nominal capital. For what pertains in particular our manufacturing industries, the source coverage was very high, by mid 1930s about 90% with respect to the total of Italian corporation in the same industry for almost all the ten industries included in our dataset (the figure is closer to 99% for Metallurgy, Artificial textile fibers, Rubber and Sugar; the exception was Bricks and building materials with 70%). Interestingly the coverage in terms of capital was very high also in industries with a below 50% coverage in terms of number of JSCs, as in the case of Cotton, Paper, Glass, and Cement (our calculations).

<sup>14</sup> The latest edition of the Yearbook of 1984 still had a very high representativeness of the universe of Italian SpA, with 83% of the total nominal capital.

Also the *Annuari*'s coverage with respect to the universe of Italian firms (not JSCs) was significant overall in terms of numbers (the only variable available for an historical comparison), even if it is quite difficult to have a well-defined quantitative representation. Again, there were large differences between sectors, in relation to their dimensional structure and the use of forms of business organization other than joint stock companies (e.g. the newly designed “Società a responsabilità limitata” - S.r.l. for the post WWII period). For example, in 1911, whereas in the industrial sector as a whole JSCs were 3414 out of 22413 enterprises (with more than ten employees), some industries were mostly composed of JSCs: looking at our selection of manufacturing industries, of the 18 firms (with more than ten employees) recorded as active in the iron and steel sector, the JSC were 16 (typically the largest companies in the metal industry); of the 42 companies operating in the sugar industry the JSC were 37; in the case of the production and processing of glass, the JSC were 59 out of 145 (see Census of factories and industrial enterprises, June 10, 1911, Tab. III, pp. 442-454). In the paper and cotton industries instead, always in terms of numbers, JSC were a clear minority (with respectively, only 51 JSCs out of 287 firms and 188 out of 629). In 1937, all 19 companies active in the sugar industry had the legal form of the Spa (see The Sugar industry, Census of August 25, 1937). In 1951, in the industrial sector as a whole the JSCs were 5978 out of 27297 enterprises (22 per cent of all the companies, whereas the same percentage was 15 in 1911), the cotton industry registered 253 JSC on 819 companies with more than ten employees (31 per cent of all the companies, whereas the same percentage was 19 in 1911) and the paper industry had 141 JSC over 728 companies (19 per cent, from 18% in 1911).

Returning to the composition of our dataset, to construct indicators of external/foreign competitive pressure we finally complemented the information of the *Annuari* with external data from the “Historical dataset on Italian Foreign Trade – Banca d’Italia” (Federico et al., 2011).

For the product classes related to our 10 manufacturing industries we have collected:

- import and export (in terms of quantity and value) for each year in the time period of interest;<sup>15</sup>

- domestic production (in terms of quantity and value, when available) for all years in the time period of interest (up to now for 7 classes of products).<sup>16</sup>

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<sup>15</sup> Sources: Federico et al. (2011); OEEC (1951-61); OECD (1997). In particular for the following SITC2 classes of products: Cement (6610, 6611, 6612), Artificial textile fibers (2661, 2667), Rubber (621, 625, 628), Sugar (0611, 0612),



Most of the quantitative studies that have analyzed the role of competition in Italian economic history focused on the calculation of indicators of industrial concentration and left significant room for improvement in several aspects, since they often have considered sectors wide and not very homogeneous in terms of product, using benchmark years (instead of time series) or short periods, relying on a single measure, without making a cross-checking with other indicators.

Our dataset has allowed us to reconstruct three different types of indicators of competitive tone:

- Concentration indexes, C1-C10, calculated as the ratio of Total assets (Nominal capital) of 1-10 main JSCs (in terms of assets) belonging to the industry "i" and Total assets (cumulative) of all companies belonging to the same industry for that year;

- Mark-up indexes, Mkp1-Mkp10, calculated as the ratio of Profits and Total assets (Nominal capital) of 1-10 main JSCs (in terms of assets) belonging to the industry "i", and the ratio of Profits and Total assets (Nominal capital) of all the other JSCs of that industry (industry's profits and total assets net of the main 1-10 JSCs);

- Import penetration indexes, calculated as the ratio of Imports to Domestic demand of a specific class of product (i.e. the domestic production adjusted for the specific product's foreign trade balance, the difference between its exports and imports).<sup>17</sup>

We interpret our concentration and mark-up indexes as proxies of the internal competition level, the import penetration index as a proxy of international competitive pressure.

We have built long time series over the period 1908-1965 (with the ultimate goal of reaching 1971, with a break in the years 1940-1947) of the indicators of concentration and mark-up for the 10 manufacturing sectors of interest. Among the different variables by which to measure market concentration - employment, value added, turnover, capital and assets - in order to cover a long period of Italian economic history and a significant number of firms and industries, in fact the choice narrowed to balance sheet variables. After constructing concentration indicators on both

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Electrical Components (773, 776, 778), Glass (664, 665), Bricks (662), Paper (641, 642), Metallurgy (67, 68; precious metals excluded), Cotton (yarn and fabric, 6513, 652).

<sup>16</sup> Sources: Istat (1956), Istat (1986). Up to now for the following products: Cement, Artificial textile fibers, Sugar, Paper, products of the Metallurgy, Cotton and Electrical components industries.

nominal capital and total assets, we preferred for our analysis the total assets index, as more *reliable* and less erratic than the index built on nominal capital – that in any case “historical studies generally use, simply because it is the easiest measure to find” (Giannetti e Vasta, 2004, p.51).

We have assembled long time series over the period 1890-1975 (with a break in the years 1941-1945) of the import penetration indexes for 6 product classes relates to our manufacturing branches (with the ultimate goal of covering all the 10 industries under analysis). Import penetration indexes show the degree to which domestic demand for a specific class of products is satisfied by foreign producers rather than from domestic production. Is a proxy of the degree of exposure to international competition, of openness of a market, also a proxy of trade protection policies (of import duties or non-tariff barriers protecting domestic producers).

The sample we analyze covers different phases of Italian economic history: a first liberal period since 1908 to 1925 (made up of a Giolittian era and an economically “liberal” Fascist era), an increasingly close and cartels sympathetic Fascist era (1926-1939), an increasingly open and moderately pro-market republican era in 1948-1965.

We start examining the sectoral synchronic and diachronic values of the concentration index, it emerges that (see Table 3.2 and Figures 3.1-3.3):

- Over the full 1908-1965 period (on average), out of our 10 manufacturing industries, 6 resulted as monopolistic ( $C4 > 59\%$ ), 2 semicompetitive ( $40\% \leq C4 \leq 59\%$ ) and 2 competitive ( $C4 < 40\%$ ).<sup>18</sup> This picture was pretty stable over time, with only one passage (Electrical components) from the semicompetitive to the monopolistic class moving from 1908-1939 to the post WWII period.
- Of the 6 monopolistic industries 3 were modern (Artificial textile fibers, Electrical components, Rubber) and 3 were capital intensive (Cement, Glass, Sugar), while the two semicompetitive were one capital intensive (Metallurgy) and the other labour intensive (Paper), leaving the remaining two labour intensive industries (Bricks, Cotton) to the competitive class.

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<sup>17</sup> The import penetration index is calculated according to the following formula:  $[M/(P-X+M)]$ , where M are imports, and Production minus exports X plus imports is the domestic demand.

<sup>18</sup> We follow the classification for Italian industry concentration proposed by Giannetti and Vasta (2003), which distinguish sectors on the basis of the following quantitative thresholds: a concentration index ( $C4$ , total assets) below 40 per cent for competitive sectors; a  $C4$  value between 40 per cent and 59 per cent for semicompetitive sectors; concentration index over 59 per cent for monopolistic industries.

- In the monopolistic industries, two had a C1 index (first company) higher than 50% (Artificial textile fibers and Rubber), the other 4 industries had a C1 around 35%. Looking at the concentration index built on the 10 major companies, only the 2 competitive industries (Cotton and Bricks) had a C10 below 70%.

In the long term six industries show a decreasing trend in concentration (that remains at high levels in most cases), while only 2 sectorial indexes resulted increasing (Sugar and Cotton) and 2 stable (Artificial textile fibers and Cement). In the first half of the XX century, the 1926-1939 Fascist protectionist era was characterized by a significant and diffused increase in concentration (7 industries; all in the 1930s), while the 1919-1925 saw a prevailing decreasing trend (8 industries), and the 1908-1918 exhibited a mixed picture (3 decreasing, 4 stables and 3 increasing). The post WWII period displayed an almost “unanimous” decreasing trend in concentration (with just one exception, Glass, stable).

**Table 3.2 – Industrial concentration indexes – 10 manufacturing industries (%)**

Years	C4 - Electrical compon.	Comp. Level	C4 - Rubber	C.L.	C4 - Glass	C.L.	C4 - Cotton	C.L.	C4 - Paper	C.L.	C4 - Sugar	C.L.	C4 - Metallurgy	C.L.	C4 - Bricks	C.L.	C4 - Cement	C.L.	C4 - Artificial textile fibers	C.L.
1908-1965	72,1	M	94,7	M	61,2	M	22,7	C	46,1	S	65,4	M	52,5	S	37,7	C	61,9	M	77,6	M
1948-1965	61,3	M	92,5	M	64,4	M	25,4	C	42,2	S	69,5	M	48,8	S	35,4	C	63,6	M	78,7	M
1908-1939	57,8	S	96,4	M	59,4	M	21,1	C	48,4	S	63,1	M	54,6	S	39,0	C	60,9	M	76,6	M
1908-1918	73,7	M	97,9	M	83,1	M	21,5	C	50,6	S	61,8	M	55,7	S	58,4	S	61,9	M	-	
1919-1925	52,8	S	91,6	M	50,1	S	20,0	C	42,9	S	54,9	S	53,3	S	32,1	C	65,5	M	76,6	M
1926-1939	47,9	S	98,6	M	47,1	S	21,4	C	49,3	S	68,2	M	54,5	S	27,1	C	57,8	S	76,6	M
1948-1959	64,5	M	93,8	M	65,2	M	27,2	C	47,7	S	71,8	M	49,1	S	37,2	C	67,0	M	81,1	M
1960-1965	55,0	S	90,0	M	62,9	M	21,9	C	31,2	C	65,0	M	48,3	S	31,7	C	56,9	S	74,0	M

M= monopolist; S= semicompetitive; C= competitive.

Figure 3.1 – Industrial concentration indexes - High concentration

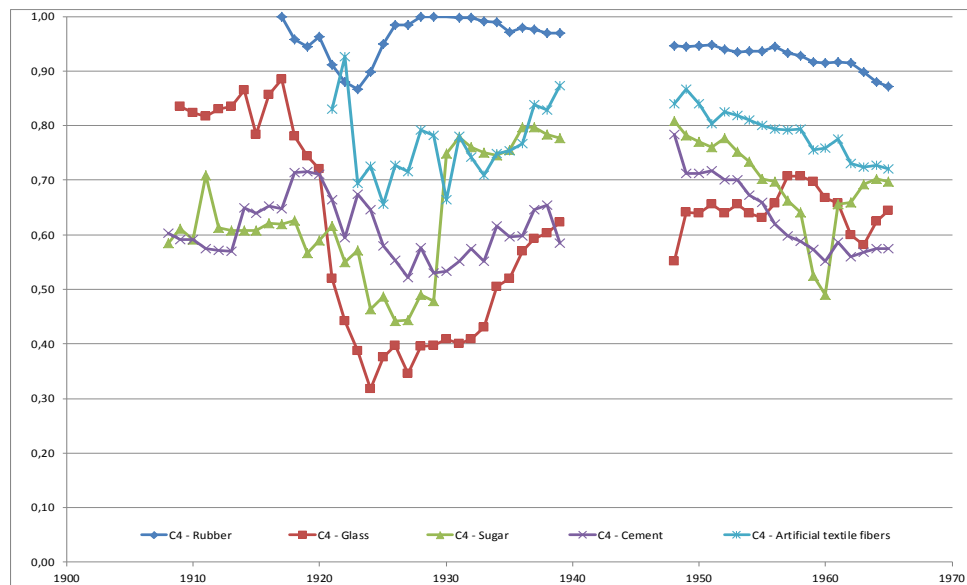
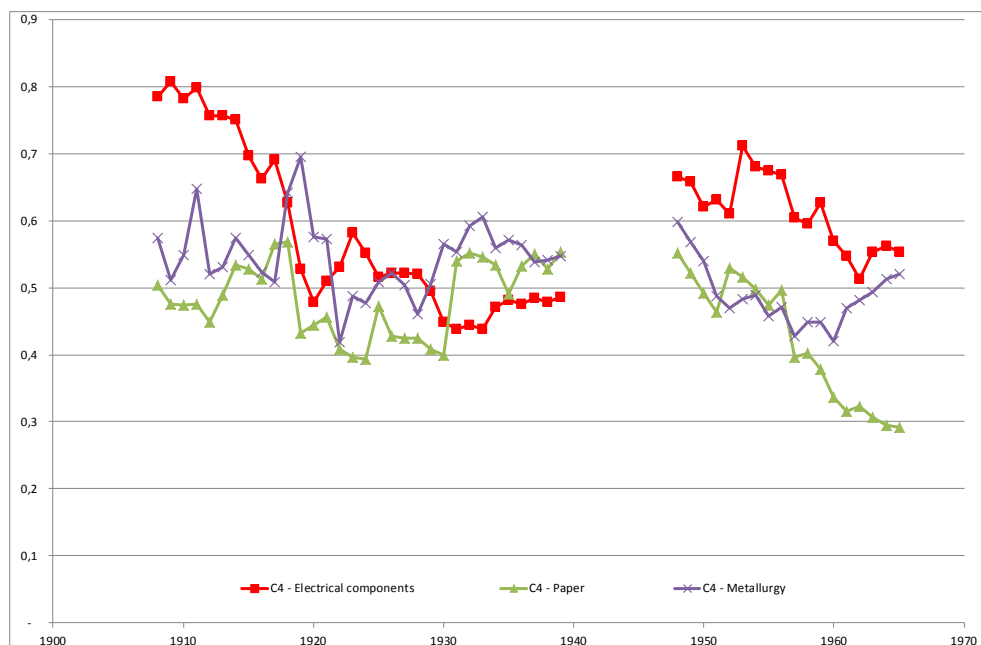
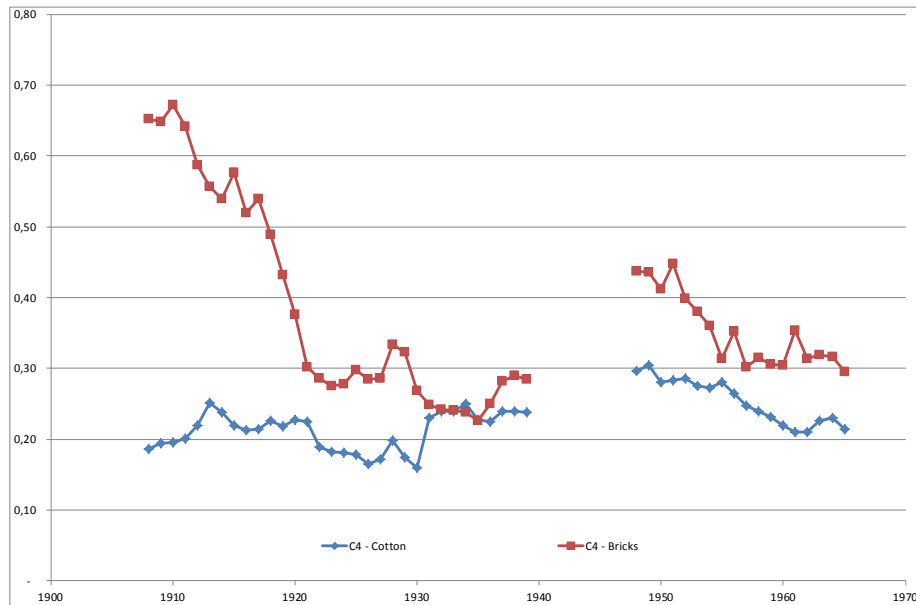


Figure 3.2 – Industrial concentration indexes - Medium concentration



**Figure 3.3 – Industrial concentration indexes - Low concentration**



From the analysis of sectorial mark-up indexes, it emerges that (see Table 3.3 and Figures 3.4-3.10):

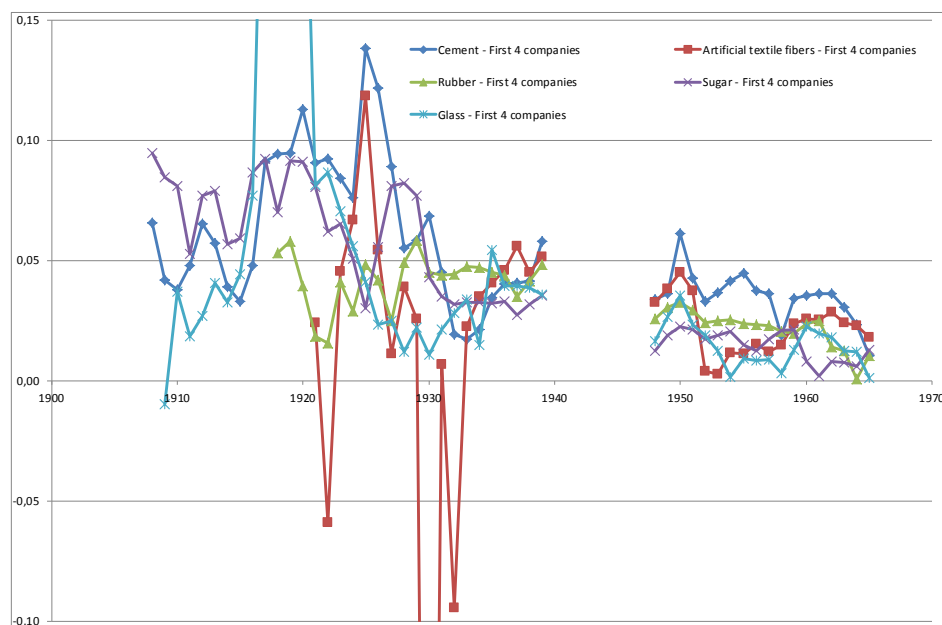
- Over the full 1908-1965 period (on average), 5 out of 10 industries exhibited high markup indexes for the biggest four companies (MKP4 in the 3-5% range); 4 of these 5 industries were monopolistic (one semi-competitive), 3 of them were capital intensive (Cement, Glass and Sugar), 1 was modern (Rubber), and 1 labour intensive (Paper).
- Almost all the high mark-up industries – the 4 monopolistic – also exhibited a significant and systematic (in all phases) mark-up premium for the first 4 companies over the rest of the sector in the 1908-1965 period (on average); even the fifth monopolistic industry (Artificial textile fibers) – with positive but lower mark-up – was characterized by a significant mark-up premium (MKP4).
- Only 2 industries exhibited a mark-up gap for the first 4 companies in respect to the rest of the sector (Metallurgy and Electrical components), while the last 3 industries (the 2 competitive, Bricks and Cotton, and the semicompetitive Paper) had mark-ups not significantly different for their biggest companies and the rest of the sector.
- Mark-up indexes were higher in the pre WWII period than in the 1948-1965 in all the industries but two (Artificial textile fibers and Electrical components); also the mark-up

premiums were higher in the pre WWII period for 7 industries out of 10 (the exception being Metallurgy, Paper and Electrical components).

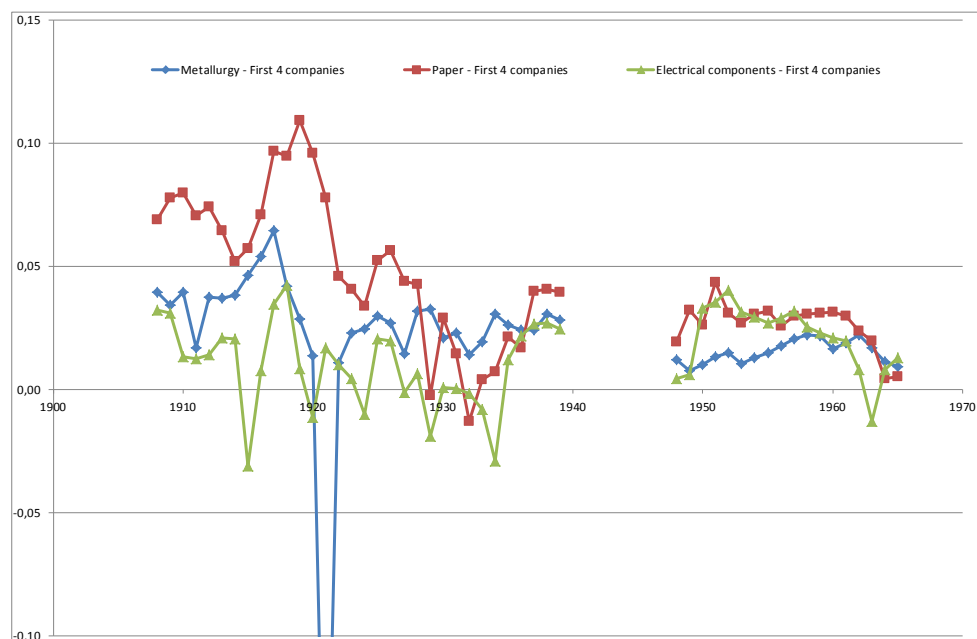
**Table 3.3 – Mark-up indexes,10 manufacturing industries (%)**

Years	Cement - First 4 companies	Rest of industry	Metal. - 4	R.of I.	Artif. text. fibers - 4	R.of I.	Paper - 4	R.of I.	Cotton - 4	R.of I.	Bricks - 4	R.of I.	Rubber - 4	R.of I.	Sugar - 4	R.of I.	Glass - 4	R.of I.	Electric. comp. - 4	R.of I.
1908-1965	5,3	1,6	2,0	2,4	1,1	-2,0	4,2	4,1	2,1	2,0	2,6	1,8	3,3	-0,1	4,4	2,6	4,7	1,6	1,4	1,5
1908-1939	6,3	1,2	2,2	3,1	0,1	-4,9	5,0	5,5	3,5	2,5	3,4	2,0	4,2	-0,7	6,0	3,7	6,6	2,0	1,0	1,9
1948-1965	3,5	2,2	1,5	1,2	2,2	1,0	2,6	1,6	-	0,3	1,2	1,2	2,2	0,7	1,5	0,7	1,5	0,9	2,1	0,9
1908-1918	5,6	3,0	4,1	4,5	-	-	7,3	6,3	3,1	2,3	3,6	2,6	5,3	9,4	7,6	4,5	8,3	3,3	1,8	4,0
1919-1925	9,8	3,0	-	1,2	2,0	3,9	-1,1	6,5	6,4	5,8	5,1	4,7	3,6	-4,1	6,7	2,5	11,6	3,3	0,6	0,1
1926-1939	5,1	-	1,1	2,5	2,6	-	1,3	-6,2	2,4	4,4	2,8	1,4	2,5	0,2	4,4	0,2	4,5	3,7	2,9	0,5
1948-1959	3,8	2,3	1,5	1,1	2,1	1,1	3,0	2,3	-	0,1	1,5	1,4	2,0	2,5	1,0	1,8	1,3	1,5	1,4	2,6
1960-1965	2,9	1,9	1,6	1,3	2,4	0,7	1,9	0,3	-	0,9	0,4	0,7	0,1	1,4	0,2	0,7	-0,4	1,4	-0,0	0,9

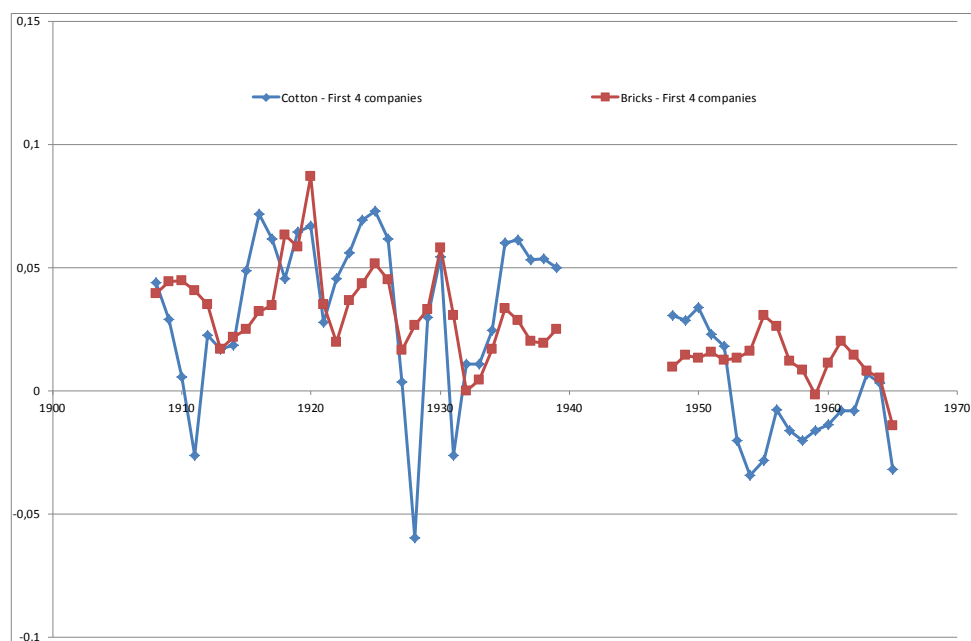
**Figure 3.4 – Mark-up indexes, Highly concentrated industries**



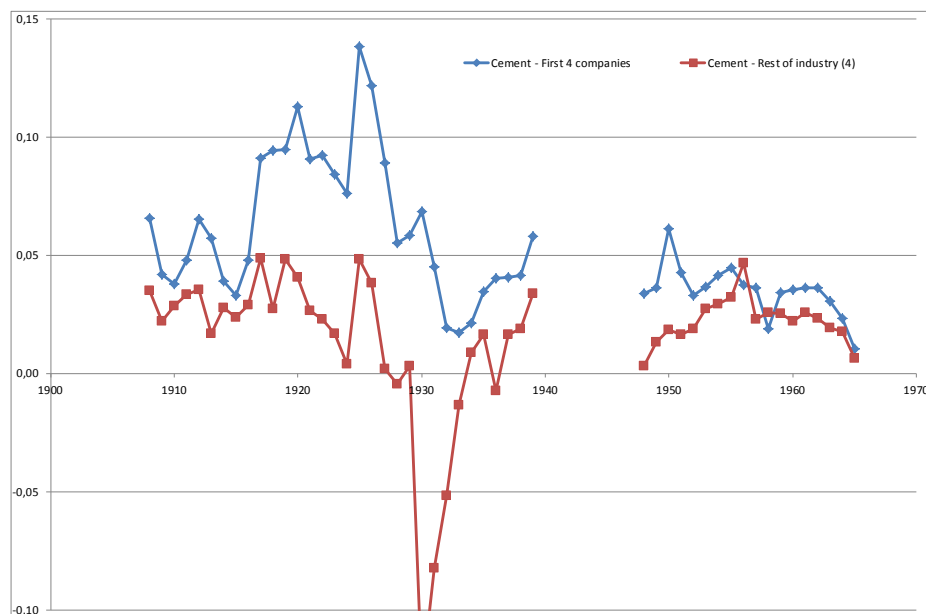
**Figure 3.5 – Mark-up indexes, Medium concentrated industries**



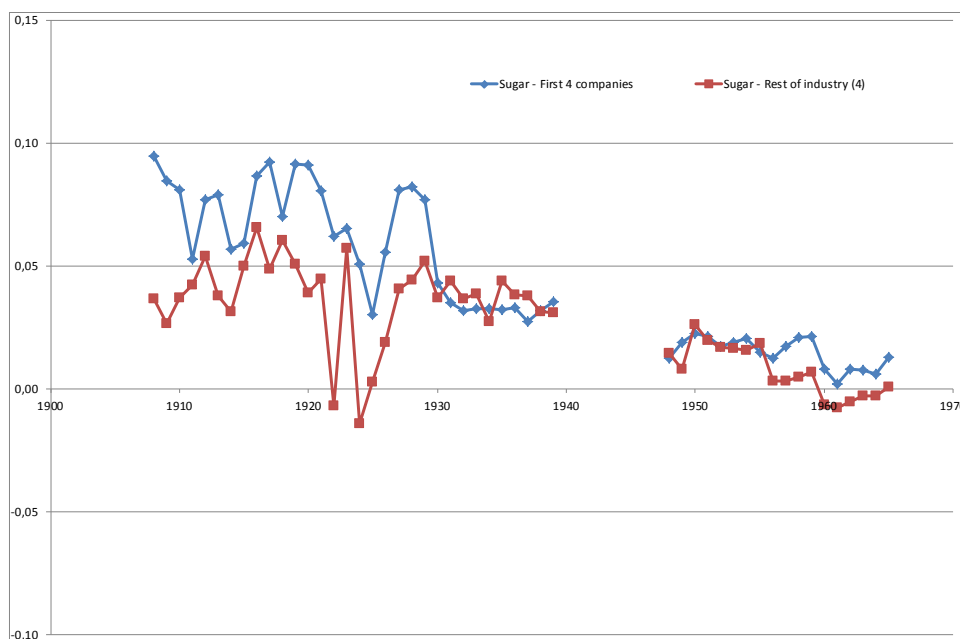
**Figure 3.6 – Mark-up indexes, weakly concentrated industries**



**Figure 3.7 – Mark-up premium in highly concentrated industries (Sugar): first four companies compared with the others**

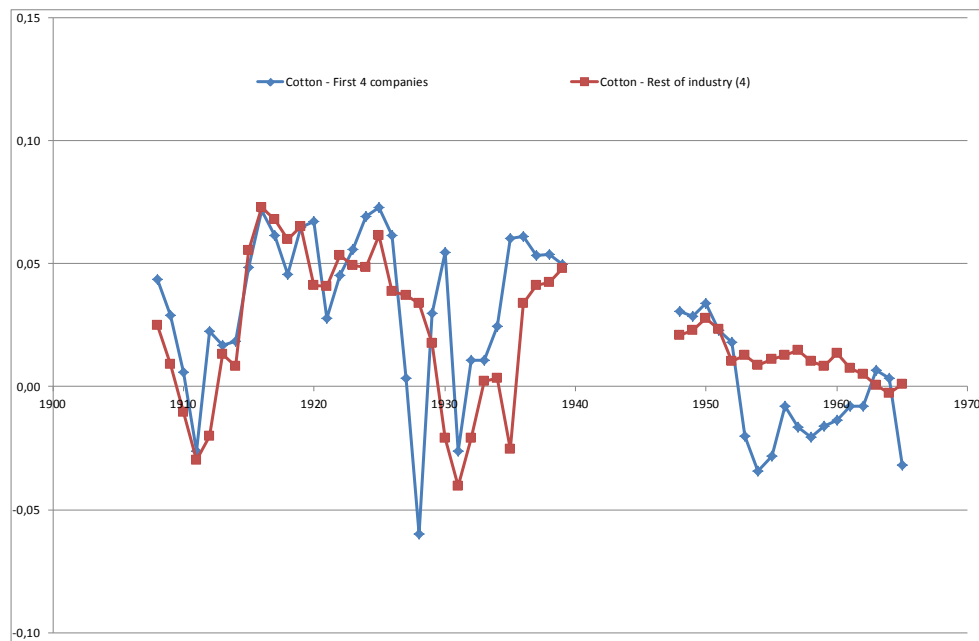


**Figure 3.8 – Mark-up premium in highly concentrated industries (Cotton): first four companies compared with the others**

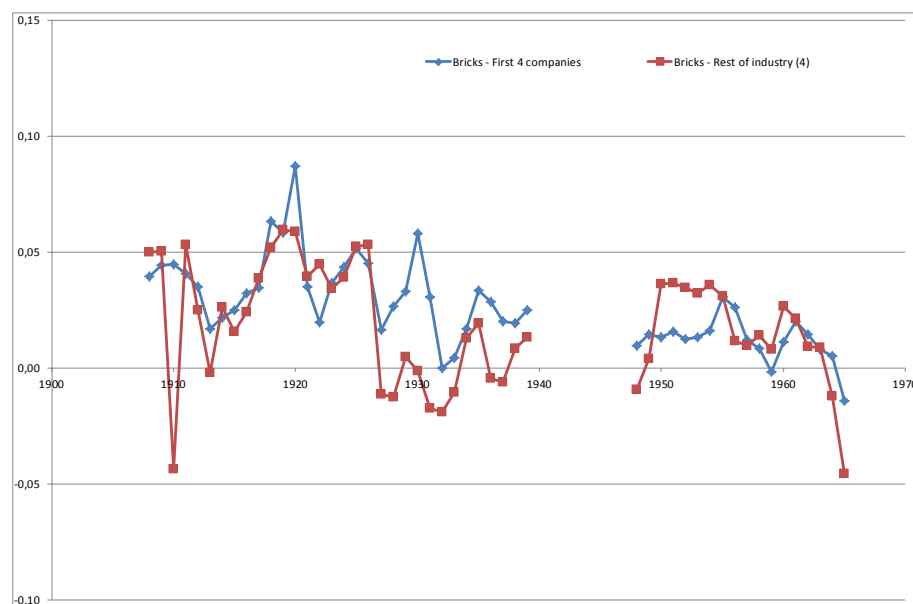




**Figure 3.9 – Mark-up premium in weakly concentrated industries (Bricks): first four companies compared with the others**



**Figure 3.10 – Mark-up premium in weakly concentrated industries (Bricks): first four companies compared with the others**



Finally from the analysis of import penetration indexes emerges that (see Table 3.4 and Figures 3.11-3.12):

- Over the 1908-1965 period (on average), out of 6 classes of products (related to our industries) only 1 (the products of the semicompetitive Metallurgy) exhibited a quite high (over 20%) import penetration rate; 3 classes (Paper, Artificial textile fibers and Sugar, 1 semicompetitive and 2 monopolistic industries) show a medium import penetration rate (in the range 5-10%), and two (one monopolistic, Cement, and one competitive, Cotton) have a very low international competitive pressure.
- Diachronically, it emerges a quite common decreasing trend of import penetration in the first half of the XX century, with a mild reversal in the early 1920s, and a diffused retrenchment in the 1926-1939 protectionist Fascist era. The post WWII period displayed an “unanimous” gradual increase in import penetration, stronger since late 1950s-early 1960s in connection with international and European trade liberalizations, more intense since late 1960s-early 1970s.

**Table 3.4 – Import penetration indexes (SITC product classes; %)**

Anni Years	Paper	Artificial textile fibers	Cotton Yarn	Cotton Fabric	Cotton Yarn and Fabric	Cement	Metallurgy products	Sugar
<b>1908-1965</b>	8,1	5,0	0,5	2,1	1,2	0,6	21,1	11,1
<b>1908-1939</b>	8,0	7,9	0,6	2,1	1,0	0,3	23,0	12,1
<b>1948-1965</b>	8,6	2,3	0,5	2,5	1,5	0,8	19,0	8,8
<b>1908-1918</b>	6,8		0,6				31,6	12,1
<b>1919-1925</b>	12,1	18,4	0,7	3,7	1,7		27,9	20,9
<b>1926-1939</b>	6,8	5,7	0,5	1,5	0,8	0,3	13,8	7,7
<b>1948-1959</b>	6,8	2,8	0,6	1,1	0,8	0,9	16,6	6,8
<b>1960-1965</b>	12,3	1,4	0,3	5,4	2,7	0,6	23,8	12,6

Figure 3.11 – Import penetration indexes, Low and medium penetration sectors (%)

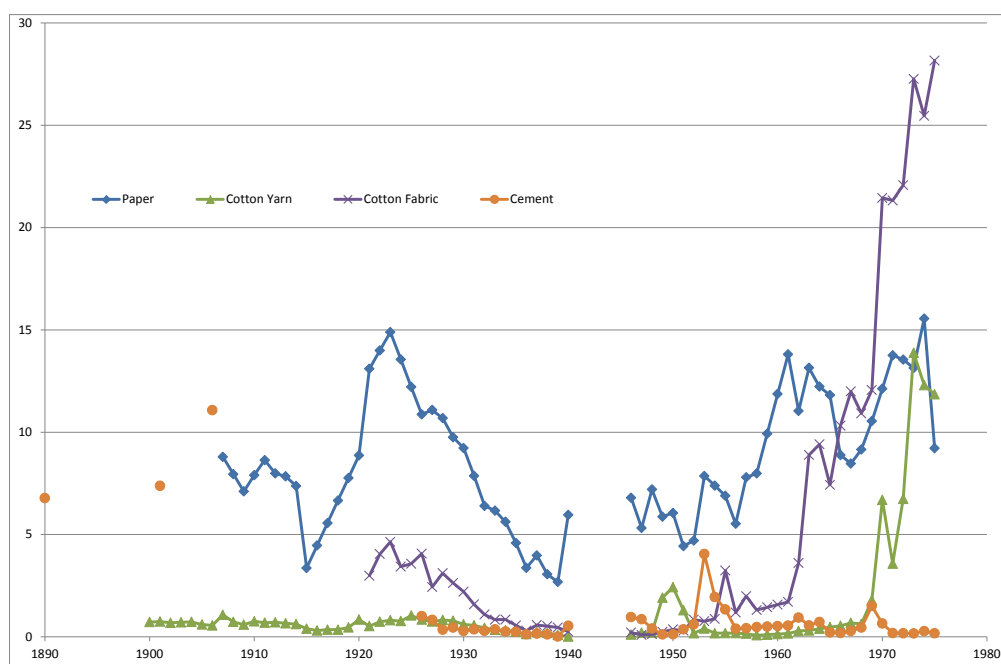
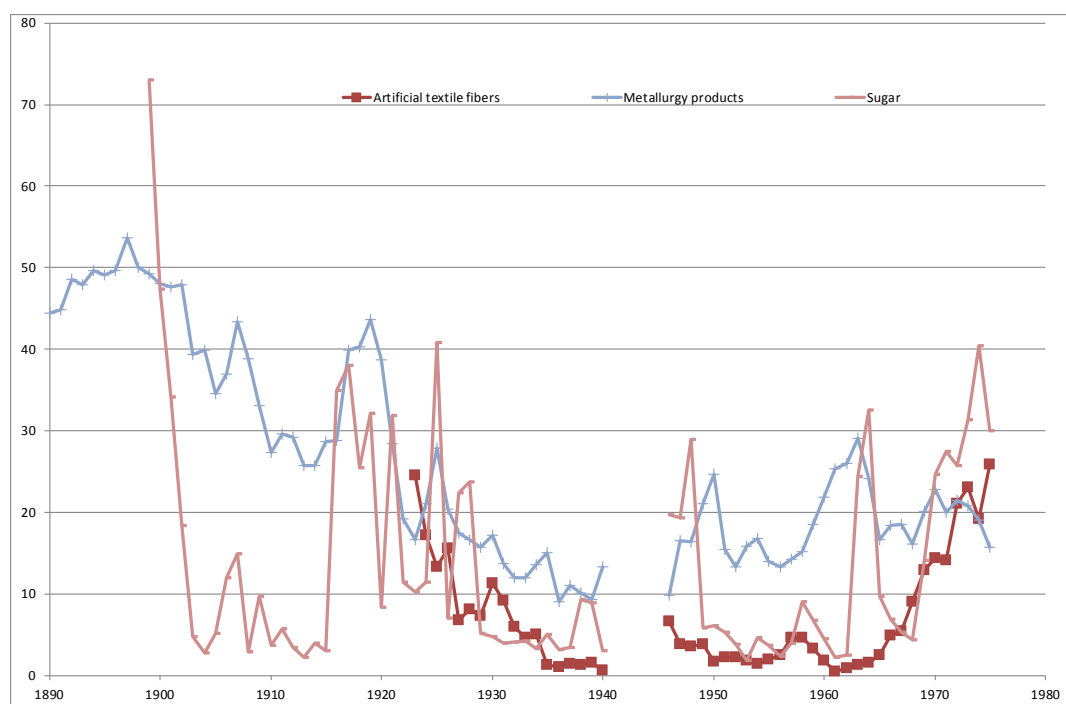


Figure 3.12 – Import penetration indexes, high penetration sectors (%)



#### *4) Competitive pressures, mark-up and firms growth: A correlation analysis*

In this section we want to analyze two relationships . First we are interested in investigating how mark-ups are correlated with our two measures of internal and external competition (namely, the concentration indexes and the import penetration ratios). Second, we want to explore if and how the same competition indexes are correlated with (a proxy for) firms' growth.

The research questions we have in mind are thus clear. We want to explore to what extent a higher or lower competition can affected the performance of our firms and their ability of earning extra profits that we measure with higher-than average markups.

Theory does not provide an unambiguous guidance to these different relations, prospecting a range of possible outcomes. In fact, although high concentration is commonly associated to high market power, de facto, a high degree of concentration does not per se imply firms actually exercise their potential market power.<sup>19</sup>

Indeed, most of the major theories of oligopoly imply a positive relationship between concentration and profit margins, though the strength of the relationship differs depending on the conduct by the firm on the related sector, on the type of product.<sup>20</sup> Different pricing strategies, and then mark-ups, could be compatible with different market structures. Think about an oligopolistic industry in which aggressive low prices and low mark-ups are used to drive other firms out of the market. Furthermore, an industry could be highly concentrated because of domestic regulations related to entry and exits, nonetheless, if the sector faces significant foreign competition firms may behave competitively charging low markups.

Nor performance is one way linked to market structure. The causality between structure (proxied in our case by concentration), conduct (summarized in markups) and performance (asset growth from balance sheet data) may not necessarily run unidirectional and the three could be tangled in a hank difficult to unravel.

In recent times, a question that seems to be of utmost importance is linked to the necessity of a deep understanding of the impact that the globalization process, with its raising international competition, had and will have on the incentives to innovate. In a recent analysis of the pro-competitive effects of trade in the case of Italy, it was found that increases in the share of

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<sup>19</sup> See Gomellini (2012), Bresnahan (1989), Dixit and Stiglitz (1977), Sutton (1998).

<sup>20</sup> See: Gomellini (2012), Oliveira Martins, Pilat, Scarpetta (1996); Scarpetta et al (2011).

Chinese products in total Italian imports had a negative non-negligible causal impact on firms' price dynamics.<sup>21</sup>

The sample on which we base our analysis is composed by 862 firms for 14.195 observations over the years 1908-1965. We deflated balance sheet data with an historical consumer price index (Istat 2011).

Considering the aims of the analysis, as well as the structure of the data (panel data characterized by both a long time range and a very wide cross-sectional range), we adopted a Panel data regression model, so as to: (1) take advantage of both dimensions. The cross-sectional allows us to account for the mostly structural differences between firms and industries; time-series (within) contain information about the changes in firms/industries characteristics over time and permit a test of competitive pressure linkages relevance. (2) We can also control for possible omitted variables both those time-invariant (firms or sector specific) and of those that vary over time but are constant between firms/industries (through year dummies and random-effects estimation. See Wooldridge, 2001).

Thus, our general regression equations for mark-up and growth are:

$$(1) \text{Markup}_{it} = \alpha + \beta X_{it} + \delta Z_{jt} + \text{FIRM} + \text{SEC} + \text{YEAR} + \text{GEO} + \epsilon_{it} ;$$

$$(2) \text{Growth}_{it} = \alpha + \beta X_{it} + \delta Z_{jt} + \text{FIRM} + \text{SEC} + \text{YEAR} + \text{GEO} + \epsilon_{it} ;$$

where: X are firm level controls; Z is the vector of explanatory variables, alternatively a proxy of sectorial market concentration and a proxy of sectorial import penetration; YEAR, FIRM, SEC, GEO are dummy variables for firm, industry, year, geographical location (City, District, Region).

Starting with the Mark-up equation, we first investigate whether sectorial market concentration ( $\text{ConcSect}_j$ ) is correlated to cross-firms variation in mark-ups within our panel. We use a fixed effects (FE) estimation (or random effects estimation method, RE, depending on the result of the Hausman test implemented) of the following equation:

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<sup>21</sup> Bugamelli, Fabiani, Sette (2010). This result is obtained estimating on the period 1990-2006 a reduced-form model of firm-level pricing that accounts for demand and cost shocks, for domestic competition and import penetration, for firms' size and productivity and for time and sector effects. The size of the impact of the

$$(1a) \text{Markup}_{it} = \alpha + \beta \text{ConcSect}_{jt} + \text{FIRM} + \text{SEC} + \text{YEAR} + \varepsilon_{it};$$

The main estimation results are reported in Table 4.1. We interpret the results of our estimates as “clean correlations” between selected variables: firms mark-up emerges as positively related to sectorial market concentration (C5). The result for the full period covered mirrors the result found for the restraining of competition/autarchic Fascist period (1926-1939).

Table 4.1. Mark-up and industry concentration, 1908-1965: Panel Analysis; equation (1a).

(Dependent variable: Firms' mark-up)				
VARIABLES	(1) 1908-1965	(2) 1908-1925	(3) 1926-1939	(4) 1948-1965
mkt5_attivo	0.0329*** (0.00943)	-0.0187 (0.0187)	0.0738*** (0.0285)	0.0108 (0.0135)
Constant	0.00987 (0.00806)	0.0404*** (0.0124)	0.0116 (0.0140)	0.00204 (0.00891)
Dummy industry	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES
Observations	13265	3029	3954	6282
Number of cod_azienda	845	318	413	607
Estimation	FE	FE	FE	FE
F	20.28	16.71	12.52	19.16
R-squared within model	0.0758	0.100	0.0474	0.0575
between model	0.00601	0.00156	0.00765	0.0241
overall model	0.0552	0.0520	0.0132	0.0405
corr(u_i, Xb)	-0.0883	-0.0973	-0.224	-0.00936

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

In order to better qualify our results, we analyzed in which type of sectors the relationship appear tighter. The results (not shown) point to capital intensive sectors as those in which markups exhibited a higher correlations with the degree of concentration, and to a minor degree, also to the more modern sectors. This in particular happens during the Thirties (more capital intensive sectors exhibit a stronger relationship also between concentration growth, as we will see next).

In terms of firms' dimension, the higher concentration of the sector is associated to a growth in the mark up of all the firms in our sample that belong to the same sector. Differently, as we will see next, the correlation between concentration and firms' growth is higher for those firms at the very top of the dimension scale.

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Chinese import share is non-negligible: firms operating in a sector where such a share is 10 per cent higher tend to contain their output price growth by 0.3-0.4 percentage points per year. A non-negligible welfare gain.

Table 4.2. Mark-up and Import penetration, 1908-1965: Panel Analysis; equation (1b).

(Dependent variable: Firms' mark-up)				
VARIABLES	(1) 1908-1965	(2) 1908-1925	(3) 1926-1939	(4) 1948-1965
Import_penetration_ratio	-0.000730*** (0.000153)	-0.000481** (0.000194)	-0.00123* (0.000670)	0.000121 (0.000142)
Constant	0.0500*** (0.00814)	0.0516*** (0.00700)	0.0536*** (0.00784)	0.0152*** (0.00227)
Dummy industry	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES
Observations	6891	1246	2283	3362
Number of cod_azienda	394	154	244	274
Estimation	FE	FE	FE	FE
F	14.10	9.496	8.711	15.56
R-squared within model	0.0986	0.137	0.0568	0.0836
between model	0.00740	0.111	0.0172	0.0178
overall model	0.0853	0.117	0.0252	0.0529
corr(u_i, Xb)	-0.0438	0.0684	-0.111	-0.0273

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

We then investigated how foreign competitive pressures are correlated with cross-firms variation in mark-up within our panel:

$$(1b) \text{Markup}_{it} = \alpha + \beta \text{Import penetration ratio}_{it} + \text{FIRM} + \text{SEC} + \text{YEAR} + \epsilon_{it};$$

The sample size shrinks considerably, as the import penetration variable is available only for a subset of industries. A negative link between import penetration and mark-up prevails in both the liberal epoch and in the more protectionist phase of Fascism. After WWII no significant relation emerges.

Once again, we qualify our results distinguishing between type of sectors and firms dimensions. The negative relationship detected between import penetration and markups is emphasized in modern sectors, especially before WWII. Those are, in contrast, sectors that registered a higher growth openness related (as we will see next). We found no sharp difference in the responsiveness of firm's markup to higher degrees of import penetration according with firms' dimension.

Table 4.3. Growth and Market concentration, 1908-1965: Panel Analysis; equation (2a).

(Dependent variable: ln Real total assets)

VARIABLES	(1) 1908-1965	(2) 1908-1925	(3) 1926-1939	(4) 1948-1965
L3.mkt5_attivo	0.141** (0.0693)	0.130 (0.119)	0.346*** (0.104)	-0.0614 (0.132)
Constant	16.75*** (0.0687)	17.30*** (0.0894)	16.64*** (0.0534)	17.03*** (0.0866)
Dummy industry	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES
Observations	10672	2392	3576	4704
Number of cod_azienda	781	258	379	561
Estimation	FE	FE	FE	FE
F	260.7	17.65	45.84	355.8
R-squared within model	0.549	0.124	0.168	0.564
between model	0.00390	0.000474	0.000804	0.0439
overall model	0.0544	0.00750	0.0182	0.0359
corr(u_i, Xb)	-0.198	-0.0184	0.0305	-0.0358

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Moving to the Growth equation, we investigate whether sectorial market concentration with a 3-years lag can explain cross-firms variation in real total assets, using a fixed effects (FE) estimation (or random effects estimation method, RE, depending on the result of the Hausman test implemented):

$$(2a) \ln k\_Total\ assets_{it} = \alpha + \beta ConcSect_{jt} + FIRM + SEC + YEAR + \varepsilon_{it};$$

The main estimation results are reported in Table 4.3. Over the full 1908-1965 period, a positive relation between firms total assets at time t and market structure lagged three year emerges. This result seems to be mostly due to competition restrictions of the Fascist phase.

We also tried as a dependent variable the ratio of fixed capital (machinery, plants, buildings) on total assets: again a direct relation with firms' fixed assets growth emerges.

In this growth analysis, labor intensive sectors show higher correlations between growth and concentration before WWI, while more capital intensive sectors show higher correlations later. Top rank firms (in terms of assets) benefited more of a higher concentration (their asset grew proportionally more).



Last, we investigated whether and how foreign competitive pressure affected cross-firms variation in performance within our panel.

$$(2b) \ln k\_Total\ assets_{it} = a + \beta Import\ penetration\ ratio_{jt} + FIRM + SEC + YEAR + \varepsilon_{it}$$

Over the full 1908-1965 an inverse relation between firms total assets at time t and import penetration three year earlier emerges; a result driven by pre WWII period, while interestingly in the 1950s-1960s phase the relation tunes direct.

Table 4.4. Growth and Import penetration, 1908-1965: Panel Analysis; equation (2b).

(Dependent variable: ln Real total assets)

VARIABLES	(1) 1908-1965	(2) 1908-1925	(3) 1926-1939	(4) 1948-1965
L3.Import_penetration_ratio	-0.00229* (0.00131)	-0.00373* (0.00199)	-0.00645*** (0.00170)	0.00774*** (0.00237)
Constant	17.20*** (0.0814)	17.82*** (0.0780)	17.46*** (0.0314)	17.70*** (0.0300)
Dummy industry	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES
Observations	5634	912	2003	2719
Number of cod_azienza	368	127	215	263
Estimation	FE	FE	FE	FE
F	175.5	3.717	29.34	161.4
R-squared within model	0.607	0.0760	0.188	0.498
between model	0.00611	0.0138	0.0462	0.0284
overall model	0.0862	0.00931	0.000424	0.0498
corr(u_i, Xb)	-0.196	-0.195	-0.142	-0.000646

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Modern sectors exhibit higher coefficients in the pre-WWII era with respect to other sectors while labor intensive sectors show higher coefficients after WWII and in the liberal phase. Capital intensive sectors' growth seems to grow less the more is the international competition . Once again, the assets of big firms reacted more strongly to an increase in import competition at the sector level: the firms at the top of the scale, exhibit a stronger positive correlation between the degree of import penetration and their growth. This result can be variously interpreted especially

along the line of new trade theories (see Melitz, 2003); nonetheless, at this stage of research we live it as a to-be-more-investigated issue.

### *5) The (causal) effect of competition: the sugar industry in the interwar period*

In this section we investigate the effects that a discrete change in the degree of competition had on firm's markups. In particular, we try to measure how the discontinuity that took place in competition-related legislation and that completely shielded firms from competitive pressures, influenced our measure of extra profits.

The case on which we focus on is that of the sugar industry.

The sugar industry was born in Europe at the beginning of the nineteenth century when, following the Napoleonic continental block, importing cane sugar became prohibitive. In Italy, the take-off of the sugar industry (beet sugar) occurred in the late nineteenth and early twentieth century. In ten years, between 1890 and 1900, the rate of import penetration dropped from levels close to 100 per cent to almost zero (thanks to the adoption of protectionist measures: Tonizzi, 2001, p. 8). The industry flourished starting from pre-existing cane sugar refineries that later specialized in the cultivation and industrial processing of sugar beet.

Throughout the period under review, the sector is characterized by a relatively low degree of competition related to both international protection and to legal measures aiming at restricting domestic competition (e.g., the Sugar Union, formed in 1904, favored productive and financial concentration and had a certain influence at the political level). The year 1968 marks the adoption of the European legislation and the regulation of sugar production within the Common Market. Following the changes in the regulatory framework towards a more open to competition from EU partners, the sector had significant efficiency gains: "The inclusion in the EU sugar market essentially resulted in a net reduction in extra profits and stimulated the productivity growth (Tonizzi, p.?: a rise in productivity through selection).

The history of the Italian sugar industry between early 1900s and the joining of the Common Market is complex and compelling, continuously linked to international markets (the Brussels Convention which regulates a number of crucial issues in international trade in sugar was signed in 1905), characterized by technological innovations and discontinuities that mark the transition between different regimes of competition.

With reference to the latter, this section focuses on the events occurred in the period between the two wars. More precisely, we investigate some economic effects produced by the creation of the Consorzio Nazionale Produttori Zuccheri (National Consortium of Sugar Producers, CNPZ).

The Consortium rules almost all the aspects related to sugar production. It defines sourcing and distribution of beets: the definition of selling contracts are demanded to the Consortium; the quantity and quality of sugar sales are regulated by the CNPZ. Most importantly, "Prices and conditions of sale are set by the Consortium ...". So, joining the CNPZ means suspending all the possibilities of using any instrument of competition (prices, quantities).

Although officially CNPZ was born in 1925, the actual ability to restrict competition and determine prices and quantities starts only in 1929, when all the firms producing sugar join the cartel. Pricing and production limitations, "the two main purposes of the cartel" (Tonizzi, 2001), were in fact not effective until 1930, when the market is "armored and the price is set jointly with the state authorities."

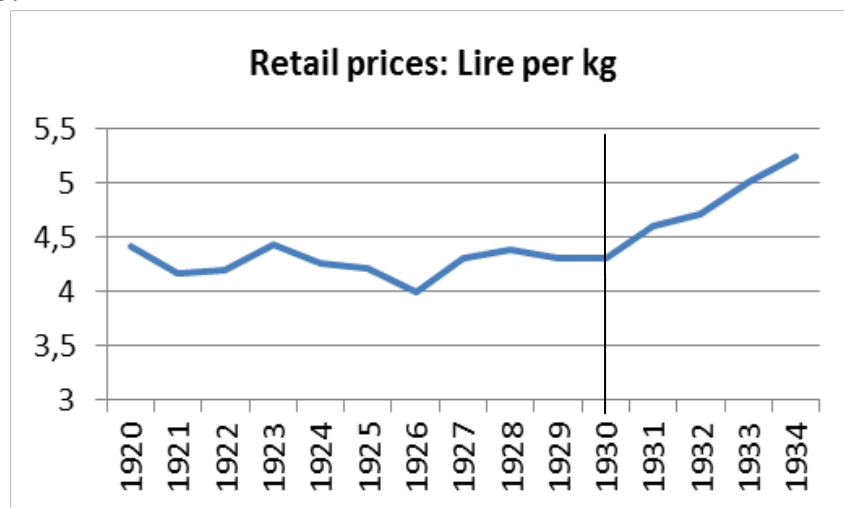
A simple evidence that is consistent with this periodization and with the story about the effectiveness of the cartel, is shown in Fig. 5.1 If we look at the dynamics of retail prices (net of the general price trends) they exhibit a clear discontinuity in their cyclical behavior that seems to start exactly at the beginning of the 1930s.

Thus, the goal of the exercise that follows is to analyze the relationship between this radical restriction of competition and the possible effects this limitation had on sectorial markups.

In terms of empirical analysis, we try to compare the different sectorial trends in the markups before and after the "treatment", that is, before the regulatory discontinuity. We use as a control sample a selection of the other sectors (that did not receive the treatment) and control for a series of sectorial fixed effects, year fixed effects and firm-specific factors (that hopefully are able to control for sector specificities, common time-varying dynamics and single firm characteristics).

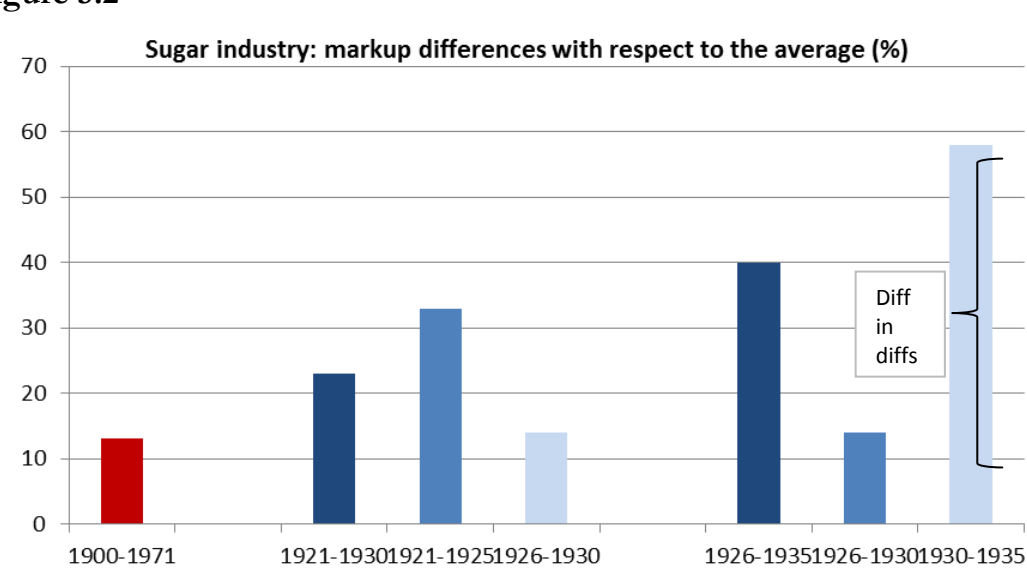
Therefore, we measure the differences in markups before the treatment between sugar and non-sugar firms, and compare it with the differences in markups we find after the treatment. The *difference-in-differences* we detect can be thought of as a causal effect of a measure of competition limitation on markups.

**Figure 5.1**



Based on our dataset, the sugar sector recorded a markup 15 per cent higher on average over the entire period, 1900-1970.

**Figure 5.2**



Focusing on the decade 1926-1935 the markup in the sugar sector results 40 per cent higher with respect to the average of other sectors. In the two sub-periods, pre-and post-treatment the "difference in differences" is significant: the markup in sugar rises from a value of 14 per cent above the average up to 58 per cent (Figure 5.2).

The empirical goal of the exercise is to investigate how much of this variation is due to the discontinuity in the related regulation. To do this, we estimate the following equation for the period 1925-1935 i.e., the period astride the treatment:

$$mkp_{ist} = \beta_t + \lambda_s + X_{ist}^T \beta_0 + \delta DID_{ist} + \varepsilon_{ist}$$

where  $i$  is the firm,  $s$  is the sector,  $t$  is the year.  $mkp$  is the firm's markup;  $\beta_t$  e  $\lambda_s$  are year and sectorial dummy variables;  $X^T$  are *time varying, firm specific* variables that attempt to control for differences in population characteristics that may represent a channel through which the change of competition has different effects on markups

The DID variable is an interaction variable interaction equal to the product of the post-1929 year dummies and the dummy indicating whether a firm belongs to the treated sugar (sugar) or not (other sectors). This variable is therefore equal to zero for all firms before the treatment and equal to 1 after the treatment only for firms belonging to the sugar sector.

The coefficient of interest is  $\delta$ : it should measure what is percentage of the increase in the difference between the markup of the sugar sector and other sectors that is determined by change in regulation that starting from 1930 shielded the sector from competition pressures. Variables are in logarithms, so the value of  $\delta$  expresses directly a percentage.

The Table 5.1 shows the values of the coefficient  $\delta$  in different specifications in which are progressively added controls (absent in the first column). In the second column we control for time-varying firm characteristics. The coefficient triples rising to 0.63. On the basis of this estimate, two-thirds of the change in the difference in markup that firms sugar recorded after 1929 can be attributed to the cartel effectiveness.

**Table 5.1 Effects of competition on markups in the case of the sugar industry:  
DID estimator**

	1		2		3		4		5	
	Coeff.	St.	Coeff.	St.	Coeff.	St.	Coeff.	St.	Coeff.	St.
Model 1	0.27	(0.08)								
Model 2			0.63	(0.09)						
Model 3					0.78	(0.12)				
Model 4							0.63	(0.14)		
Model 5									0.58	(0.06)
<i>Firms feat.</i>	<i>No</i>		<i>Yes</i>		<i>Yes</i>		<i>Yes</i>		<i>Yes</i>	
<i>Year</i>	<i>No</i>		<i>No</i>		<i>Yes</i>		<i>Yes</i>		<i>Yes</i>	
<i>Sector</i>	<i>No</i>		<i>No</i>		<i>Yes</i>		<i>Yes</i>		<i>Yes</i>	
<i>Sector selection</i>	<i>No</i>		<i>No</i>		<i>No</i>		<i>Yes</i>		<i>Yes</i>	
<i>M&amp;A</i>	<i>No</i>		<i>No</i>		<i>No</i>		<i>No</i>		<i>Yes</i>	
<i>N. Obs</i>	1467		1402		1402		817		733	
<i>Cluster SE (sett)</i>	<i>Yes</i>		<i>Yes</i>		<i>Yes</i>		<i>Yes</i>		<i>Yes</i>	

#### *Robustness checks*

The analysis of the previous paragraph must necessarily undergo some robustness checks. In particular, the following aspects have to be considered:

- Matching. In order to ensure that the control sample is composed by firms that before the treatment behaved in a way that is as similar as possible with respect to the treated sample, a preliminary selection must be done. An effective technique could be to submit the dataset to a matching procedure (forthcoming). At now, we just selected out two sectors on the basis of the behavior of a few economic yardsticks computed using balance sheet data. They showed a “suspect” behavior, indicating that some radical changes happened that can influence our result.

Nonetheless, as said, it should be done a preliminary matching analysis in order to select a sample that includes firms more similar to those of the sugar sector.

- We must be sure that we appropriately control for events that affected the sectorial degree of domestic and international openness (like changes in tariffs). At now, we were able to control for domestic competition using as a proxy our indexes of concentration (based on total assets). Furthermore, we introduced sector fixed effect that can, although imperfectly, control for sector specific events (as a change in import duties).

- Some controls must be included to account for the geographic location of the firm. We can use a macro area dummy variable that allows to consider territorial heterogeneity.

The estimates proved robust to the introduction of some of the additional controls. In particular, introducing year and sector dummies (model 3) the DID coefficient rises to 0.78; the exclusion of anomalous sectors (sector selection) brings the coefficient back to 0.63. Controlling for episodes of concentration that happened in other sectors (M & A: model 5) reduces the coefficient to 0.58.

In conclusion, from this simple exercise emerges that after 1930 the markups in the sugar sector grew with respect to those in other sectors. They were 15 per cent higher on average and became more than 50 per cent higher after 1930. According with our preliminary estimates, 58 per cent of this relative rise in markups could be attributed the total lack of competition pressures that characterized the sector after 1930.

## *6) Conclusions*

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