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## Bain and the origins of industrial economics

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### 1. Introduction

Joe Bain, a pioneer of Industrial Economics, was born hundred years ago. Bain defined the “Structure-conduct-performance” (SCP) paradigm which represented for years the pillar of the discipline and which remains today, with a few revisions, rich of potential development. Bain is particularly famous for his studies on oligopoly and entry barriers, on which Paolo Sylos Labini also has seminal contributions. The studies of both scholars constituted the basis for a wide theoretical reflection with important applications, so much so that Franco Modigliani, when presenting both authors’ work in 1958, talked about a new frontier for research on oligopoly. It is also useful to examine how Bain came to define the SCP paradigm, in order to appropriately derive both the essential characteristics and the development of the discipline, which in Italy is called Industrial Economics and Policy.

Joe Staten Bain was born in Spokane, in the State of Washington, in 1912. He studied at the University of California in Los Angeles, where he took his BA in 1935; he then went to Harvard University, where his main field of study became Industrial Organization, and took his Ph.D. in 1940. He was strongly influenced at Harvard by the teaching of E.S. Mason (1899-1992) and J.A. Schumpeter (1883-1950). Already in 1939 he became assistant professor at California Berkeley, then associate professor. He became Professor of Economics at Berkeley, where he stayed more than thirty years until his retirement in 1975. Bain died in 1993.

### 2. Origins of Industrial Economics in the English tradition

Bain dedicated to the analysis of industrial organization in a context in which the need for research aimed at understanding the continuous transformations of the economy after the 1929 crisis was deeply felt. The discipline of industrial economics emerged from two traditions with distinct roots: the Economics of industry in the UK and industrial organization in the US. The British tradition originates in the work of Adam Smith, with his analysis of the relationship between production organisation and the extent of the market. The case of the pin factory, used by Smith in his book *The Wealth of Nations* (1776) had already been presented in detail both in the *Chamber Cyclopaedia* and in the *Encyclopédie* of Diderot and D’Alambert (*Encyclopédie ou dictionnaire raisonné des sciences, des arts et des métiers*).

Smith relates a country’s growth to its capacity to structure manufacturing production according to principles of specialisation and complementarities of activities which allow the full development of labour productive capacity. Smith argues that the division of labour, hence production organisation, must be limited by only the extent of the market, and must be freed from feudal and corporatist constraints which prevailed in the *Ancien Régime*. In this analysis the most significant element is the link between increasing returns and production organisation. According to Smith scale economies are intimately linked to learning economies which individual workers and the whole organisation develop as the productive dimension rises.

The analysis of labour division with particular reference to increasing returns in manufacturing –contrary to decreasing returns in agriculture which is the basis of the Ricardian theory of growth– remains a constant theme of studies until Nassau Senior who was the first Professor of Political Economy at Oxford in 1825.

In *An Outline of the Science of Political Economy* (1836), Senior highlights the role of increasing returns to scale in industry, but he focuses on machines, hence capital, so that dynamic economies related to learning are put aside.

John Stuart Mill in chapter IX of the first volume of his *Principles of Political Economy* (1848) emphasizes the correlation between increasing returns and production scale referring to the work of Charles Babbage (*On the Economy of Machines and Manufactures*, 1832), often quoted by Marx.

The centrality of a structural element like productive dimension becomes even more obvious by looking at the concentration processes of the time. The introduction of the steam engine as a driving force of productive units where operative machines worked in an integrated way, and localized in urban areas with high industrial concentration, induced a significant increase in industrial concentration. These elements are considered by Alfred Marshall in the book published together with his wife Mary Paley, *The Economics of Industry* (1879), where he adds the concept of agglomeration economies generated by the interaction of firms operating in the same sector and located in the same territory.

This deep analysis of a changing context is pursued at least partly in book IV of the *Principles* (1890), where Marshall shows the complexity of firm systems, in a theoretical framework involving marginalist theories but based on the British tradition of Political Economy. Marshall offers a general vision of firms' life, which leads him to distinguish the advantages of small size as well as those of large size. The growth of firms continues up to a point where internal organizational diseconomies arise and induce the firm to decline. Marshall is indeed aware that scale economies would lead to excessive concentration (1972 Italian edition, 404-455).

His analysis converges in a partial equilibrium framework although Marshall considers the stylized process as neither instantaneous nor having a precise end.

The hypothesis of increasing returns to scale derived from empirical observation is at odds with the hypothesis of perfect competition induced by the marginal analysis, as argued by Piero Sraffa in his 1926 pioneering work.

Marshall examines this issue many years later. He proposes in *Industry and Trade* (1919) a detailed analysis of the new economic context dominated by large industrial concentrations and the decline of the British leadership. The book's subtitle is *A study of industrial technique and business organization; and of their influences on the conditions of various classes and nations* and it is noteworthy that Marshall thanks both Sir W. Ashley and Professor Schmoller (1919, p. 7). Gustav von Schmoller (1838-1917) was an outstanding representative of the German historical school and Sir William Ashley (1860-1927) diffused this tradition in the anglo-saxon world, playing an important role in the relationships between British and US universities.

### 3. First studies of Industrial Economic in the USA

The development of the discipline followed a different route in the USA. This country required studied applied to its specificities, which were much different from the European ones. Ricardo defined his theory of income distribution with the assumptions of decreasing returns in agriculture and stability of the population. In contrast, the land was a free good, to be conquered, in the USA and in Canada. In addition, labour supply was constantly growing due to the arrival of immigrants from Europe. The German historical school had an important impact in the new continent, stressing the importance of empirical studies, considering the institutional framework and centred on the environmental conditions in which economic dynamics unfold. Economic analyses consequently could not have universal and absolute validity but had to be put in specific economic, social, political and historical context.

In the 1880s a significant number of German economists emigrated to the United States and had an important influence on the development of the discipline and on the creation of the American Economic Society in particular (Devine et al., 1974, p. 15). The American context was extremely sensitive to the evolutionary theories, particularly to the reading of Spencer who applied the thoughts of Darwin to the social realm and highlighted that also in human societies the most able to survive were the strongest. Spencer theorised that the shift from the so-called military society to the industrial society could happen only under two conditions: a) initiative should only stem from the single individual, without any interference from the State which could otherwise prevent the emergence of the most apt; and b) the State should only ensure public order, so as to avoid that power positions could block the emergence of the most apt.

Ashley was actually the bridge between the European and American traditions. Ashley had studied in Oxford under the influence of Leslie Toynbee (who was his tutor) and Ingram, who were the British representatives of the historical school, and became Professor of Political Economy and Constitutional History in Toronto in 1888, where he developed a research method which he defined as “historical, statistical, inductive”. He then moved to Harvard, where he taught for ten years, and came back to Birmingham in 1901 to teach “Business Economics” in the new Faculty of Commerce (Devine et al., 1974, p. 19).

In 1914 Ashley, who taught until 1925, published the book *The Economic Organization of England*. The successor of Ashley in Birmingham was Sargent Florence who published *Logic of Industrial Organisation* in 1933. In the same year G. C. Allen, the other pupil of Ashley, published *British Industries and their Organisation*. The book by Philip Andrews, *Manufacturing Business* (1949), follows the same line, and Sylos Labini (1967) quotes it as one of the most influential on the development of the discipline. In 1952 Andrews publishes in the first issue of the *Journal of Industrial Economics* the seminal article “Industrial Economics as Specialist Subject”, which constitutes a sort of manifesto of the new discipline.

In the meantime the economic conditions in the USA were changing, with the consolidation of the new big trusts which Marshall already described in *Industry and Trade*, confronting them with the German Konzern and the Japanese Zaibatsu which were also consolidating at that time.

The discovery of oil reserves in the USA gave a new impetus to the concentration process of the American industry, generating trusts of such dimension and strength as to threaten public order and the development of the country. The Sherman Antitrust Act is therefore adopted in 1890 and makes the attempt to monopolise the economy by one or more firms a “criminal infringement”.

The attempt to monopolise becomes a criminal infringement because it affects the essence of individuals’ freedom, by constraining freedom rights and therefore, in the above-mentioned Spencerian perspective, create an obstacle to collective dynamics. However, when monopolisation becomes a crime in a country of Common Law, the body of evidence has to be clearly defined. A very precise and detailed analysis of the industry where the crime is supposed to take place is therefore required, highlighting both the environmental conditions and firms’ behaviour, in order to identify the investigated action in that given industry and that given institutional environment.

This triggers a double development of the US industrial economics: first, research aimed at systematically identifying structural, environmental and institutional conditions where anti-competitive behaviour is carried out; and second, research focused on situations of high concentration where nonetheless effective and potential competitive dynamics are maintained. A more operative concept of competition is thus looked for, with respect to both concepts of perfect competition in marginalist theory and free competition in classical theory.

Among the pioneers of these studies, Henry Carter Adams (1851-1921) dedicated to the theoretical study of the monopoly and increasing returns to scale. Adams focused on the identification of natural monopolies, namely market structure in which no competition is possible and therefore public regulation is necessary. John Bates Clark (1847-1938) focused on markets which are efficient although characterised by the presence of trusts, hence excluding the necessity of public regulation (deJong and Shepherd, 2007, p. 147).

This conflict sharpened between 1906 and 1914 –year in which the Clayton Act was adopted. These years are indeed characterised by a number of suits against important trusts, including Standard Oil, American Tobacco and AT&T. American economists divided into “regulationists” and “marketists”: John Maurice Clark (1884-1963) introduced the concept of “workable competition”, namely competition existing despite the limited number of competitors, while George W. Stocking (1892-1975) extensively studied the negative effects of market power (deJong and Shepherd, 2007, p. 187). The contrast between Harvard and Chicago emerged in these years.

Harvard –the first university created in the US, in 1636– was strongly influenced by the German historical school and maintained, together with other universities of the East coast, great attention to an inductive economics open to the analysis of social dynamics. Chicago was created in 1890 by the American Baptist Education Society, with an important financing from Rockefeller, in the same year in which his Standard Oil was attacked by the adoption of the Sherman Antitrust Act. Chicago rapidly focused on theoretical research, with the dominant idea that any public intervention is harmful. This idea was powerfully expressed in *Risk, Uncertainty and Profit* by Frank Knight (1885-1972), who defined the essential lines of what would later be called the Chicago School, which was considered in the Keynesian years as “out-of-stream” but would become dominant particularly in international economic organisations. Two students of Knight, namely Friedman and Stigler, won the Nobel Prize respectively in 1976 and 1982. Stigler had a profound influence on the US industrial economics, developing an alternative approach to that of Bain, thereby maintaining the conflict between Chicago and Harvard.

## 4. The 1930s and the search for a wider definition of competition

The 1930s were called the “years of high theory”. The 1929 crisis had roots in the depletion of the “long century” which World War I had highlighted. There was a need for a new analysis, which was built by a number of contributions that together constituted the basis for an approach to economic analysis which still prevails today in economic thinking.

Marshall’s writings started to be reconsidered in the 1930s in the UK starting from the pioneering work of Piero Sraffa. Sraffa outlined how the consideration of increasing returns was not possible in models of perfect competition and required therefore new models, in a logically coherent paper published in 1926. This line of thought was pursued in the UK by Joan Robinson who developed models of imperfect competition. In the USA in the same year Chamberlin published *The Theory of Monopolistic Competition* (1933). The hypotheses of perfect product substitutability and homogenous production techniques, which were the basis of the marginalist formalization, started to be relaxed. E.A.G. Robinson, a Canterbridgian economist strictly linked to Keynes, had already delineated the bases of such a reasoning in *The Structure of Competitive Industry* (1931) which contributed to the building of the discipline defined as Industrial Economics and inspired some of the above-mentioned works of Andrews especially with the research carried out by Basil Yamey at the London School of Economics and Political Sciences.

The issue of market concentration was examined differently in Europe relative to the US. Rather than defending consumers' interest the idea was to favour the "national interest", hence concentration, to face the competition between countries. An attention to anticompetitive behaviour only emerged in the UK which however before the second world war stressed the importance of consolidating the firms operating in the large market of the British Empire and which were important to support the war effort. After WWII, the issue was the support to large firms which protected market was reducing, in a difficult context not only post-war but also post-colonisation.

The other European countries implemented policies aimed at the nationalisation of the internal market or at least the creation of national champions, both before the War, where explicit theories in favour of monopolisation were developed, and after the War, where the opening of the European market induced firms which had long been closed and protected to face the competition from very large multinationals.

Meanwhile in the US the discussion on the necessity to define rules in order to avoid the monopolisation of the market continued. As previously mentioned, the need for instruments to analyse monopolistic dynamics had already been stressed after the adoption of the Sherman Act which defined monopolisation as a criminal infringement. Precise proofs of monopolisation or competitive behaviour had to be provided to the Court of Justice. This implied in particular the development of a large literature on whether concentration and market power are proofs of monopolisation or not, as well as on the definition of the relevant product and geographical market.

The Clayton Antitrust Act of 1914 already made an important specification. The Sherman Act indeed induced a paradox whereby in order to avoid agreements between the operators on the oil sector Standard Oil had to acquire them all, thereby transforming the trust into an incorporated company with very high market power. The issue of mergers and acquisitions was therefore raised. However there were cases where acquisitions increased efficiency, as for instance if the smallest firms in the steel sector had merged to face the competition of the dominant firm at that time, namely United Steel. Mergers and acquisitions were therefore regulated and this favoured the creation of conglomerates and crossed subsidies.

Analytical instruments to prove the existence of an explicit agreement between firms in a market were developed and refined, given that in the Common Law tradition single cases can become law ("case law"). The main anticompetitive behaviour was identified as the practices aimed at either preventing entry or limiting the independence of rivals, in line with the Harvard school.

In the meantime some studies showed that a market can be efficient even if there is only one incumbent, if that market has no barriers to entry. This is the basis of the theory of contestable markets, defined by Baumol, Panzar and Willig, according to whom the presence of a monopolist in a market without barriers to entry shows that the monopolist is efficient and more apt for survival relative to any potential entrant. This theory has roots in the evolutionary vision of the Chicago school which starts from the American interpretation of Darwin theories. Stigler even argues that the efficient dimension of a firm is that of the firm which survives competition (Stigler, 1983).

In both cases the issue of barriers to entry becomes a key issue in the debate.

Bain carries out his research in this context. He studies at Harvard between 1935 and 1940, but he will maintain coherence with this school even subsequently. While at Harvard he works with Edward G. Mason, who was born in 1899 and was already famous as a pioneer of industrial economics. Mason studied at the Kansas University and did his Ph.D. at Harvard, where he stayed all his life afterwards. Mason defined the first lines of the SCP paradigm between the 1930s and the 1950s, although Bain fully defined it and used it as an instrument for sectoral analysis to be systematically used in antitrust cases. The article of Mason

published in 1939, "*Price and production policies of large- scale enterprises*" (American Economic Review March, 64-74), was quickly recognised as a reference for studies on Industrial Organization. Mason guided a team of scholars including Bain, Caves and Markham, who deeply studied American industry in the 1940s. They realised "industry studies" which influenced research on industry in the whole world. Mason dedicated much time to antitrust policies and was particularly concerned by the lobbying activity of industry on public decision-makers. He also argued that higher firms' size was not always associated with higher efficiency and was against the idea of "workable competition" defined by Clark, whereby mergers could be accepted if they increased efficiency. Mason insisted on the need for a detailed analysis of the impact of the different concentration activities on market power. Both Bain and Mason repeatedly argued in favour of a concept of "operative competition" which stressed the importance of making the productive system dynamic by limiting barriers to entry and favouring new entry.

The influence of Joseph Schumpeter was also strong at Harvard at that time. The Austrian economist (1883-1950) reached Harvard in 1932, a few months before Hitler became Chancellor of the Reich (30 January 1933). His research was already famous. After being Finance Minister of the young Austrian Republic, Schumpeter had developed a theory where dynamic elements were essential, with an important role of the entrepreneur in the competitive process. He published *Business Cycles* in 1939 which developed the research published in the *Theory of Economic Development* of 1911 and remained a reference for scholars of economic dynamics.

Bain examined the issues of competition in the presence of strong dominance by one or more firms, following the debate initiated by E. H. Chamberlin. Chamberlin, after studies in the Universities of Iowa and Michigan, reached Harvard in 1927 to do his Ph.D., where he became Professor in 1937 and stayed until his death in 1967. The name of Chamberlin is associated with "product differentiation" which became an essential part of his *Theory of Monopolistic Competition*, published in 1933, the same year where Joan Robinson published *The Economics of Imperfect Competition*. These studies highlight a variety of oligopolistic behaviours which have effect not only on prices but also on product policies and therefore on firm organisation, overall showing the complexity of firms' strategies on markets and the importance of their internal coherence to implement these strategies.

Berle and Means in fact publish *Modern Corporation and Private Property* in 1932 which, in line with the above-mentioned research, initiate a field of managerial studies which will affect studies in industrial economics.

## 5. Barriers to entry and new competition

Bain provides a synthesis of all these contributions. He centred his analysis on the constraints to free market competition and was led to focus on the concept of barriers to entry. His studies carried out after WWII on barriers to entry created by dominant firms as a limit to effective competition are fundamental. The key hypothesis is that potential competition regulates the behaviour of incumbent firms. In particular, the incumbent firms should adopt competitive behaviour when there is free entry and exit into and from the market (workable competition). The threat of entry should prevent the incumbent from adopting monopolistic behaviour such as raising prices and profit margins. Hence the incentive for the incumbent to create barriers to entry, which Bain outlines in "A Note on Pricing in Monopoly and Oligopoly" (1949, American Economic Review).

Bain publishes an analysis of twenty US manufacturing industries in 1954, on the American Economic Review. He measures scale economies, concentration and entry conditions, distinguishing between minimum efficient scale reached under technical optimality and the effective size reached by the firm thanks to specific strategies. This

extensive empirical study allows Bain to identify the core of a theory which he presents in 1956, where he shows how firms can create strategic barriers to entry by raising capacity, hence the straight relationship between structure and strategies. Franco Modigliani confronts the Bain's book *Barriers to New Competition* (1956) with the book by Paolo Sylos Labini (*Oligopoly and Technical Progress*) published in the same year, in an article published in 1958. Modigliani thus defines the new frontiers of research on oligopoly and lays down the foundation of a new approach to the analysis of strategic interaction in oligopoly<sup>1</sup>.

The crucial point made by Bain is that a firm can act on its capacity and raise size beyond the minimum efficient scale in order to pre-empt entry. This "new competition" identified by Bain is based on the search for monopolistic conditions despite the absence of normative or technical barriers to entry. In other words, it is based on the strategic creation of barriers to entry by filling all market spaces by generating excess capacity. The market is thus made "imperfect" by firms' anticompetitive strategies. This is the synthesis of the Harvard tradition.

The SCP paradigm is however fully defined in the book published in 1959, *Industrial Organization*. According to this paradigm structural aspects of the industry, namely concentration, barriers to entry and scale economies, influence firms' behaviour, such as pricing and advertising. Performance refers to technical efficiency, the relation between prices and long-run costs, size, growth capacity and last, but not least, the social progress derived from these market dynamics: for Bain not only individual profit but also collective performance must be considered in the analysis of competition (II ed. 1967, pp. 11-12).

After declaring himself as "behaviourist" (II ed., 1967, p. Vii), namely scholar of firms' behaviour, Bain puts this behaviour into a specific (historical) context, where structural elements influence individual behaviour, but he also stresses that behaviour can also influence structure by creating barriers to entry, thereby making the paradigm dynamic (deJong and Shepherd, 2007, p. 224).

In the following book, *International differences in industrial structure* (1966), Bain confronts the industrial structure of 8 countries, namely Canada, the UK, Japan, France, Italy, India, Sweden and the US, thereby initiating a method for comparative analysis based on data and statistics which will become important much later with the development of the new economic geography.

Lastly, Bain re-considers and deepens his analysis of price determination in oligopolies in cases of significant scale economies, high product differentiation or vertical integration, in *Essays on Price and Industrial Organization* (1972). This book confirms the vision of Bain whereby industrial structural elements and firms' behaviour interact in a dynamic process.

## 6. The relation between theoretical analyses and empirical studies and the identity of the discipline

In all his work Bain carries out both theoretical reflection and empirical analysis, avoiding both descriptive simplification and marginalist abstraction. Bain looks for new theoretical results, but he continuously confront them with the reality of facts, searching for a method of applied economics where theories are never a priori assertions but always hypotheses to empirically check. Thus Bain writes in *Industrial Organization*:

Although I have depended strongly upon received economic theory for concepts and hypothesis... the present work is definitely not one in a priori price theory. The emphasis is directly on empirical study concerning issues raised by such theory, or

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<sup>1</sup> Sylos Labini studied at Harvard together with Schumpeter and subsequently went to the UK where he was strongly influenced by Andrews. In the next generation of economists, Romani Prodi had the first chair of Industrial Economics and Policy in Italy, after studies in London together with Yamey and in Harvard where he was visiting professor and published *Concorrenza dinamica e potere di mercato* (1967), where the Harvardian influence is clear.



on the implementation, application and critical testing of such theory. (II ed.1967, p. viii)

A similar affirmation was made 7 years before by Andrews in the first volume of the *Journal of Industrial Economics*, where Industrial Economics was identified as a specialist subject in the wider field of economics. Andrews outlined that the theoretical basis of the discipline was value theory, which, in the British tradition, rooted pricing in the division of labour derived in the classical tradition.

There is therefore a sort of methodological synthesis in Bain's works, unifying the analysis of industry structure with the analysis of firm behaviour without a priori determinism or behaviourism without constraints. Bain concludes that the results of these industrial dynamics will have to be checked by measuring effective performance. If supernormal profits lasts in the long-run in an industry with no structural barriers to entry or exit, firms strategies will have to be examined in order to explain this situation. In contrast, if prices do not generate supernormal profits in a concentrated industry the reason will be that the potential competition has prevented anticompetitive behaviour.

In the following years this "empiricism rooted in theory" reduces in importance and Richard Caves, successor of Bain at Harvard, referred to industrial structure writing:

Market structure is important because it determines the behaviour of firms in the industry, and that behaviour in turn determines the quality of the industry's performance. (1964, p. 16)

This tendency for determinism was enhanced by the development of econometric techniques which allowed to directly relate firm size and industrial concentration to performance data. The use of the Harvardian approach in antitrust analyses became more mechanical, thereby reducing the analytical flexibility which Bain used in his work, namely the avoidance of a priori theory to focus on the confrontation of theory with the reality of facts.

To this tendency was added in the 1980s the search for a theory of industrial economics by the new marginalist orthodoxy linked to the Chicago school. The emergence of new theoretical instruments and the use of game theory to formalise strategic interaction has led to the almost ignorance of structural data, as they are taken as given. Thus industrial economics was redesigned in a new "a priori" vision of human behaviour which tends to take distance from reality.

It would be useful to go back to the roots of our professional identity in the present context in which there is an urgent need to understand the new production and market dynamics unfolding today. Looking at the long history of our discipline is useful to strengthen its identity, which is otherwise threatened by the academic convulsions that tend to flatten research on orthodoxy rather than undertaking the difficult exploration of a complex reality which rapidly evolves without waiting for the academic melancholy.

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