UNIVERSIDADE FEDERAL DO RIO DE JANEIRO

INSTITUTO DE ECONOMIA

PROGRAMA DE PÓS-GRADUAÇÃO EM ECONOMIA

DIEGO FANGUEIRO VIEIRA

THEORIES OF INDUSTRIAL ORGANIZATION:

A CLASSICAL PERSPECTIVE

RIO DE JANEIRO

2024

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Tese de Doutorado apresentada ao Programa de Pós-Graduação em Economia (PPGE), do Instituto de Economia da Universidade Federal do Rio de Janeiro, como requisito parcial à obtenção do título de Doutor em Ciências Econômicas.

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Rio de Janeiro, 27 de Fevereiro de 2024

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FICHA CATALOGRÁFICA

V658t Vieira, Diego Fangueiro.
Theories of industrial organization: a classical perspective / Diego Fangueiro Vieira. – 2024.
283 f.

Orientador: Franklin Leon Peres Serrano.
Tese (doutorado) – Universidade Federal do Rio de Janeiro, Instituto de Economia, Programa de Pós-Graduação em Economia da Indústria e da Tecnologia, 2024.
Bibliografia: f. 242-283.

1. Organização industrial. 2. Concorrência. 3. Preços. I. Serrano, Franklin Leon Peres, orient. II. Universidade Federal do Rio de Janeiro. Instituto de Economia. III. Título.

CDD 338.6

Ficha catalográfica elaborada pela bibliotecária Bruna Amarante Oliveira CRB/7 – 6602
Biblioteca Eugênio Gudin/CCJE/UFRJ

"[…] *only through the principle of competition has political economy any pretension to the character of a science*."
(Mill, 1948, p. 239)

"*Industrial organization is a field that is in deep intellectual trouble. The source of the trouble is that old textbook theory that we all know so well*"
(Nelson, 1976, p. 732)

"*Nothing in theology or technology ordains that God created the world convex downwards*." (Rosenstein-Rodan, 1984, p. 209)

Agradecimentos

À minha família e amigos.

Ao Franklin Serrano, pela orientação atenta, mantendo o foco analítico e contendo meus excessos “hpeístas”, e ao Fábio Freitas, pela orientação da dissertação, da qual esta tese é uma extensão.

Ao corpo de professores do Instituto de Economia e, em particular, àqueles que têm como preocupação o desenvolvimento de uma teoria micro e macro heterodoxa.

Conforme apontou George Shackle (1967b, p. 23), existe um enorme caráter oral e tácito no conhecimento acadêmico: “Tais fios, que ligam uma mente a outra, podem ser imprecisos. Uma palavra dita por um aluno e repetida pelo professor a um outro, sem que nenhum deles se lembre ou mesmo saiba de todas as circunstâncias; uma conversa superficial ao acaso numa sala de refeições da universidade; uma observação feita em seminário anotada subconscientemente; tudo isto, em grande parte, foge da lembrança das pessoas.”. Neste sentido, a influência do IE-UFRJ na minha formação nestes mais de 10 anos enquanto aluno de graduação, mestrado e doutorado vai muito além do que as referências bibliográficas podem indicar.

Ao CNPq, pelo financiamento provido ao longo do doutorado.

Abstract

This dissertation aims to reclaim and develop the classical approach to competition, centered on the notion of capital mobility. It is argued that this conception of competition can be better understood once it is restored to its original place, the classical theories of prices and distribution. For this reason, the analytical scheme of the classical economists, as revived by Piero Sraffa and his followers, is the backbone of this work. It is recognized, however, that the classical (or surplus) approach is far from complete, so that contributions from the Industrial Organization Theory can be incorporated to enrich this more general theoretical framework. We believe that this integration provides a viable way to bring back classical concepts into a modern context in order to rethink microeconomic theory.

It is contended that limit-pricing is convergent with the classical theory of value, regulated by the dominant techniques of production, and that barriers to entry can be interpreted as cost advantages that give rise to extraordinary profits or "Ricardian" differential rents. We also propose that the neo-Schumpeterian and Kaldorian approaches provide interesting insights into the transformation of industrial structures over time. The incorporation of these contributions regarding the dynamics of mobility barriers' creation and destruction enables an explanation of the evolution of cost structures and associated extraordinary earnings, while maintaining the classical framework as a microeconomic baseline.

Key-words: Industrial Organization, Competition, Barrier to entry, Limit pricing, Prices, Surplus approach, Technical Progress, Structural Change

Resumo

Esta tese tem como objetivo resgatar e desenvolver a abordagem clássica de concorrência, centrada na noção de mobilidade de capital. Argumenta-se que esta concepção de concorrência pode ser melhor compreendida uma vez restituída ao seu lugar de origem, a teoria clássica de preços e distribuição. Por essa razão, o esquema analítico dos economistas clássicos, conforme retomado por Piero Sraffa e seus seguidores, constitui a espinha dorsal deste trabalho. Reconhece-se, no entanto, que a abordagem clássica (ou do excedente) está longe de estar completa, de modo que contribuições teóricas da Organização Industrial podem ser incorporadas de modo a enriquecer este arcabouço teórico mais geral. Acreditamos que esta integração oferece um caminho viável para reintroduzir conceitos clássicos em um contexto moderno, a fim de repensar a teoria microeconômica.

Argumenta-se que o conceito de preço-limite é convergente com a teoria clássica do valor, regulada pelas técnicas de produção dominantes, e que barreiras à entrada podem ser interpretadas como vantagens de custo que dão origem a lucros extraordinários ou rendas diferenciais "Ricardianas". Também propomos que as abordagens Neo-Schumpeteriana e Kaldoriana fornecem explicações interessantes acerca da transformação das estruturas industriais ao longo do tempo. A incorporação dessas contribuições acerca da dinâmica de criação e destruição de barreiras à mobilidade possibilita a investigação da evolução das estruturas de custo e das rendas extraordinárias a elas associadas, mantendo-se o esquema analítico clássico como base microeconômica.

Palavras-chave: Economia Industrial, Concorrência, Barreiras à entrada, Preço-limite, Preços, Abordagem Clássica do Excedente, Progresso Técnico, Mudança Estrutural.

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Introduction

This dissertation aims to recover and develop the classical approach to competition. As the contributions to these subjects are spread across different fields of specialization and streams of thought, a careful selection and combination of theoretical elements is required. Two theoretical references were chosen to pursue this aim: i) the classical theories of prices and distribution, as interpreted by Piero Sraffa and his followers; ii) the Industrial Organization (IO) literature centered on capital mobility and the associated barriers that affect such competitive process.

It is believed that the Sraffian analytical framework can be considered as a more general theoretical framework for non-neoclassical contributions from Industrial Organization Theory and, on the other hand, the classical approach can be advanced and enriched by Industrial Organization contributions that discuss more specific subjects which were not sufficiently highlighted or were not yet addressed by this tradition of thought. Surely, this integration cannot be done automatically nor easily, as it faces some theoretical and methodological obstacles. There are, however, some convergence points which can show that this path is possible and may produce fruitful results.

The attempt to 'organize' the Industrial Organization literature follows two main theoretical criteria: i) the rival conceptions of competition derived from the classical economists (grounded on the degree of capital mobility) and Cournot (grounded on the number of established firms); ii) the contrasting views on the source of extraordinary earnings: the Ricardian one associated with cost-advantages with regards to the dominant technique and the Marginalist one associated with the ability of producers restraining output in order to elevate prices.

1. A history of economic thought approach to Industrial Organization Theory

We believe that to study the history of economic thought is not a mere exercise of erudition (e.g., delving into the classics) or curiosity (e.g., to know the biography of an author), but a pre-condition to adequately comprehend the existing literature of any field of specialization. In this sense, the history of economic thought can be regarded

not only as a branch in itself, but also as a way of approaching different fields of knowledge (Macroeconomics, Development Economics, etc.) taking into consideration the existence of different theoretical lineages.

Having this in mind, this work follows a history of economic thought approach to Industrial Organization theory, examining and evaluating the different schools of thought of this branch of knowledge. There has been a defense of pluralism in economics for quite some time in economics (Caldwell, 1982; Salanti and Screpanti, 1997; Reardon, 2009). The presentation of macroeconomic theory in terms of schools, streams of thought is more common (Snowdon and Vane, 2005; Mair and Miller, 1991; Lopes and Vasconcellos, 2014, pp. 1-15; De Vroye, 2016; Bougrine and Rouchon, 2022), but Industrial Organization textbooks with such proposal are scarce – Reid's *Theories of Industrial Organization* (1987) is a good exception.

It is proposed here that the history of economic thought approach can improve our understanding of the origin and development of Industrial Organization theory (or better, Industrial Organization *theories*), which is often neglected relative to the empirical results. Also, the recognition of the existence of such theoretical and methodological pluralism can shed some light on why economists diverge so much on "microeconomic" (regulatory, antitrust, industrial, commercial, etc.) policies.

Many economists (especially among the heterodox) are willing to accept that "macroeconomic" discussions (for example, monetary and minimum wage policies) reflect theoretical and methodological choices of neoclassical research program. Oddly, few economists face the "microeconomic" discussions (especially with regards to particular markets) with the same intellectual attitude. The different competition models (e.g., monopolistic competition, neoclassical oligopoly and SCP models) are frequently portrayed as a box of tools at the disposition of applied researchers, whose choice depends essentially on characteristics of the specific problem to be solved, which is not subjected to major theoretical (let alone ideological) controversies or disputes.

This positivist narrative of the marginalist apparatus as a neutral tool (which goes beyond the use of Marshallian 'supply and demand' curves in Introduction to Economics) is recurrently taught to each generation of economists by microeconomics textbooks. Unfortunately, part of this reasoning still finds its way into the minds of non-orthodox economists, probably because of the underdeveloped state of heterodox microeconomic theory *vis-à-vis* the heterodox (Keynesian, Kaleckian, Kaldorian) macroeconomic theory.

Sraffa did not consider the value theory as a mere intellectual "tool" (Robinson, 1933, p. 1) or as "an apparatus of the mind, a technique of thinking" (Keynes, 1922, p. v), but as a crucial analytical problem to be tackled, which ultimately led him to a radically distinct understanding of production and income distribution in capitalist economies. As it will be argued, even though Sraffa exposed his ideas in a very abstract way, his framework is not only logically more coherent than the marginalist one, but also presents a general view on technology and competition that is also much more consistent (aligned with the findings of the Industrial Organization literature) with industrial reality.

The interest of the Sraffian approach in capital theory is well known, particularly because of the participation of Sraffa and other important exponents (Garegnani, Pasinetti) in the Cambridge Controversy, who showed the severe deficiencies of the marginalist approach when it is admitted the heterogeneity of capital. Since then, much work has been done to demonstrate that this fragile simultaneous explanation of value, distribution and output still lies at the foundation of the orthodox macroeconomic and growth theories.

Kurz (1990, p. 79) argued that "the theory of capital […] holds the key to the explanation of profits. Since the notion of 'capital' is at the centre of an inquiry into the laws of production and distribution in a capitalist economy, controversies in the theory of capital are reflected in virtually all other parts of economic analysis". The exact same reasoning could be applied to the different conceptions of competition. Unfortunately, this subject received much less intellectual attention, even within the Sraffian tradition. This work wishes to explore and try to diminish this gap. The discussion about the different treatments of competition is placed in a broader context of contrasting theories of value, stressing the different *analytical structures* of the classical and marginalist approaches (Bharadwaj, 1986, p. 2; Garegnani, 1990c).

2. Rival conceptions of competition

Competition is certainly one of the most iconic features of Capitalism. It is intimately connected with the motivation of economic agents, as well as the actions undertaken by them to pursuit those objectives. At the structural level, competition

plays a crucial role in disciplining prices, limiting each sector's profitability and endowing the system with regularity and stability.

Curiously, the process of competition rarely is theme of autonomous theoretical efforts, being usually discussed because of its influence over important subjects such as price determination, income distribution and economic growth. For this reason, it is frequently needed to infer from a specific theoretical formulation the conception of competition which is in use, so that this identification ends up constituting itself as a History of Economic Thought's interpretation exercise.

Competition is not a dichotomous theme, but a matter of degree. Consequently, the distinction between alternative conceptions of competition is an important issue: different conceptions of competition select different theoretical elements to gradate the intensity of competition.

We have chosen to identify two conceptions of competition – Classical and Cournoutian[1] –, which will be used in the remainder of the dissertation as reference points to analyze the history of industrial organization thought. The characteristics of both conceptions of competition will be briefly discussed below.

2.1. Classical conception of competition

In Classical Political Economy, several authors identified properties of the competitive process and stressed its importance for the economic system. Among the pioneers, we can mention Petty, Boisguillebert, Cantillon, Harris and Turgot. The latter even identified that there was a tendency to form a uniform profit rate. It was with Adam Smith, however, that the classical conception of competition was inserted into a more organized theoretical body, connecting it to a theory of price determination (or "value") (Eatwell, 1982, pp. 205-207; Kurz and Salvadori, 1995, p. 39; McNulty, 1967, pp. 395-396; 1987, p. 536).

Smith emphasized the importance of the individual pursuit of gain to the operation of the economy. As it can be perceived by the famous (and controversial) quote "it is not from the benevolence of the butcher, the brewer, or the baker, that we

[1] The models of perfect competition, imperfect competition and oligopoly will not be considered as autonomous conceptions of competition, but rather as specific models that combine one or both of the conceptions here defined with auxiliary hypotheses.

expect our dinner, but from their regard to their own interest", Smith (1776, pp. 26-27) believed that capitalism was justified not by the individuals' motivations, but by its results. The achievement of these favorable results requires, however, that certain competitive conditions hold[2].

With free capital mobility, the migration of capital from less profitable to more profitable activities produce a tendency to the elimination of abnormal profit opportunities and the establishment of a uniform profit rate. This competitive pressure regulates the market prices and ensure that they gravitate around natural prices, which possess systematic determinants and can be explained by economic theory. Hence, competition plays a central role in the regulation of the price system, guaranteeing its viability and persistence[3]. Yet this orderly result does not necessarily imply a full utilization of resources (allocative efficiency) or optimality (Eatwell, 1982, p. 284).

Capital mobility is thus the centerpiece of the classical conception of competition, which does not rely on any hypothesis regarding the number of producers in the markets or their respective market shares. When there is the possibility of entry, established producers cannot enjoy extraordinary profits for long, regardless of their absolute or relative size (Roncaglia, 2009, pp. 121-122).

For Smith (1776, pp. 77-78), supernormal profits accrued from competitive advantages such as the possession of industrial and commercial secrets, the ownership of lands with more fertile soils – such as some vineyards in France – or a monopoly granted to an individual or to a trading company. The existence of obstacles to capital mobility – barriers to entry in Industrial Organization's terminology – does not contradict the classical conception of competition. In fact, they were conceived

[2] The classical economists did not provide an organized exposition of such conditions, so that the discussion of this subject requires efforts of interpretation. With respect to Smith's analysis of competition, other authors associated it with "rivalry in a race" (Stigler, 1957, pp. 1-2; Backhouse, 1990, p. 59; Salvadori and Signorino, 2010, p. 2). It is even possible to infer a "quantitative" sense of competition from a specific passage in which Smith (1776, pp. 361-362) stresses that the division of capital among a greater number of grocers favors the lowering of prices (McNulty, 1967, p. 397; Tsoulfidis and Tsaliki, 2019, p. 200; Salvadori and Signorino, 2010, p. 2). This passage does not seem, however, strictly Cournotian: not only Smith does not seem to imply a decreasing monotonic relation between the number of competitors and prices, but also the role played by these numbers are more related to the possibility of pricing agreements (collusive practices) than with producers that take the conduct of competitors as given.

[3] This notion of competition was a constitutive part of the classical theories of value and distribution, which followed the long-period method (Garegnani, 1976, pp. 27-28; Eatwell, 1982, p. 203; Petri, 2004, pp. 6-7).

simultaneously (Arena, 1979, pp. 143-144; Eatwell, 1982, pp. 207-208; Roncaglia, 2009, p. 121; Petri, 2020, pp. 16-17).

The identification of barriers to capital mobility enables us to identify limits to the operation of the competitive process, indicating paths for more specific analysis. Many contributions in the Industrial Organization Theory allow us to develop and detail the classical conception of competition, rather than denying it. Here, it is sufficient to recognize that free capital mobility – a hypothesis implied in the "perfect liberty" scenario characterized by Smith (1776, p. 73, p. 79, p. 151) and referred by Ricardo (1817, p. 46) as a situation in which "competition operates without restraint" – is just a particular case (extreme situation) of a more general conception of competition based on *capital mobility*.

The interpretation of the classical conception of competition as capital mobility can be found in the writings of authors from different theoretical affiliations, such as Sraffian (Roncaglia, 1978, pp. 22-23, p. 32; Arena, 1979, pp. 135-136; Steedman, 1984, p. 123; Aspromourgos, 2007, pp. 50-51; Levrero, 2014, p. 74), Marxian (Semmler, 1984a, p. 10; Duménil and Lévy, 1987, pp. 134-136; Shaikh, 2016, pp. 330-333, p. 340) and even Austrian (Machovec, 1995, pp. 1-2).

2.2. Cournotian conception of competition

Antoine Augustin Cournot wrote his most famous book *Recherches sur les príncipes mathématiques de la theórie de richesses* (1838) (translated to English and republished in 1897 under the title of *Researches into de mathematical principles of the theory of wealth*) in a period that the classical theory of value was under attack from Utilitarianism. Cournot's work only was duly recognized after the emergence of the Marginalist Revolution because, in spite of his rejection of the utilitarist conception of

value, Cournot was able to develop a functional[4] relation between price and demanded quantities (Fisher, 1897, p. vii; Roncaglia, 2005, pp. 282-283) [5].

Cournot discussed on Chapter 5 a monopoly of mineral water. Assuming a continuous, differentiable and downward sloped function F(p) – that relates the quantities produced/sold (D) of a particular commodity with its price (p) – and a cost function $\phi(D)$, we arrive at the following profit[6] function for a single producer (Cournot, 1838, p. 47, pp. 49-50, p. 57):

$$\pi = p.F(p) - \phi(D)$$

Solving the maximization problem, we obtain:

$$\frac{\partial \pi}{\partial p} = F(p) + p.\frac{dF(p)}{dp} - \frac{d\phi(D)}{dp} = 0$$

As F(p) = D, we can arrive at the following equations:

$$D + p.\frac{dD}{dp} - \frac{d\phi(D)}{dD} . \frac{dD}{dp} = 0$$

$$D + \frac{dD}{dp} (p - \frac{d\phi(D)}{dD}) = 0$$

Considering that $\frac{d\phi(D)}{dD} = \phi'(D)$ (marginal cost, in a modern definition) is zero, Cournot (1838, pp. 60-61, p. 82) obtains [7]:

[4] The "Law of Demand" enunciated by Cournot (1838, ch. 4) had an eminently descriptive character, as it was not grounded on utility. Later, Jevons (1871) proposed a subjective concept of value but was unable to derive an inverse relationship between price and quantity demanded. Cournot's formulation was particularly important to Marshall in this aspect, enabling him to develop the demand blade of his pair of scissors (Marshall, 1920, p. xxi, p. 290, p. 675).

[5] McNulty (1987, p. 536) and Machovec (1995, pp. 1-2) also stressed that Cournot's work diverted from the classical lineage, proposing an idea of competition which was later developed by neoclassical economics.

[6] Counot (1838, p. 37) referred to profits as "net receipts".

[7] As Shackle (1967a, pp. 16-17, p. 22) pointed out, Cournot (1838, p. 59) was not entirely successfully in defining what we currently call as the monopolist's marginal revenue. Not only Cournot differentiated total revenue with respect to price instead of quantity but also he referred to the increase in the gross receipts (marginal revenue) as "p.dD" instead of "p.dD + D.dp". As we know now, the marginal revenue in a monopoly differs from the market price and it is negatively related to the quantity produced. Although the price-times-increment of output is positive, the increase in production negatively affects the price of every of precedent unit, so that the maximizing decision of the monopolist must take into account the two terms with opposite signs.

$$D + \frac{dD}{dp}.\ p = 0 \quad (1)$$

In chapter 7, Cournot analyzed a duopoly of mineral water. In this case, $D = D_1 + D_2$, where D_1 = quantity of mineral water produced/sold by the proprietor of the spring 1, D_2 = quantity of mineral water produced/sold by the proprietor of the spring 2. The total revenue – Cournot called it *gross receipts* – of each producer is $R_1 = p.D_1$ and $R_2 = p.D_2$, respectively (Cournot, 1838, p. 57, pp. 79-81). Using the inverse demand function $p = f(D_1 + D_2)$, we obtain:

$$R_1 = D_1.f(D_1 + D_2)$$
$$R_2 = D_2.f(D_1 + D_2)$$

Subtracting the costs of production from the revenue received by each producer, the profit functions are given by:

$$\pi_1 = D_1.f(D_1 + D_2) - \phi(D_1)$$
$$\pi_2 = D_2.f(D_1 + D_2) - \phi(D_2)$$

Cournot considered then that each proprietor acts independently, that is, the proprietor 1 does not have any direct influence on the determination of D_2 (all that he can do is to choose – taking D_2 as given – the level of D_1 which is more favorable to him) and the symmetrical condition applies to the proprietor 2 (Cournot, 1838, pp. 79-81). This implies that the choice of production of each producer does not encourage reactions from its rival. Formally, these essential hypotheses permit the use of partial derivative (to calculate optimal D_1 given D_2 and vice versa). Thus, the problem of profit maximization with respect to quantity[8] for each producer becomes:

$$f(D_1 + D_2) + D_1.\frac{d\ f(D_1 + D_2)}{dD_1} - \frac{d\ \phi(D_1)}{dD_1} = 0 \qquad (2)$$
$$f(D_1 + D_2) + D_2.\frac{d\ f(D_1 + D_2)}{dD_2} - \frac{d\ \phi(D_2)}{dD_2} = 0 \qquad (3)$$

[8] As Shubik (1987b, p. 710) remarked "Chapter 7 provides a smooth transformation from single person maximization to noncooperative optimization […] It is at this point that Cournot switches from price to quantity of a homogenous product as the strategic variable used by the competitors".

Assuming that marginal costs are equal to zero[9] ($\phi'(D_1) = \phi'(D_2) = 0$) and that both springs have identical qualities, similarly situated and supply the same market (in such a way that it is possible to consider $D_1 = D_2$), we arrive at the following equations:

$$f(D) + D_1.f'(D) = 0 \quad (2')$$
$$f(D) + D_2.f'(D) = 0 \quad (3')$$

Adding (2') to (3'), we obtain $2f(D) + D.f'(D) = 0$, which can be transformed into:

$$D + 2.p.\frac{dD}{dp} = 0 \quad (4)$$

Comparing equation (4) to equation (1), we notice that the only difference between them is the multiplication of "$p.\frac{dD}{dp}$" by "2". The same reasoning could be applied to a larger number of producers (3, 4, ..., n), so that the respective equations would be $D + 3.p.\frac{dD}{dp} = 0$; $D + 4.p.\frac{dD}{dp} = 0$; ... ; $D + n.p.\frac{dD}{dp} = 0$ (Cournot, 1838, p. 79, p. 82). This showed that that the commodity's price would successively diminish with the increase in the number of firms in the market, which led him to conclude that "[...] the result of competition is to reduce prices" (Cournot (1897 [1838], p. 84). It is possible, therefore, to interpret that the conception of competition underlying Cournot's analysis as the *number of established firms* in a market.

Generalizing for a situation with "n" firms and positive marginal costs, the following system if equations is obtained (Cournot, 1897 [1838], p. 84):

$$\begin{cases} f(D) + D_1.f'(D) - \phi_1'(D_1) = 0 \\ f(D) + D_2.f'(D) - \phi_2'(D_2) = 0 \\ \vdots \\ f(D) + D_n.f'(D) - \phi_n'(D_n) = 0 \end{cases} \quad (5)$$

[9] In his exposition, Cournot (1838, p. 79) eliminated the cost of production from the start, suposing not only that the marginal cost but also the total cost was equal to zero. Thus, his condition of profit maximization was the same as revenue maximization. For this reason, Cournot (1838, p. 81) was able to define the proprietors' profit maximization functions presented in equations (2) and (3) omitting the terms $\frac{d\,\phi(D_1)}{dD_1}$ and $\frac{d\,\phi(D_2)}{dD_2}$, respectively.

Cournot (1838, p. 90) imagined that the individual production (D_i) of each agent i would be insignificant with reference to the total production $\sum_{i=1}^{n} D_i$ = D = F(p) and to the derivative F'(p), so that D_i could be subtracted from D without any considerable variation resulting in the price of the commodity. Based on this hypotheses ($D_i \approx 0$), the equation $D_i + [p - \phi_i'(D_i)].\frac{dD}{dp} = 0$ is reduced to: $p - \phi_i'(D_i) = 0$. Consequently, the system of equations (5) can be replaced by:

$$\begin{cases} p - \phi_1'(D_1) = 0 \\ p - \phi_2'(D_2) = 0 \\ \vdots \\ p - \phi_n'(D_n) = 0 \end{cases} \qquad (6)$$

So, if we envision a scenario in which the number of firms tend to infinity ($n \rightarrow \infty$) and that each one of them responds to a negligible proportion of total output ($\frac{D_i}{D} \approx 0$), then the market price will be equalized to (what we now call) the marginal cost. This situation was labelled as *unlimited competition*, expressing that the virtuous effects of competition reach its maximum.

Cournot, therefore, was not only a pioneer in applying differential calculus tools in Economics and constructing a downward sloping demand curve, but he also proposed an atomistic market structure as a normative view of competition (which later became the benchmark for the economics profession). It was argued here that such situation does not consist of a notion of competition by itself, but rather reflect a particular case of a broader notion of competition grounded on the number of firms established in the market.

3. Contrasting views on the source of extraordinary earnings

It is argued in this dissertation that the classical and marginalist theories of value and distribution distinct analytical structures carry with them different views on the source of extraordinary earnings. The classical approach acknowledges the existence of extraordinary earnings even under the prevalence of the price of production, while the marginalist approach associates their emergence with prices above and quantities below the competitive level.

3.1. The classical theory of value and economic rents

As it is well known, David Ricardo (1815, 1817) was concerned with the *Corn Laws.* These laws prevented that domestic demand was met by imports, encouraging the internal expansion of the agricultural frontier: as the effective demand for corn grew beyond the level of production of most fertile lands, worse lands had to be incorporated. As corn was a homogenous commodity, all producers earned equal revenue per unit of corn sold. This led to the emergence of extraordinary earnings on the inframarginal lands as a result of their cost advantages *vis-à-vis* the marginal land.

David Ricardo argued that the "Corn is not high because a rent is paid, but a rent is paid because corn is high […]" (Ricardo, 1817, p. 80). That is, the increasing rent was not justified by the fact that the landlords existed in a reduced number and were able to impose their monopoly or oligopoly power, making corn more expensive (the price of corn was not high because a rent was paid). In fact, when effective demand could be met only by the production of the most fertile lands, the landlords' income was nil (Ricardo did not identify what Marx later called absolute rent). Only when effective demand outgrew the production of the best lands that it became necessary to occupy lands with less fertile soils. As these lands presented increased costs, higher prices of corn were a requisite to make this additional production economically viable. Accordingly, the owners of the superior lands became able to charge rents commensurate to their cost advantages over the production on marginal lands (a differential rent was paid because the price of corn was high).

In this theoretical formulation, extraordinary earnings are explained by cost advantages that arise from the coexistence of different methods of production (technological asymmetries). Drawing on Serrano (1988, p. 71) and Schefold (1989, p. 203), we argue that this reasoning can be generalized to the majority of commodities produced in contemporary capitalist economies. There are, however, some important differences between the Ricardo's case and the reconsideration of the classical conception of competition proposed along this dissertation:

i) Ricardo described an idiosyncratic situation in which extraordinary earnings stemmed from the limited availability of a non-reproducible element of production and legal restriction on imports, leading to a reduction in overall agricultural productivity (technical regress).

Nevertheless. the more common source of extraordinary earnings in capitalism arises precisely from the reverse process, where profit-seeking firms introduce innovations (technical progress).

ii) Rents stemming from land ownership are paid to landlords, whereas economic rents generated from owning more efficient techniques are acquired by capitalists. Thus, the conflict between rent and normal profits highlighted by Ricardo involved two distinct social classes (landlords and capitalists), whereas normal and extraordinary profits (interpreted as economic rents) are restricted to the capitalist class;

iii) In the situation described by Ricardo, it was not possible to expand production on infra-marginal lands. In the great majority of economic activities, however, owners of more efficient techniques are normally able to do so, although they frequently choose not to because it is economically more advantageous to keep higher-costs competitors in the market.

It is also true that the price *could* be lower if the superior technique was disseminated by means licensing, imitation, industrial espionage and/or other business actions, eventually becoming the new dominant technique. Nevertheless, in a given moment, it is the presence of competitive asymmetries that explains the existence of most extraordinary earnings in capitalist economies.

Having noted these caveats, we can proceed with the analogy that superior methods of production (e.g., improved machinery) give rise to rents much like best lands do:

> "The effects are precisely similar to those which follow from the use of improved machinery at home.
>
> Whilst the use of the machine is confined to one, or a very few manufacturers, they may obtain unusual profits, because they are enabled to sell their commodities at a price much above the cost of production—but as soon as the machine becomes general to the whole trade, the price of the commodities will sink to the actual cost of production, leaving only the usual and ordinary profits.
>
> During the period of capital moving from one employment to another, the profits on that to which capital is flowing will be relatively high, but will continue so no longer than till the requisite capital is obtained." (Ricardo, 1815, p. 25)

3.2. The marginalist theory and extraordinary profits

In the marginalist (or neoclassical) theory, extraordinary profits arise from producers' ability to collectively withhold output, producing less than what the market could absorb in a situation of competitive price. They are therefore related to the creation of "artificial" scarcity or shortage, allowing prices to remain above marginal costs.

In the supply and demand apparatus, higher prices and lower quantities are interconnected. Equilibrium prices above the competitive benchmark are seen as detrimental to consumers: the consumers' surplus is reduced, which is partially redistributed to producers and partially lost due to deadweight (Harberger's triangle). The lower the quantity produced and the less elastic the demand (the steeper the demand curve), the greater this welfare loss will be.

From this perspective, extraordinary profits can emerge even when all producers have access to the *same technology* (production function). If certain producers hold a more significant market share, changes in their output can have more effect on the industry's supply, impacting prices and profits. This exercise of market or monopoly power by dominant firms (ability to restrain the level of production, influencing prices) is thus a key element in the marginalist explanation of extraordinary earnings in capitalist economies. According to this view, a commodity's price is high because the profits are high, and not the other way around.

4. The outline of the dissertation

Once this introduction concludes, the remainder of the dissertation is structured as follows.

The first chapter introduces the classical (or surplus) theories of value and distribution, as reinterpreted by Piero Sraffa and his followers. It also discusses their main criticisms towards the marginalist supply-and-demand approach, both in partial equilibrium and general equilibrium. It is argued that Sraffa's system is not a particular case of general equilibrium, but rather an alternative analytical framework that has different understandings of production, technology and competition.

The second chapter provides an overview of the Industrial Organization field from the first studies in the late nineteenth century to its official birth and consolidation under the hegemony of the Harvard School/SCP approach. It explores the classical and neoclassical elements of the models of competition from both microeconomics and Industrial Organization. The contrasting views on the source of extraordinary earnings are also identified in the post-war Industrial Organization literature.

The third chapter examines the decline of the SCP hegemony and the rise of the neoclassical schools of Industrial Organization Thought (Chicago School, Contestability Theory, New Industrial Organization, and Neo-Austrian approach). Although methodological, empirical, and political factors have also influenced in this mainstream shift, it is interesting to observe that the theoretical tension between the rival conceptions of competition became particularly evident in this period.

The fourth chapter proposes the integration of contributions on mobility barriers from Industrial Organization to the surplus approach to value and distribution. It is argued that it is possible to acknowledge the presence of competitive asymmetries among producers while maintaining the essential features of the Sraffian framework. At the heart of this proposal lies the classical conception of competition and the view that extraordinary earnings stem from the coexistence of techniques of production.

The fifth chapter evaluates some of the Sraffian and Marxian interpretations of the competitive process. Within the Sraffian perspective, the influential article by James Clifton (1977) is analyzed. Within the Marxian perspective, the Monopoly Capital School (Hilferding, Baran, Sweezy, among others) and a few of its critics are presented. It highlights the similarities between the interpretation developed in this dissertation and Anwar Shaikh's classical-Marxian theory of real competition. It also discusses the concept and circumstances for the validity of monopoly price in the classical theory.

The sixth chapter asserts the compatibility between the classical theory of value and distribution and the Schumpeterian/Kaldorian views of technological progress and productivity growth. It is considered that these contributions draw attention to "dynamic" aspects of competition which can enrich the classical depiction of competition. From this viewpoint, the central feature of capitalist competition becomes how barriers to mobility are created and destroyed by companies and/or the State and how the associated income is appropriated.

Chapter 1 – The classical approach to value and distribution

1.1. Introduction

This chapter presents the classical analytical schema, whose rehabilitation can be attributed mainly to the efforts of Piero Sraffa and his followers. It is argued that the classical framework is able to express industrial interdependencies and to determine prices and distributive variables in a logically consistent way, consisting of an alternative to the supply-and-demand approach to value and distribution.

The next section briefly examines Sraffa's path from his early dissatisfactions towards partial equilibrium analysis to his incisive assertion during the Symposium *Increasing Returns and the Representative Firm* that Marshall's theory should be discarded (Sraffa, 1930, p. 93). It is suggested that, by that time, Sraffa had already rejected central features of the marginalist theory, regretted his own reformist positions of the 1925 and 1926 articles and had already initiated the return to the classical economists that culminated in the *Production of Commodities by Means of Commodities* (1960).

The third section expounds the basic methodological and theoretical assumptions underlying the classical (or surplus) framework, which were clarified by the Sraffian tradition. It is argued that the classical and marginalist approaches to value and distribution have different understandings of production, technology and competition. The recognition of such divergences helps to show that Sraffa's system is not a particular case of general equilibrium, but an alternative analytical framework that provides a completely distinct explanation of how markets work.

The fourth section discusses the classical theories of value and distribution. It is presented Sraffa's system of equations as the solution for determining relative prices and the general rate of profit. The process of gravitation of market prices towards such long-period equilibrium prices are discussed through a schematic representation, there including some possible patterns for disequilibrium prices.

1.2. Sraffa's early dissatisfactions towards the marginalist theory

1.2.1. Sraffa's critiques of partial equilibrium analysis

In two articles, Sraffa (1925, 1926) questioned the logical consistency of Marshall's theory, arguing that the law of non-proportional (diminishing and increasing) returns was incompatible with the conception of partial equilibrium and/or perfectly competitive conditions. We will attempt to outline the main points of criticism to Marshallian economics developed throughout these works, without attempting to fully address the intellectual changes that the author went through in this period (*i.e.*, differences between the original article in Italian and the subsequent one in the *Economic Journal*). Before doing so, it is worth to recapitulate some basic assumptions underlying the Marshallian partial equilibrium analysis.

In the marginalist approach, consumer preferences/tastes, technical conditions of production and endowments of factors of production[10] are exogenous variables and the equilibrium prices and quantities are endogenously determined (Eatwell, 1977, p. 62; Garegnani, 1990c, p. 114). The distinctive feature of partial equilibrium analysis[11] lies in the fact that it focuses on examining the price and quantity of a particular commodity, while holding constant the prices and quantities of all the other commodities.

The industry's demand curve is deemed to be continuous and negatively sloped (which we now know that preferences must be complete, transitive, strictly convex and that there cannot be strong income effects/Giffen goods). The slope of the industry's supply curve depends on the 'law of returns' prevailing at the industry: it is negatively sloped in the case of increasing returns and positively sloped in the case of diminishing returns[12].

[10] It is worth remembering that technology and preferences must have particular characteristics to generate sufficient direct and indirect substitution and capital must be homogenous so that the main results proposed by the marginalist theory can hold.

[11] Partial equilibrium can thus be considered as a "part" of the General Equilibrium. As De Vivo (1992, p. 80) remarked, "Marshall had formulated a general equilibrium system independently of, and probably earlier than, Walras. In fact, not only did Marshall sketch out a general equilibrium system in Note XXI of the Mathematical Appendix to the *Principles*, but a fragment from his early writings, which Whitaker published (1975, pp. 161-4), attributing it to the earlier part of the 1867-74 period, already contains what is in fact a general equilibrium system."

[12] The assumptions of technology and consumer preferences, as well as potential stability problems in the partial equilibrium resulting from cobweb processes (Kaldor, 1934c), will not be discussed here.

It is possible identify four main hypotheses (or sets of hypotheses) underlying the analytical procedure of partial equilibrium:

H.1. Independence between the supply and demand curves of the particular markets (they must have distinct determinants, 'costs' and 'utility', respectively).

H.2. Independence between the two curves of the particular market and the curves from all the other markets (which implies that the impact of a change in production in one industry must be negligible for all other industries).

H.3. Variations in quantities must be modest and to take place in the neighborhood of the equilibrium position[13].

H.4. Markets are perfectly competitive. This definition is not consensual[14], but here we will adhere to the conventional logic that individual producers have negligible influence on total production (at the limit, the firm's demand curve is infinitely elastic, horizontal).

The sets of hypotheses H.1-H.3 are more connected with the validity of the *ceteris paribus* clause, while H.4 concerns the conception of competition in use. The internal logical consistency of using these assumptions in the context of partial

[13] As Marshall stressed repeatedly, partial equilibrium analysis is valid only for *slight* variations in the neighborhood of the equilibrium position (Sraffa, 1925, pp. 39-40): "It has already been remarked that the ordinary demand and supply curves have no practical value except in the immediate neighbourhood of the point of equilibrium. And the same remark applies with even greater force to the equation of derived demand" (Marshall, 1920, p. 328). Unfortunately, microeconomic textbooks do not warn readers of this limitation of the partial equilibrium apparatus.

[14] Post-Marshallians argue that Sraffa was unable to understand Marshall's rich analysis about competition and that many of his criticisms should had been directed to Pigou and other Marshallians that reinterpreted and modified Marshall's original analysis (for example, O'Brien, 2006, p. 626; Raffaelli, 2001, p. 124). Some Sraffians identify a line of continuity between the articles from 1925 and 1926 and the book from 1960 (Panico, 1991; Panico and Salvadori, 1984), while other Sraffians identify a rupture (Clifton, 1977; Mongiovi, 1996; Garegnani, 2005). We are unable to fully address this topic here, but our general opinion is that the 1925 article seems more Pigouvian, while the 1926 article is more Marshallian and the 1960 book is strictly Classical. In the 1925 article, Sraffa defines perfect competition as price taking behavior and even cites Pigou's 'simple competition'. He also developed the U-shaped cost curve because, given the definition of competition adopted then by him (perfectly elastic firm's demand curve), the equilibrium of the firm would be indeterminate under constant costs (Sraffa, 1925, p. 29, pp. 31-32). In the 1926 article, Sraffa (1926, p. 546) proposed the idea that firms face particular markets, which is one of the key aspects of the Post-Marshallian interpretation of Marshall original analysis (see Reid, 1987, ch. 5). In the 1960 book, Sraffa attempted to revive the classical approach and to purge the marginalist remnants from economic theory (including both Marshallian and Pigouvian analyses).

equilibrium with non-proportional returns was contested by Piero Sraffa in these two articles, which we will discuss henceforth.

a) Critique of the origin of the "law of returns" and to their use in the construction of a supply function

The Italian author begins his critique pointing out that the concepts of increasing and diminishing returns had been displaced by Alfred Marshall (1890) from the original formulations of the classical economists to coin a law of non-proportional returns. The motivation behind this change was to build a functional relationship between the cost of production and the quantity produced in particular markets (*i.e.*, to develop an industry supply curve) (Sraffa, 1926, p. 537).

Adam Smith (1776) had noticed that the division of labor spurred the growth of productivity in manufacturing production due to the improvement of the workers' skills, the stimulus to the invention of new machinery or tools to ease the execution of specific tasks and the reduction of the time wasted with the displacing or exchanging tools by each worker (Smith, 1776, p. 17). Considering that the extent of the division of labor depended on the absolute size of the market, Smith envisioned dynamic, non-reversible interactions between capital accumulation, division of labor and general productivity[15] (a process which was not confined to particular markets) (Sraffa, 1925, pp. 2-3; Sraffa, 1926, p. 537; Sylos-Labini, 1985, pp. 57-58)

David Ricardo (1815, 1817), in turn, was concerned with the *Corn Laws* which prevented that domestic demand was met by imports, thus encouraging the expansion of the agricultural frontier towards less fertile lands. Considering corn as a homogeneous product and assuming the profit rate to be uniform, the price of corn is determined by the "most unfavorable" conditions of production, the marginal land (that presents the highest cost), and the infra-marginal producers (who have more fertile lands) obtain a "premium" between the price (which includes a uniform rate of profit) and their own cost, which is treated as a differential rent. Following this reasoning, the *Corn Laws* would have given rise to a distributive conflict between landowners (who benefited from the increasing differential rent) and capitalists (who suffered from the fall in the rate of profit as the agricultural frontier expanded incorporating worse lands).

[15] Although it is possible to associate it with the division of labor within a plant or factory (such as Adam Smith's pin factory example) (Roncaglia, 1991, p. 377).

According to Sraffa, Marshall had appropriated these ideas of very different origins and natures – the Smithian associated with the production and accumulation of capital and the Ricardian related to the income distribution between social classes[16] – to build a functional relationship between cost and quantity produced (negative in the first case and positive in the second) (Sraffa, 1925, p. 19, pp. 37-38; 1926, pp. 536-537). These contributions from the classical economists have been reinterpreted to allow the construction of a supply curve that, together with the demand curve, to determine equilibrium prices and quantities in a particular market. Only in this way, Marshall could put himself in a conciliatory position between the classical tradition (supposedly conserved in the supply curve) and the utilitarian tradition (which underpinned the demand curve), proposing an allegedly more general theory.

Even though Sraffa's criticism of Marshall is generally correct, the distortion of the "law of diminishing returns" has taken a much longer and more tortuous path than Sraffa realized[17]. From the death of David Ricardo to Marshall's "Principles", several authors discussed the subject, changing successively what was understood about the alleged "law".

For Ricardo, "diminishing returns" were associated with the limited availability of better-quality land, driving the occupation of less fertile land as the demand for corn increased (extensive expansion of the agricultural frontier)[18]. Lands of different fertility therefore presented different productions when combined with equivalent doses of capital and labor (Iglesias, 1988, pp. 18-19; Tolipan, 1990, p. 30). In this way, the "law of diminishing returns" is associated with the *heterogeneity* of the land, keeping the proportion between labor and capital unchanged. Moreover, for Ricardo, the occurrence of "diminishing returns" did not result from any universal law of nature but from a law

[16] Sylos-Labini (1985, pp. 54-61) argued that the Smithian and Ricardian laws of returns reflected not only the scope and the main interests of their eanalyses, but also differences between their theories of value, particularly the standard of value that each author had chosen. Also, the classical laws of returns were conceived dynamically, in the sense that represented a sequence over time of dated quantities. As time is unidirectional and irreversible, so are the classical 'laws of returns'. The marginalist theory, on the other hand, make use of the 'laws of returns' in a static context, as a series of logical variations at the margin independent of time, to draw a monotonic, continuous and reversible supply schedule in a bi-dimensional (price-quantity) space.

[17] In this aspect, we are referring particularly to the 1926 article. In the subsequent years, Sraffa changed considerably his mind, as it will be discussed in 1.2.2.

[18] To be more precise, Ricardo also discussed the intensive rent case associated with the utilization of techniques that use less land per unit of product when the supply of this non-reproducible natural resource is taken as fixed to the whole community (Ricardo, 1815, p. 14; Bharadwaj, 1986, pp. 40-42; Bharadwaj, 1989, p. 226; Fratini, 2010; Serrano, 2010a). In this sense, it would be a mistake to peremptorily associate the extensive case with classical theory and the intensive case with marginalist theory.

enacted by the Parliament (*Corn Laws*), which would cease to produce its pernicious effects once repealed (Sraffa, 1925, pp. 13-14; Pasinetti, 1999, pp. 9-10).

Nassau Senior and John Stuart Mill were the main authors responsible for the transition from the classical "laws of returns" to the ones used by Marshall. Senior diverted the discussion of "diminishing returns" from applying equal doses of capital and labor to quality land (extensive margin) to the addition of successive doses of capital and labor to the same piece of land (intensive margin). J. S. Mill, in turn, limited "increasing returns" to a change in the scale of production of a specific commodity, distancing himself from the Smithian notion of "increasing returns" arising from general progress (Iglesias, 1988, p. 15, pp. 18-19, pp. 23-25; Sraffa, 1925, p. 19)

Nassau Senior and John Stuart Mill (as well as his father, James Mill) also considered the "law of returns" within a given state of technology, neglecting the possibility of discovering new materials, improving machines, among other factors that fulfilled an essential role in Adam Smith's "increasing returns". The "original sin" of the hypothesis of the absence (or, better, slowness) of technical progress must be attributed, however, to David Ricardo, who assumed that technical progress would not be enough to counteract the tendency towards "diminishing returns" in agriculture, thus producing a tendency for the rate of profit to fall (Sylos-Labini, 1985, p. 58; Pasinetti, 1999, pp. 2, pp. 9-10).

In short, by the time Marshall wrote his *Principles*, the "law of returns" had already been completely distorted: associated with the intensive margin, confined to the production of a particular commodity and under the assumption of a constant technology. The author's innovation was to use it to build a supply curve that determines, together with the demand curve, the equilibrium price of a commodity just as "two blades of scissors cut a piece of paper" (Marshall, 1920, p. 290). Only then, the law of returns was finally used to substantiate a theory of prices (Sraffa, 1925, pp. 20-21).

Finally, it was up to the marginalists contemporary to Marshall (Knut Wicksell, John Bates Clark, among others) to generalize the "law of diminishing returns" (associated with the application of successive additional doses of a variable factor to a fixed and already fully employed factor) to any (homogeneous, by definition) "factor of production" (Pasinetti, 1999, p. 12). This last step was crucial to expand the validity of such 'law', originally restricted to agriculture, to all economic activities (there including manufacturing), making it 'universal'.

b) Critique of the incompatibility between partial equilibrium and the assumption of non-proportional (increasing and decreasing) returns

These internal criticisms to the Marshallian partial equilibrium have considerable destructive effects, as they expose the logical inconsistencies of such theoretical apparatus. They are, however, less emphasized, particularly in the Industrial Organization literature which usually jumps directly to Sraffa's more 'constructive' remarks in the end of his 1926 article. Here, we will examine these critiques in more detail.

To begin with, it is worth to underline that the 'law of diminishing returns' occupies a central role in the marginalist view on the market mechanism, underpinning an 'harmonic' theory of distribution, tendencies to full employment of resources, fragmented markets and global income convergence. In other words, the conception of Economics as the 'Science of Diminishing Returns'[19] is crucial to keep asymmetries of technology, income, wealth and power apart from the main body of economic theory that discusses the workings of firms, markets, national economies and the international system.

Regarding partial equilibrium analysis, which we are more interested now, the 'law of diminishing returns' was essential to the construction of a supply curve symmetrical to the already existent demand curve in order to attain a 'geometrical' theory of value consisted of two opposite and independent forces. To examine the logical incompatibility of 'diminishing returns' (increasing costs of production) with partial equilibrium analysis, we will distinguish between two types: pecuniary and physical.

Pecuniary diminishing returns occurs when increases in the quantity produced of a particular commodity pressures the market for the variable factor of production, raising its price. If such factor is used by other industries, their supply curves are also affected, thus violating H.2. With the alteration of supply curves, the prices of these commodities change. The modification of relative prices then brings about a revision of consumers' decisions, so that the position and/or slope of the demand curves are also affected – there including the one from the original particular market (violating H.1).

[19] The expression was borrowed from Rosenberg (1992).

Therefore, aside the very rare cases in which the particular industry uses all of the limited factor of production[20], pecuniary diminishing returns give rise to a generalized interdependence that undermines the partial equilibrium analysis (Sraffa, 1925, p. 40; 1926, pp. 538-540; Crespo, 2008, pp. 51-52).

Physical diminishing marginal returns, in turn, are the consequence of assuming the addition of successive incremental doses of a variable factor to a fixed (and already fully employed) factor and a multiplicity of methods of production with slightly different factors-ratio. In this case, the marginal product of the variable factor can be considered to be positive, although decreasing[21]. The changes in the methods of production in use will be reflected in an alteration of the proportion between the factors of production (*i.e.*, in the technical coefficients).

Sraffa remarked that this type of diminishing returns was incompatible with a long period partial equilibrium analysis. In the short period, the existence of a fixed factor may give some justification for the existence of *marginal* diminishing returns (Sraffa, 1925, pp. 21-22, pp. 38-39). However, in the long period, by definition, all factors can be increased[22].

The industry's productive capacity can be expanded by investments in new buildings or machinery, while specialized labor can be hired by offering higher wages,

[20] It is important to stress that not only the variable factor of production, but also the commodity itself from the considered particular market cannot be used as an important input in other markets [this reasoning is less precise because it depends on the critiques to the one-way avenue that leads from 'Factors of production' to 'Consumption goods' and of capital as an independent 'factor of production', which were only fully elaborated in 1960]. Otherwise, changes in the price of such commodity affect the supply curves of other markets, bringing the already mentioned destabilizing interdependence. In this way, partial equilibrium analysis cannot be employed for examining commodities which are used in a variety of industries (which Sraffa later called basic commodities). Contradictorily, the case of raw materials (agricultural and mineral products) are the most common textbook examples to justify the existence of diminishing returns and to present the curves of "supply" (upward sloped) and "demand" (downward sloped) as the basic tools of the economists.

[21] As Serrano and Cesaratto (1997, p. 4) have elucidated, "the utilization of additional quantities of a factor inevitably requires a change in the production method in use. This change will be in the direction of a method that has the disadvantage of having a lower product per unit of the factor that is varying, but at the same time uses proportionally less of the other factors, so that it becomes possible to increase production. In fact, if it were always possible to automatically ensure parallel expansion of the quantities of all the other factors, the economy would continue using the same constant returns to scale methods on a larger scale. On the other hand, if several methods using different proportions of the factors were not available, the marginal product of an additional unit of a single factor would be zero, once full utilization is reached of the factor that is given."

[22] It is worth noticing that Sraffa is concerned with the long-period and does not consider the existence of any fixed factor of production at the level of the firm. The idea that entrepreneurship or managerial skill would constitute a fixed factor, defining a single optimal size of the firm, was not discussed by this author (Tolipan and Guimarães, 1982, p. 7). To deal with this issue, we would have to refer to the Industrial Organization literature about the theory of the firm.

benefits and/or better working conditions. A particular industry can always dislodge factors[23] from other industries and increase its production under at least constant returns to scale. Physical diminishing returns can thus only arise in a general equilibrium context (which Sraffa considers as a more consistent theoretical alternative in the end of the 1925 article), where the endowment of factors is exogenous and cannot be bypassed by the actions if the industry's firms (as they depend on the aggregate supply of savings and labor).

Increasing returns can be divided into three categories: i) external to the industry; ii) internal both to the industry and the firm; and iii) internal to the industry but external to the firm.

In the case i), if the industry in consideration appropriates an appreciable share of the total resources that give rise to external economies, an increase in the quantity produced will lead to decreasing costs not only in the particular industry but also in other industries, thus affecting their supply curves (violating H.2, and, consequently, H.1). But if the industry holds a small part of these resources, then it must undergo a great change in production to attain such economies, thus infringing H.3 (Sraffa, 1925, pp. 43-45)[24].

The case of increasing returns internal to the firm and the industry (ii) is compatible with partial equilibrium analysis, but requires abandoning the assumption of

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[23] If it its considered that the fixed factor can be drawn from other industries to a particular industry: either the industry's share of the common factor is negligible and an increase of its usage does not affect the average costs of the commodity itself and the cost of other commodities (so that costs should be considered constant); or the industry's share of the common factor is considerable and changes in the particular industry's demand for it affects the costs of other industries (thus making unfeasible the partial equilibrium analysis) (Sraffa, 1925, p. 41; Clifton, 1977, p. 139; Mongiovi, 1996, p. 211). Anyhow, diminishing returns and partial equilibrium are mutually exclusive.

Sraffa (1925, pp. 21-22) argued that while the industry demand curve could be constructed by a simple algebraic sum of the individual demand curves, the industry supply curve could not be built in the same way under diminishing returns. This occurs because the quantity of the fixed factor is constant for the totality of the producers, but the single producer can increase or decrease its quantity. Therefore, a change in the number of producers (and/or the distribution of the common fixed factor among them) can alter the industry supply curve. Sraffa also remarked the importance of assuming that the number of producers is fixed (which we called as the Cournotian conception of competition) for deriving a functional relationship between cost and the industry's quantity produced.

[24] "For example, it is going too far to suppose that a small increase in production of *one* among many commodities can have as a result such an improvement in means of transportation that in its turn reacts in such a way as to make the price of that same commodity decrease. Yet, if that did happen, the prices of all other commodities would decrease at the same time […] It seems probable that there must be very few cases indeed of external economies which can be introduced as a consequence of a variation - not a very large one - in the size of an industry." (Sraffa, 1925, p. 45)

competitive markets: there is an unceasing incentive for the firm to increase its quantity produced – decreasing its unit costs and gaining market share – leading to market monopolization, thus defying H.4 (as it will be discussed, Sraffa suggested discarding this hypothesis at the end of the 1926 article) (Sraffa, 1926, pp. 540-541)[25].

The only situation in which partial equilibrium and perfectly competitive conditions are compatible is the case in which increasing returns are external to the firm but internal to the industry (iii). This is, however, the most unusual case[26], as external economies to the firm (institutions for training the workforce, research institutes, communication and transport systems, etc.) usually affect more than one industry simultaneously, as most cases of 'Marshallian industrial districts' (Sraffa, 1925, pp. 43-44; 1926, p. 540).

Furthermore, the improvements associated with external economies "cannot be taken into account in a theory that contains among its premises perfect competition, that is, which presupposes, right from the start, a perfect organization of the markets" (Sraffa, 1925, p. 44). That is, they are incompatible with H.4.

c) Critique of the identification of industries according to the 'law of returns' which they are presenting and to the very definition of industry

In addition to the already mentioned problems of logical incompatibility between the "laws of returns" and the partial equilibrium, Sraffa pointed out that there is a considerable degree of ambiguity in the application of such "laws". An expansion of the iron industry as a whole, for instance, will more likely be restricted by the amount of available iron ore than the isolated expansion of the industries of wrought iron, steel or cast iron. An increase of overall agriculture production will sooner face constraints of land or fertilizers than the specialized production of fruits, vegetables or grains. The same reasoning would apply if we disaggregate Marshall's tea market into white tea, green tea, black tea, etc.

[25] As Shackle (1967, p. 11, pp. 13-14) remarked, Sraffa faced the dilemma that had been previously recognized by Cournot (1838, pp. 91-92) and Marshall (1920, p. 380, footnote 1; p. 701, note XIV): the incompatibility between economies of large scale and unlimited competition.

[26] As Sraffa (1931, p. 121) posteriorly remarked in his manuscripts "These limitations restrict so much the field of application of external economies to the supply curve that it is not surprising we should find such a small number of real examples of ext. econ. in textbooks (… and lectures!)."

The wider the scope of the industry, the greater the chance that the expansion of production will be restrained by the fixity of a factor of production, inducing producers to add successive marginal doses of the variable factor to the already full employed one, thus obtaining diminishing returns. In other words, the lower (higher) the chosen level of aggregation, the more likely that the industry presents increasing (decreasing) returns: the choice of which "law" to use (increasing or diminishing returns) is arbitrary, as well as the very definition of "industry" (Sraffa, 1926, p. 538).

Hence, there is no univocal way to classify the economic activities into industries with increasing or diminishing returns (Clapham's empty boxes cannot be adequately filled), contradicting the alleged generality of partial equilibrium analysis. 'Supply' and 'demand' can no longer be considered as a simple tool to guide empirical researches with only minor adaptations, as the configuration of such apparatus (slope and position of the curves) varies considerably accordingly to the demarcated research object[27].

d) The need to abandon the law of non-proportional returns

Having demonstrated on numerous grounds the inconsistencies associated with the laws of non-proportional returns, Sraffa opted to assume constant returns to scale (horizontal supply curve) as the general case, thus preserving the *ceteris paribus* clause and the validity of partial equilibrium analysis. He also remarked that the assumption of proportional returns meant an abandonment of the marginalist view that prices and quantities of equilibrium are determined simultaneously by the interaction between functions of supply and demand and a return to the "old and now obsolete theory" of the classical political economists in which prices are dependent on the costs of production alone and quantities are determined by demand (Sraffa, 1926, pp. 540-41).

[27] It should not be inferred from this that only inter-sectorial analyses (such as the one carried out by Sraffa in 1960) are acceptable. Surely, more specific, sectoral analyzes are incredibly valuable. The problem is to believe that it is possible to explain the industry's price and quantities by the interaction of supply and demand curves. Despite Sraffa's demolishing criticism from almost a century ago, this apparatus of supply and demand continues to be taught in microeconomics textbooks, being recurrently inserted in the subconscious of each new generation of economists. In this way, we must make an effort of "economic psychoanalysis" to purge the image of the Marshallian cross from our minds. The marginal method (or 'marginism') and the geometrical representation are so pervasive in Economics that positively and negatively sloped supply and demand curves, respectively, are even used to represent markets (money, foreign currency, real estate) in which the principle of substitution in consumption and production (the basic marginalist explanation of how *commodities'* markets work) is not fully operative.

The assumption of constant returns may seem, however, somewhat contradictory with his recognition in the same article that "everyday experience shows that a very large number of undertakings – and the majority of those which produce manufactured consumers' goods – work under conditions of individual diminishing costs" (Sraffa, 1926, p. 543). This issue was tackled in a letter to Keynes on June 6, 1926, in which Sraffa expressed his lament that his 1925 article had been misunderstood:

> "The conclusion has been misunderstood and take to imply that in actual life constant returns prevail: although I believe that Ricardo's assumption is the best available for a simple theory of competition (*viz*. a first approximation), of course in reality the connection between cost and quantity produced is obvious. It simply cannot be considered by means of the system of particular equilibria for single commodities in a regime of competition devised by Marshall". (Sraffa *apud* Roncaglia, 1978, p. 12, emphasis in original)

The acid, ironic and profoundly analytic Sraffa's writing style may give the wrong impression that he was a fierce anti-Marshallian at that time. In fact, the opposite was true: Sraffa (1925, 1926) sought the necessary conditions for guaranteeing the logical consistency of Marshallian partial equilibrium analysis in order to preserve it. Also, his interpretation of the classical theory of value as an equilibrium between a downward sloped demand function and a horizontal supply function follows the same reasoning as Marshall (1920, Appendix I) (Roncaglia, 1991, pp. 377-378; Mongiovi, 1996, pp. 212-123; Garegnani, 2005, p. 475). We must, therefore, be cautious not to develop an anachronistic interpretation of Sraffa's early intellectual production.

e) The need to abandon perfect competition

The assumption of constant returns to scale (horizontal supply curve) produces, however, an undefinition for the firm's size. Without diminishing returns (increasing costs) there is no way to guarantee both the existence and uniqueness of equilibrium in perfect competition (horizontal firm's demand curve) (Sraffa, 1925, p. 24, p. 31).

The solution proposed by Sraffa in the 1926 article consisted of considering that each firm possess a particular market, a subdivision of the general market for the commodity, relaxing the hypothesis H.4. The main reason for the existence of a series of distinct sub-markets is *lato sensu* product differentiation (e.g., quality of the product, design, marketing, reputation, proximity, custom).

Firms are thus benefited from a monopolist position (although more modest than the Marshallian case of 'absolute monopoly'), being able to explore a negatively sloped individual demand curve due to the preservation of a clientele. In this way, Sraffa managed to conceive an equilibrium of the firm even when there are increasing returns at the firm level (firm's individual supply curve is descending)[28], but also discarded a tendency towards market monopolization as there are obstacles between the various segments of the market (diversification requires incurring in additional marketing expenses[29]). The growth of the firm is fundamentally constrained by the demand side (inability of selling higher quantities without charging lower prices), rather than the supply side due to the occurrence of "diminishing returns" (inability of producing larger quantities except at increasing costs) (Sraffa, 1926, pp. 542-546).

In addition of being a precursor of the imperfect or monopolistic competition theory (an influence which was recognized by Joan Robinson, but denied by Edward Chamberlin), Sraffa suggested many ideas that were later developed in the Industrial Organization literature, such as the 'kinked demand curve' (Hall and Hitch, Sweezy), the principle of increasing risk (Kalecki), the notion of barriers to entry (Bain, Sylos-Labini) and even the importance of active forces which produce permanent and cumulative effects (Schumpeter) (Sraffa, 1926, p. 542, pp. 547-550; Tolipan and Guimarães, 1982, p. 10)

1.2.2. Sraffa's turns of position in the late 1920s

Although the 1925 and 1926 articles show that Sraffa had already a sympathy towards Classical Political Economy, his reasoning was still marginalist, as it can be perceived by Sraffa's: i) uncritical acceptance of the demand curve as a result of the

[28] In the following sub-section, we will discuss "Sraffa's disillusionment with his original idea of generalized monopoly as the link between supply-and-demand and increasing returns" (Dardi, 2001, p. 129).

[29] The recognition of advertising and selling expenses introduces additional difficulties in conceiving supply and demand as independent each another. Although Sraffa did not mention it in the article from 1926, Marcuzzo (2001, p. 90) has found in Sraffa's Archive a handwritten note posterior to the Symposium about Increasing Returns and the Representative Firm, held in March 1930 in the *Economic Journal*, that stressed this particular point. There was an informal argument around 1929–30 between Sraffa, Kahn and Shove about the question of 'marketing costs' (Dardi, 2001, p. 129).

'elementary and natural hypothesis' of decreasing utility[30] (Sraffa, 1925, p. 3); ii) specification (particularly in the 1925 paper) of the marginal product and its mirror image, the marginal cost curve, contributing to the developments of the marginalist theory of distribution and the axiomatic theory of the firm[31]; iii) endorsement of the Marshallian interpretation of the classics (*i.e.*, equilibrium between supply and demand functions when constant returns prevails) in both articles; iii) suggestion to pass from the partial to the general equilibrium analysis (Sraffa, 1925, pp. 41-42, p. 45); iv) defense of the idea that there were two well defined extreme cases of competition in economic theory – absolute monopoly and perfect competition –, which were uncapable of addressing the type of competition at work in most real markets, so that intermediate cases (linked to the slope of the individual firm's demand curve) should be considered. In the subsequent decade, Sraffa's suggestions of negatively sloped firm's demand curves and of a looser characterization of monopoly were developed by Robinson, Chamberlin, Lerner and others, building a framework to deal with the exercise of 'market power'.

In this dissertation, it is argued that the *Production of Commodities by Means of Commoditie*s (1960) enabled not only the rehabilitation of the classical theories of value and distribution, but also the conception of competition associated with it.

In this book, Sraffa initially rejected any variation at the margin, so that: i) the demand for each commodity is considered to be a single magnitude ("point") and not a price-quantity relationship ("curve"); ii) the supply of each commodity is also considered to be a single magnitude, so that there cannot exist a cost curve. While discussing the choice of technique, Sraffa relaxed the initial assumption of given income distribution and showed that the irregular effects between distribution and the value of capital have destructive effects on the notion of a downward sloped factor demand curve and on the very concept of factor of production; iii) constant returns (or any quantity variation) are not considered to be necessary for the validity of the classical

[30] Even if the "empirical" content is not contested, the whole reasoning is false, as Hicks (1939a, chs. 1, 2) has shown that Diminishing Marginal Utility is neither necessary nor sufficient to derive a negatively sloped demand curve.

[31] Sraffa (1925, p. 30) exposed in a clear way the reasons why the average cost curve needs to be U-shaped: increasing costs for all of its length would lead the individual firm's output tending to zero, while solely decreasing costs would produce a tendency of monopolization in the industry. His neat exposition reveals that the construction of a cost curve concave upwards did not have any descriptive concern, being conceived by "backward induction" to obtain certain desired *market* outcomes.

theory of value and distribution. A new interpretation of the Classicals, centered on the concept of social surplus and representing the economic system as a circular process, was proposed.

Sraffa (1960) thus argued that the classical theoretical framework could be considered as an alternative to the general equilibrium theory (iv) for identifying the industrial inter-relationships of the economic system and determining relative prices and income distribution. Unfortunately, he was particularly laconic with respect to v), leaving room for a great diversity of interpretations regarding the points of continuity and rupture of his view on competition. As it will be discussed in the next chapter, the consideration of monopoly and perfect competition as polar cases of competition and the development of intermediate cases of "particular monopolies" associated with the slope of the individual firm's demand curve are incompatible with the classical conception of competition based on capital mobility. Hence, we choose to follow the interpretation originally proposed by Clifton (1977)[32] that the "Production of Commodities" produces a discontinuity to the treatment given to competition by Sraffa with respect to the articles from the 1920s.

Although there is a considerable temporal lag between the articles from 1925, 1926 and the last published works by Sraffa (1951, 1960), the modification of his intellectual position did not take long to happen. Garegnani (2005) suggested that the turning point between the attempt to amend the marginalist theory and the initial gain of awareness of the classical economists' mode of thinking must have occurred between 1927 and 1928, while Sraffa was preparing for the Lectures on the 'Advanced Theory of Value' given by him in Cambridge from 1928 to 1931. We will briefly discuss the main elements that explain his growing discomfort regarding the marginalist framework.

a) The incapacity of eliminating the influence of demand on price

As discussed before, Sraffa (1925, 1926) considered constant returns to scale as a first approximation assumption, thus eliminating the role of demand (and, therefore, utility) in the price determination of particular commodities. In the subsequent years, however, he identified further difficulties associated with this procedure.

[32] Other important contributions to this interpretation were given by Mongiovi (1996) and Garegnani (2005).

The cost of production reflects the remuneration of agents/classes for their participation in economic activities and thus requires a theory of distribution. Following the marginalist theory of distribution, the cost of production depends on the price of factors of production and, therefore, on the equilibrium between supply and demand in the factor markets. Hence, Sraffa was unable to entirely remove the influence of demand (now for factors of production) on the price of commodities (Garegnani, 2005, pp. 459-460).

This connection between value and distribution obliged Sraffa to widen the scope of his analysis and to scrutinize the fundamentals of the marginal productivity theory of distribution. The demand curve for factors of production depended on assumptions about methods of production which were not in use and could not be observed[33]. The supply curve of factors of production, in turn, depended on feeble psychological concepts such as marginal disutility of labor and abstinence, waiting or thrift (Sraffa, 1931, pp. 14-17).

b) The change in the notion of costs

From Petty and the Physiocrats to Smith, Ricardo, and Marx, the cost of production was considered as a technical, physical, material requirement so that production could take place. This objective conception of cost was successively modified by post-Ricardian authors (Senior, Mill, Cairnes) and marginalists (Jevons, Menger, Walras, Marshall, Böhm-Bawerk and others) to be treated as an unobservable and unmeasurable feeling (effort, pain, disutility, etc.)[34]. The cost of production then became viewed as a subjective sum of marginal sacrifices (Sraffa, 1931, pp. 17-23).

Marshall argued that his formulation constituted a more general theoretical framework that combined the utilitarist tradition (which was at the basis of the demand curve) with the classical tradition (allegedly preserved in the supply curve), forging a line of continuity between classical political economy and neoclassical economics.

[33] The general discomfort with this procedure was the lack of sufficient empirical content. It is important to note that it was still an external criticism to the marginalist theory of distribution, as Sraffa had not yet developed the internal critique of the neoclassical capital theory.

[34] Fratini (2016, sec. 6) also discussed the later marginalist developments (by Davenport, Cassell and Henderson) of the notion of cost towards the concept of opportunity cost which is used in microeconomic textbooks.

Sraffa's identification of the "degeneration" that the notion of costs[35] had been through (which Fratini, 2016, p. 2 dated between autumn 1927 and spring 1928) showed, however, that this symmetrical determination of prices was actually derived from two subjective dimensions: utility and 'efforts and sacrifices' (a sort of negative utility)[36]. In short, the apparatus of supply and demand reconciled nothing, it was a strictly marginalist invention (Sraffa, 1928-1931, p. 67).

c) The changes in the conceptions of wages and profits

The classical notion of costs included not only material inputs but also a stock of goods to maintain the labor force. The real wage was thus considered as a concrete, tangible, physically measurable basket of goods, while with the subsequent marginalist tradition it became a reward for renouncing leisure.

In the manuscripts, Sraffa recognized that the physical conception of costs was crucial to define the surplus product or 'net produce' (*produit net*), which consisted in the cornerstone of the physiocratic economic thought. In the introduction to Ricardo's *Principles*, Sraffa, (1951, p. xxxi) traced back Ricardo's theory of value to a "physiocratic" measurement of the rate profit (corn as the only input and output) and, in the *Production of Commodities* (1960), Sraffa extended the centrality of the surplus concept for the whole classical theoretical system and re-interpretated the theory of distribution as a dispute between social classes over the appropriation of such surplus (distributive conflict).

Having this in mind, it is possible to identify a shift in the understanding of the nature of another distributive variable: while profits were considered as a part of the surplus and determined residually by the classical economists, it became explained by the marginalists through a simultaneous equilibrium of price and quantities in the same way that any of the other factors of production, which together add-up to (or 'exhaust') the whole social product.

The recognition of semantic changes that the notion of costs went through are thus connected with the fact that the classical and marginalist approaches developed

[35] The 'laws of returns', which was Sraffa's earlier discomfort towards Marshallian economics, synthesized many theoretical and methodological novelties from Marginalism. As time went by, Sraffa became increasingly aware that the changes in the notions of returns and costs were part of a broader and deeper theoretical shift from the classical to the marginalist approach to value and distribution.

[36] Which brings additional doubts to the hypothesis that 'supply' and 'demand' have distinct determinants (H.1).

different theories of distribution, which presented, respectively, asymmetrical and symmetrical treatments of distributive variables (Signorino, 2005, pp. 361-363, pp. 376-378):

> "The development and transformation of the notion of cost of production from the classical school to the marginal school is the new element in the evolution of Sraffa's thought. The novelty appears to be the discovery that there are two notions of cost – one concerned with *necessaries* and the other concerned with *motives* – which gave rise to two theories of distribution and two conceptions of wages and profits, one as *surplus* of the product over necessaries and the other as *shares* in the product." (Marcuzzo, 2001, pp. 86-87, emphasis in original)

d) The subjectivism associated with the proposition of modest (but generalized) monopolies

After the publication of the 1926 article, Sraffa never again explicitly dealt with the subject of competition in his published works. The absence of a statement of reinforcement or regret about his earlier propositions enabled the proliferation of interpretations regarding the evolution of the author's thought in this matter. The more recent evidences from the Archives show, however, that Sraffa considered that his previous defense of generalized monopoly was not completely satisfactory.

Maria Cristina Marcuzzo (2001, pp. 85-86) reproduced several excerpts from Sraffa's manuscripts in which he recognized that the strategic interdependence[37] between producers makes it impossible to derive a continuous, monotonic, downward-sloped demand schedule at the firm level, so that he could no longer agree with the notion of "the individual demand curve as a definite independent entity" (Kahn, 1989, p. 90). While Richard Kahn based his analysis on conjectural demand curves, "Sraffa's effort was to show that in general it was not, and in most cases that a given quantity (a point) rather than a schedule relating hypothetical or conjectural quantities to price was all which was needed for the problem to be solved" (Marcuzzo, 2001, p. 92)[38].

[37] The section 2.4 develops this reasoning in more detail, drawing on an article by Nicholas Kaldor (1935).

[38] Marcuzzo (2001, pp. 87-89) narrates the discussion between Richard Kahn, who argued that the elasticity of demand was lower in an "imperfect" model than in monopoly, and Piero Sraffa, who criticized Kahn's reasoning. Shaikh (2016, pp. 347-348) took Sraffa's side on this matter while arguing that the perfect competition model assumes irrational expectations. For him, if each firm believes that it can sell any output for a given price, there is a stimulus for increasing output. So, if all firms are identical, the market outcome of such behaviors is a price reduction, demonstrating the inconsistency of the original

Having throwing out the door the subjective elements underlying the market demand curve by assuming constant returns, they got back through the window with the undefinition of individual demand curves. Moreover, the consideration of marketing costs expenses inserted utility into costs (Dardi, 2001, pp. 133-134). Sraffa's search for an objective theory of value must not be attributed, however, to an *aprioristic* objection to subjectivism[39]:

> "The recent historiography on Sraffa has brought into focus the reasons why he abstained as much as possible from taking into account in his theoretical work those forms of social interaction in which subjectivity is expressed most directly. It is not that he considered them irrelevant; on the contrary. According to all evidence, his idea was that they were too rich in complexity and had too deep roots in history for them to be reduced to simplistic and 'evanescent' abstractions, such as the marginalist economists' concept of utility." (Dardi, 2001, p. 134)

The condescending remarks from Marco Dardi (2001, pp. 129-131) that Sraffa was unable to deal with subjective elements because he did not have the tools from the modern industrial organization theory, however, misses the point. Sraffa objections aimed his own previous formulation and what became known as the imperfect or monopolistic competition models developed by Kahn, Robinson and Chamberlin, which attempted to derive *functional* individual demand curves. He realized that such schedules could not be rigorously defined under reasonably realistic assumptions. The great diversity of reactions curves in the constellation of game-theoretic oligopoly models[40] of the New Industrial Organization Theory only confirms that Sraffa's intuition was correct: no general theory can be achieved by following this path. More importantly, even if Sraffa could have foreseen all the developments of oligopoly theory, they would probably be of no use to him. Such oligopoly models are derived from the Cournotian conception of competition, which differs radically from the

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expectations. According to Shaikh (2016, p. 348), the consistent expectations would lead to the same result as pure monopoly, so that "Sraffa's formulation is exactly right when competitive firms do take the effects of their collective behavior into account".

[39] This should not be belittled considering that one of the main criticisms developed by Samuelson (1987, 1990, 1991) was that Sraffa removed demand (subjective elements) from the determination of the equilibrium price for ideological reasons (Cavalieri, 2001, pp. 110-111).

[40] The Post-Marshallian author hand-picked one particular formulation, an infinitely repeated game with strategies made conditional on information acquired, to develop this reasoning (Dardi, 2001, p. 135).

conception of competition corresponding to the tradition of thought that Sraffa was starting to recover.

e) The definitive rupture with Marshallian economics

Sraffa's radical change of position was evident in his intervention during the Symposium *Increasing Returns and the Representative Firm*, in which he declared that Marshall's theory should be discarded (Sraffa, 1930, p. 93). Even though the Marshallian partial equilibrium was Sraffa's most specific target at that time, he had already considerable dissatisfactions with the marginalist theory in general. In that period, Sraffa was aware that classical economists did not assume constant costs and had already formulated his first equations under the assumption of given quantities (Marcuzzo, 2001, p. 83; Sraffa, 1960, p. vi; Garegnani, 2005, p. 474).

In sum, Sraffa gave up on all the three alternatives (general equilibrium, partial equilibrium with constant returns and generalized 'slight' monopolies) he had proposed in the 1925 and 1926 articles and proceeded in his long, arduous and solitary journey to reclaim the old classical economists that ended up in the *Production of Commodities*, which will be taken as the main reference for the remainder of this dissertation.

1.3. The classical framework

In this section, we will outline the basic methodological and theoretical features of the classical framework (or 'model'). Despite the effort to follow a separate exposition of each characteristic, most items are interrelated and cross references are unavoidable.

1.3.1. The revival of the surplus approach

a) The concept of social surplus

The surplus approach was originally developed by the Classical Political economists (and Marx) but it became "submerged and forgotten since the advent of the 'marginal' method" (Sraffa, 1960, p. v). The rehabilitation of such theoretical

framework can be attributed mainly to the effort of Piero Sraffa and his followers. The Italian author rejected the general reasoning shared, for different reasons and motivations, by important authors – such as Marshall (1890), Veblen (1900), Hollander (1910) and even Keynes (1936) – that existed a line of continuity between classical and neoclassical economists. Sraffa pointed out, instead, that existed a discontinuity or rupture between the neoclassical (or better still, marginalist) [41] theory and the preceding tradition of economic thought.

From a theoretical point of view, the main feature of the classical theory consisted of the concept of social surplus (or *produit net*[42]), which can be defined in the following way:

Social Product (or Gross Domestic Product, from National Accounts;
or Aggregate Output, from macroeconomic theory) (P)

–

Consumption (or replacement) of the physical means of production
(circulating capital and depreciation of fixed capital) (C)

=

Net social Product (Y)

–

Necessary Consumption (or Aggregate Wages) (N)

=

Social Surplus (earnings other than wages, all property incomes) (S)

The social surplus is what is left over after the necessary means of production and necessary consumption (bundle of commodities to support workers) are deducted from the (gross) social product resulting from a period of production. It is, thus, the share of the social product of which society can dispose without impairing the

[41] On the origins of the term 'neoclassical', see Aspromourgos (1986). We will use the term 'marginalist' because: i) it does not give an idea of continuity with the classical theory; ii) it suggests the analytical principle that underpins this approach (substitution at the margin).

[42] Despite de phonetical similarity, the concept of *produit net* differs from the net domestic product from the National Accounts, which reflects the difference between the gross domestic product and the replacement of fixed capital.

conditions of its survival, as its use does not compromise the reproduction of the economic system (*i.e.*, production can continue to take place indefinitely in an unaltered scale) (Sraffa, 1960, ch. 2, Appendix D; Eatwell, 1977, p. 63; Garegnani, 1984, pp. 292-294; Garegnani and Petri, 1989, p. 416; Garegnani, 1990c, p. 122; Kurz and Salvadori, 2008, p. 1; Cesaratto and Di Bucchianico, 2020, pp. 3-4; Petri, 2021, pp. 6-7).

b) The classical analytical scheme and the 'core'

In the classical analytical scheme, the theories of value and distribution are developed taking as given (Garegnani, 1960, Part I, ch. 1; 1984, pp. 292-294; Eatwell, 1977, p. 62; Bharadwaj, 1984, pp. 7-8):

i) the techniques of production;
ii) a distributive variable;
iii) the level of the social product;
iv) the composition of the social product.

Garegnani (1984, pp. 292-294) proposed that the 'core' of the surplus approach consists of determining the dependent variables (*i.e.*, relative prices and the residual distributive variable) taking i-iv as data[43], while discussions involving changes in these independent variables, feedbacks between dependent and independent variables and interactions among independent variables are left to be explained by analyses outside the 'core'.

Following this conceptual structure, the surplus is determined residually. Also, the classical economists envisaged that distribution and value were regulated by different mechanisms and that each distributive variable had specific determinants (Kurz and Salvadori, 2008, p. 2; Garegnani and Petri, 1989, p. 389). Real wages were explained by an independent analysis (classical theory of wages). Rents were considered as a differential income by Ricardo and differential (types I and II) and absolute by Marx. The discussion about determination of the rate of profit, however, cannot be separated from the problem of value, as it will be shown below:

[43] This does not imply that the independent variables are believed to remain perfectly still, although some degree of 'persistence' is required (Garegnani, 1976, p. 28; 1990, pp. 332-333, pp. 356-357; 2002, p. 390, p. 395; Ravagnani, 2002, p. 376-377).

The profit rate is defined as the ratio between profits and the capital advanced for production. The system's general rate of profit (r) is thus the ratio between aggregate profits and the total capital advanced for production. If we assume, to simplify, that rents are nil, then:

$$r = \frac{S}{C+N} = \frac{P-C-N}{C+N}$$

Social product (P)

$$P = p.q = p_1.q_1 + p_2.q_2 + \cdots + p_n.q_n$$

Necessary consumption (N)

$$N = w.L = w.(l_1 + l_2 + ... + l_n) = w.l_1 + w.l_2 + ... + w.l_n$$

where $w = p.b = p_1.b_1 + p_2.b_2 + \cdots + p_n.b_n$

Consumption (or replacement) of the physical means of production[44]

$$C = p.a = p_1.a_1 + p_2.a_2 + \cdots + p_n.a_n$$

where, $p = [p_1 \quad p_2 \quad \cdots \quad p_n]$, $q = \begin{bmatrix} q_1 \\ q_2 \\ \vdots \\ q_n \end{bmatrix}$, $b = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \\ b_n \end{bmatrix}$, $a = \begin{bmatrix} a_1 \\ a_2 \\ \vdots \\ a_n \end{bmatrix}$

p = row vector of prices of n commodities
q = column vector of produced quantities of n commodities
l = amount of direct labor required for the production of commodity i
L = total amount of direct labor required for the production of n commodities $= \sum_{i=1}^{n} l_i$
b = column vector of quantities of each commodity that make part of the basket of consumption of each worker (real wage)
a = column vector of quantities of commodities required as inputs for the production of n commodities (technical coefficients)

When the existence of heterogeneous goods is acknowledged, the need to formulate an explanation about the determinants of the vector of prices (theory of value) arises, so that P, C and N can be measured in a common unit. The main analytical difficulty encountered by the classical economists consisted of the fact that the determination of the general rate of profit requires the prices of commodities, while the

[44] To simplify, we will assume that all inputs are used in a single period of production (there is only circulating capital) and there is no joint production.

prices of commodities must contain a rate of profit and therefore cannot be known prior to it[45], leading to a circular reasoning.

c) The reinterpretation of the classical theory of value

In the Introduction of Ricardo's *Principles*, Sraffa (1951) argued that the reason why Ricardo assumed in the *Essay on the Influence of a low Price of Corn on the Profits of Stock* (1815) that both the product and the input of agriculture were reducible to corn was to determine the rate of profit in a physical way ($r = \frac{P^* - C^* - N^*}{C^* + N^*}$, where P^*, C^* and N^* are physical quantities of corn), independently of relative prices. After the critiques from Malthus that wages did not consist only of corn, Ricardo was led to develop a theory of value in the *Principles of Political Economy and Taxation* (1817)[46]. In Sraffa's interpretation, the labor theory of value allowed the homogenization of physically heterogeneous commodities (reducing them to a single common standard: labor), in order to obtain the rate of profit ($r = \frac{P^{\#} - C^{\#} - N^{\#}}{C^{\#} + N^{\#}}$, where $P^{\#}$, $C^{\#}$ and $N^{\#}$ are measured in terms of embodied labor). It was derived from the search for a physical measurement, based on the technical conditions of production, so that it would be independent of income distribution (Sraffa, 1951, pp. xxx-xxxiii).

Ricardo became, however, increasingly aware of the inconsistencies of his labor theory of value. These concerns can be noticed in the *Principles* (the 1st ed. from 1917 and the 3rd and last edition from 1921), but are more explicit in his later work *Absolute value and exchangeable value* (1823). The main theoretical problems encountered by

[45] In the third volume of *Capital*, Marx (1894, ch. 9) proposed the transformation of values into prices of production and surplus value into profits. Using a sequential method, he obtained the general rate of profit ($r = \frac{\sum s_i}{\sum (c_i + v_i)}$) taking in consideration the surplus-value (s) and constant (c) and variable (v) capitals from the economy as a whole and then obtained the prices of production by applying it to the advanced capital of each industry. The two main analytical problems related to this procedure are: i) as constant and variable capitals are a collection of produced means of production, they must be considered at their prices of production (rather than at their values, as Marx proceeded); ii) luxury goods should not have been considered in the determination of the general rate of profit (Bortkiewicz, 1907; Napoleoni, 1972, pp. 162-163; Garegnani, 1984, pp. 306-308).

[46] Even if the physical productivity in agriculture is declining due to the incorporation of less fertile lands as the agricultural frontier is expanded, the rate of profit reflects magnitudes of value of the social product (P) and advanced capital (C + N). Being so, if there is a change in relative prices to the detriment of industrial products (necessary goods for workers and capital goods), the rate of profit could be falling less than expected, remaining constant or even increasing (Napoleoni, 1975, pp. 80).

the author can be summarized in the following way (Sraffa, 1951, pp. xlii-xlvii; Napoleoni, 1975, pp. 74-77; Belluzzo, 1980, pp. 46-47):

i) Commodities produced with the same total amount of labor can present distinct relative prices if they present distinct intertemporal distribution of labor. Considering a simple example of two commodities (A and B) which are produced by the combination of labor with one input (previously produced by unassisted labor). In this situation, if they present identical total amounts of embodied labor ($\frac{L_A}{L_B}$ =1), but different compositions between direct and indirect labor ($\frac{L_{A1}}{L_{A2}} \neq \frac{L_{B1}}{L_{B2}}$), their exchange values will differ if the profit rate is positive (that is, in capitalistic conditions):

$$\frac{P_A}{P_B} = \frac{L_{A1}.w.(1+r) + L_{A2}.w.(1+r)^2}{L_{B1}.w.(1+r) + L_{B2}.w.(1+r)^2} \neq 1;$$

ii) Even if it is considered that the total amount and the intertemporal distribution of embodied labor of all commodities are given, changes in distribution (for example, an increase in real wages and a fall in the rate of profit), would affect relative prices (in the example above, it is easy to see that only the second 1+r is raised by 2). That is, relative prices cannot be considered as determined solely by the technical conditions of production.

iii) If commodities (in the example, A and B) are measured in terms of another commodity defined as the standard of value (unit of account) – let's say commodity C – unless it reflects a "perfect" average of the technical conditions, it is not possible to know with certainty if a change in exchange values of A and B reflect actual changes from the system or changes in the unit of measure C[47].

[47] To use a metaphor, if a body thermometer is not sufficiently invariable to changes in environmental temperature, it is not possible to attest if a person has a fever or not.

All three issues were tackled in “Production of Commodities”. The first one was developed in chapter 6, in which the equation of price was exposed in terms of a series of quantities of dated labor to each appropriate (logical, not temporal) period of production, instead of physical quantities of commodities as Sraffa did initially in the first chapters of the book. With this procedure, it becomes clear that Ricardo’s original labor theory of value is not valid when the profit rate is not zero. However, differently from what Sraffa thought in the 1920s, to express commodities in terms of labor is a valid theoretical procedure (and not a “metaphysical” discussion), although the actual measure is much more complex than Ricardo originally thought – particularly due to the sequence of exponents to (1+r) (Sraffa, 1960, p. 35).

Ther second issue shows in the simplest way that the value of a commodity is affected by alterations in the income distribution. By extension, the value of a bundle of commodities produced with different technical conditions – be it in the case of means of production (capital) or the nominal wage and the aggregate wages (‘wage fund’) – cannot be considered as a given magnitude of value. The solution to the apparent logical circularity (prices depend on the profit rate as much as the profit rate depends on prices) is a simultaneous determination of variables, as we will discuss in 1.4.3.

The third one was related to the need to obtain an invariable measure of value. As Sraffa discussed on chapters 3 and 4, not only a real commodity of such type would not be likely found, but also a simple algebraic average (such as Marx’s average organic composition of capital) would not be fully satisfactory. As the means of production are themselves produced in different technical conditions, the outcome from such recursive interdependences is indeterminate *a priori*. Sraffa’s solution was to build theoretically a “perfect composite commodity” (the standard commodity) whose price would be independent of the division of the product between wages and profits.

d) The submersion of the concept of social surplus with the advent of the ‘marginal’ method

The ascent of Marginalism produced an abandonment of the conception of social surplus in favor of the Principle of Substitution, which is now the predominant explanation in economic theory of how markets work. The general idea is that, under competitive conditions, any exogeneous increase in the endowment of a factor of

production will bring about a decrease in its relative price. Assuming that preferences and technology are sufficiently "flexible" to engender substitution at the margin, there will be a long period tendency to an increase in the demand for that factor through two channels: a) direct (or technological) substitution: cost-minimizing firms will adopt methods of production more intensive in the factor that became relatively cheaper; b) indirect substitution (or substitution in consumption): utility maximizing consumers will increase the share of their available income devoted to purchasing goods and services whose production are more intensive in the factor that became relatively cheaper as their final price decreases (Serrano, 2001, p. 10; Garegnani and Petri, 1989, pp. 391-401). The proper functioning of the Principle of Substitution is the foundation for constructing curves of supply and demand which are "well-behaved" (*i.e.*, present the desired mathematical properties to guarantee existence, unicity and stability of a full-employment market equilibrium).

The approach that became hegemonic after the Marginal Revolution considers that all distributive variables are determined by the same mechanism (equilibrium between functions of supply and demand in the factor markets), developing a symmetrical theory of distribution. If the production function is assumed to be homogeneous of degree one (the economic interpretation being constant returns to scale), then the application of Euler's theorem guarantees that, in equilibrium, all income is distributed among the owners of the factors of production (there is no residue or surplus in the classical sense) (Screpanti and Zamagni, 2005, pp. 205-207; Roncaglia, 2005, pp. 372-374; Hunt and Lautzenheiser, 2011, pp. 302-307; Braff, 1988).

1.3.2. Separation between prices and quantities

From a methodological point of view, another discontinuity can be identified: while the classical economists considered that the determination of prices were better studied separately from the factors affecting quantities (separation between prices and quantities) – taking the level and the composition of output as given (assumptions iii and iv of the analytical framework) while determining relative prices and income distribution – marginalist economists considered that prices and quantities (of both

factors of production and goods) should be determined simultaneously by the interaction of supply and demand functions[48].

The assumed separability does not mean that prices and quantities are completely independent of each other, but that there is no necessary and quantitatively exact functional relationship between the two variables. Eventual relationships between prices and quantities are evaluated by specific analyses of an iterated nature (rather than a simultaneous one). Sraffa opted to approach his research object through a method of successive approximations, in a similar way to the suggestion given by Marshall (1920, App. C, p. 638) that many short chains are preferable to few long chains of deductive reasoning. In this sense, Sraffa formulated a type of *ceteris paribus* clause, but differently from Marshall it was not used to confine the analysis to a particular industry, but rather to investigate the interdependence of the economic system (Garegnani, 1976, p. 29; Garegnani, 1987, p. 563; Eatwell, 1982, p. 219; Mongiovi, 1996, p. 219; Crespo, 2008, pp. 6-7, pp. 17-18).

1.3.3. Long-period method

The long-period method which underlies the classical mode of thinking conceives a distinction between accidental, temporary, transitory, fortuitous factors (which are associated to short-periods) and non-accidental, non-temporary, non-transitory, persistent factors (which are associated to the long-period[49]). It is considered that only the latter is endowed with sufficient regularities to be systematically investigated by deductive analysis.

[48] The marginalist's rupture was dismembered in theoretical and methodological dimensions for logical and expositive reasons, but they are obviously related to each other. After all, the foundations of both the supply and demand curves (direct and indirect substitution, respectively) depend on the *variation at the margin of demanded* quantities of factors of production and commodities, respectively, so that quantities must be determined endogenously and simultaneously with prices.

[49] Petri (2004, pp. 35-36) makes a distinction between long-period and long-run analyses, arguing that the latter is used nowadays in growth theory to mean "a (full-employment) steady-state, or a secularly stationary equilibrium where the capital-labour ratio has itself reached an equilibrium", which is definitely not the case of the classical long-period position. Garegnani (1976, p. 25) and Petri (2004, p. 4) also prefer the word "equilibrium" to characterize the marginalist analysis and the word "position" to refer to the classical explanation of distribution and relative prices. The latter suggestion will not be followed to simplify writing and minimize complications.

This methodological procedure reflects an hierarchization of causes, electing the most fundamental trends at work in a capitalist economy as the main theoretical concern. It also acknowledges that real economies are generally in disequilibrium. The theoretical link between short-periods and long-period consists of the process of gravitation of economic variables from their actual towards their normal values, which is brought about by the workings of competition (Garegnani, 1976, pp. 27-28; Petri, 2004, pp. 16-19; Kurz and Salvadori, 2008, p. 2).

We have discussed that the rise of Marginalism produced two main changes: i) a theoretical one, associated with the diffusion of the Principle of Substitution to the detriment of the notion of the social surplus; ii) a methodological one, related to the transition from a separate to a simultaneous treatment between prices and quantities. There was, however, a line of continuity between the classical and the original marginalist approaches: the adherence to the long-period method. Even though they had different analytical structures, both traditions considered that prices of products tended to yield a uniform rate of profits on the capital advanced in the long-period (Petri, 2004, pp. 6-7; Garegnani, 1976, pp. 25-26; Eatwell, 1982, p. 203, p. 213; Bharadwaj, 1986, p. 37).

This last connection between alternative theoretical traditions started to fade away in the late 1920's and the 1930's with the development of the temporary equilibrium models – such as Hayek (1928), Lindahl (1929) and Hicks (1939) – but it was only in the in 1950's that the long-period method had its relevance considerably diminished in the neoclassical research program[50] due to the emergence of Arrow and Debreu's intertemporal (or very-short-period) general equilibrium model (Garegnani, 1976; Milgate, 1979; Eatwell, 1982, pp. 219-221; Petri, 2004, ch. 5; Dvoskin, 2013).

1.3.4. Reproducible and non-reproducible resources

Having discussed some of the theoretical and methodological characteristics of the classical approach, it is easier to understand why the Marshallian concepts of primary and supplementary costs or the differentiation between variable and fixed costs

[50] Even though the very-short-period notion of equilibrium has dominated the pure theory of general equilibrium, short-period, long-period and very-long period equilibria still coexist with it in the current orthodox tradition. An important reason for this is the difficulty in creating rules of correspondence between neo-Walrasian models and real economies (see Petri, 2004, ch. 2).

since Frisch (1950), does not apply. Actually, as there are no variations at the margin, curves of variable and marginal cost cannot be derived. Making an effort to translate Sraffa's contribution to a microeconomics language (taking the chance of distorting it[51]), all there is an average cost point (defined at the normal degree of capacity utilization, as we will discuss later). Also, the concept of "factors of production" does not belong to the classical framework. While the marginalist theory deals with factors of production and commodities, the fundamental distinction for the classical approach consists of non-reproducible and reproducible resources (Bharadwaj, 1985, p. 10).

Among the reproducible resources, the key differentiation is between basic products, which enter directly or indirectly into the production of all commodities, and non-basic products, which do not (Sraffa. 1960, p. 8). It enables an hierarchization between commodities, as basic commodities such as water, oil, electricity and iron ore are definitely more important for the reproduction of the economic system than caviar. This definition does not reflect, however, only technology, but also socio-political factors (e.g., as labor is an input of generalized use, all commodities necessary for the subsistence of workers are basic commodities). Finally, it is important to stress the important theoretical result achieved by Sraffa, which had been earlier revealed by Bortkiewicz (1907), that only basic commodities affect relative prices and the general rate of profit.

a) The circular flow

Unlike Sraffa's original intentions of writing extensively about the history of economic thought, the 'Production of Commodities' ended up being essentially a book of pure theory and the two-and-a-half pages of *Appendix D – References to the literature* are "what is actually published on the history of economic thought by a person who is considered as one of the greatest scholars in the field" (Pasinetti, 2001, p. 148). Sraffa initiated this appendix in the following way:

> "It is of course in Quesnay's *Tableau Economique* that is found the original picture of the system of production and consumption as a circular process,

[51] Given the interdependence of the system proposed by Sraffa, the idea that the price of a commodity (with the exception of non-basic commodities) is determined by *costs* is questionable, as prices depend on costs (the *use* of other commodities) as much as costs (the *use* of it by other basic commodities) depend on prices (Sraffa, 1960, pp. 8-9).

> and it stands in striking contrast to the view presented by modern theory, of a one-way avenue that leads from 'Factors of production' to 'Consumption'" (Sraffa, 1960, p. 93, emphasis in original)

Some important messages can be extracted from this excerpt. The first one concerns the view of the economic system as a circular process, which emphasizes the interrelationships between the different sectors. Wassily Leontief (1936, p. 105)[52] had already manifested this influence in his input-output model, when he stated that his aim was to develop a *Tableau Economique* for the American Economy. It is true that the general equilibrium theory also presents this inter-industrial concern. There are, however, important differences between these two classically inspired models and the supply-and-demand approach to value and distribution.

The second issue consists of focusing in the creation and distribution of the social surplus (production), rather than considering that capitalism's main attribute is to allocate scarce factors of production in order to satisfy consumers preferences (demand). This implies not only discarding the existence of "consumer sovereign"[53], but also considering that, in the level of analysis and abstraction associated with systemic price determination, all commodities are produced by means of other commodities: there is not a single good which is produced by labor alone (a strict hand technique, *unassisted labor,* as originally imagined by Smith and Ricardo, and later developed by Austrians authors), nor does the distinction between intermediate and final goods applies[54]. The economic system is not a one-way avenue from factors of production to consumer goods (an "arch"), but a circular process (a "circle").

The third feature is the rejection of the notion of "factors of production", associated with the marginalist theory of distribution.

The last characteristic, connected with the previous ones, reside in Sraffa's refusal to take capital as an 'initial endowment'. Commodities are produced by means

[52] About the classical ascendency of the input-ouput analysis, see Kurz and Salvadori (2000, 2003, 2006).

[53] Shaikh (2016, p. 123) interestingly outlines the neoclassical influence on conventional national accounts, distinguishing it from the classical and input-output accounts.

[54] The relevant distinction, as we have discussed, is between basic and non-basic commodities. Only non-basic commodities could be considered just "final goods".

of labor, land (natural and 'indestructible' means of production) and capital (produced means of production)[55].

b) Capital as a produced means of production

The marginalist approach considers capital as an independent factor of production, even though it is "embodied" in heterogeneous capital goods. It would be allegedly capable of changing its "form" (composition) without changing its total "quantity" (measurable in terms of value) (Petri, 2004, pp. 27-28). There were used several metaphors or 'parables', such as 'putty' and 'jelly', to suggest that heterogeneous pieces of equipment are flexible materials that can be molded and combined to integrate a more defined, comprehensive object. This reasoning was present in the illustration provided by J. B. Clark (1899, pp. 128-129) that capital-goods are like particles of water entering and exiting a reservoir. The particles of water are constantly being renewed, but the level of the reservoir is always preserved (capital is permanent).

Pasinetti and Scazzieri (1990, p. 144) argued that "the idea that there exists an inverse monotonic relation between the rate of interest and the demand for capital was born in the financial sphere [capital as a 'free' fund]". The marginalist theory later attempted to extend such relation to the case of physical capital but, in order to do so, it had to assume capital to be completely "malleable", "plastic" as suggested by the following allegory:

> "If ten men are to be set to dig a hole instead of nine, they will be furnished with ten cheaper spades instead of nine more expensive ones; or perhaps if there is no room for him to dig comfortably, the tenth man will be furnished with a bucket and sent to fetch beer for the other nine' (Robertson, 1931, p. 226)

It is almost comical that those "examples" were provided by such important marginalist authors to justify the theory of capital which lies behind the assumption that there exists a variety (an infinity, at the limit) of *modern* methods of production that present different capital-output ratios (strictly convex isoquant) which are more or less

[55] Austrians emphasized the distinct nature between labor and land (original factors of production) and capital (which is produced), although their treatment of capital as 'average period' of production is subject to the capital critique just like the neoclassical theory (Petri, 2004, appendix 3A).

profitable depending on slight variations in the relative prices of factors of production (the inclination of the isocost line).

In addition to the patent unrealism, this theoretical framework is also logically inconsistent when capital is heterogenous. As capital goods are produced in different technical conditions, their relative prices will change when distribution varies. Therefore, the total value (which is what the businessman is concerned with) of a collection of heterogenous commodities can change in any direction. So, because capital, differently from land, is produced by means of other commodities, its 'quantity' cannot be taken as a given endowment measured independently, and prior to, prices and the profit rate (Sraffa, 1960, §7, §48, ch. 12; Bharadwaj, 1985, p. 10; Garegnani, 1990b).

Although this reasoning is most known because of its "destructive" effects on the marginalist theory, Sraffa came into it while trying to resolve the problems encountered by the classical theory of value and distribution (the "constructive" dimension of his work). The distinct classical and marginalist notions of 'capital' are thus a reflex of the differences between their approaches to value and distribution and, more particularly, their divergent explanations about the determinants of profits (Kurz, 1990, p. 79).

1.3.5. The nature of the assumed technology

a) Objective notion of costs

In the late 1920's, Sraffa rediscovered the notion of costs originally conceived by Petty and the Physiocrats, in which inputs could be measured in tons, galons, etc., which he called "physical real costs" in opposition to the subjective notion of cost of "efforts and sacrifices" (which Marshall called "real costs"). It is worth noticing that while the latter reflects a psychological sacrifice which is absolutely private to each individual, the former reflects social and technological determinants which are systemic (Sraffa, 1931, p. 21).

In his manuscripts, Sraffa compared these two conceptions of cost by using a metaphor of the donkey and the carrot: while in the utilitarian conception the provision of the carrot constitutes a necessary incentive to induce the donkey to run, in the classical conception it is a minimum requirement to keep it alive (Sraffa, 1928-1931, p.

23). Three decades later, he conveyed his thoughts in a very similar manner while dealing with production without surplus: "We have up to this point regarded wages as consisting of the necessary subsistence of the workers and thus entering, the system on the same footing as the fuel for the engines or the feed for cattle" (Sraffa, 1960, p. 9).

b) Given state of technology

The surplus approach develops the theories of value and distribution taking as given the techniques of production (assumption i of the analytical framework). Throughout his book, Sraffa did not discuss technical progress (his formulation was 'static' in this sense).

The quantities of inputs and labor which can be visualized in each "line" of Sraffa's system of equations represents the method of production used in a widespread way for the production of each commodity (*i.e.,* the dominant technique). These requirements depend on technological and political-institutional factors (the length of the average working day and the intensity of production, for example, are greatly affected by labor legislation) (Roncaglia, 1978, p. 28; Kurz and Salvadori, 1995, pp. 43-44, p. 74). Following Alessandro Roncaglia, we can also refer to socially necessary techniques of production "in the same sense that Marx uses when introducing the notion of the labour time 'socially necessary' for the production of a given commodity, implying reference to the dominant technique in the historical period under consideration" (Roncaglia, 1978, p. 27).

In real economies, however, there is usually a variety of other methods of production, which can be assembled into two groups: i) inferior or dominated methods of production, which present a higher cost than the dominant one, thus obtaining a sub-normal rate of profit; ii) superior methods of production, which present a lower cost than the dominant one, thus obtaining a super-normal rate of profit or, alternatively, a differential rent above the normal rate of profit, even when all the prices are in equilibrium. The first group is normally associated with fixed capital embodying obsolete, out-of-date methods, which generates a sub-normal profitability (or a positive quasi-rent, following Sraffa, 1960, §91) but it is still advantageous to use it in production compared to the alternative of selling it in the secondary market[56] or as

[56] "The 'dominated' techniques still in use correspond to investments carried out in the past which are no longer those which would be chosen today to suit present conditions. These techniques can serve, as

scrap. The second group comprises more efficient methods, typically developed by innovative producers and carefully safeguarded to prevent their diffusion (Roncaglia, 1978, pp. 27-28; Eatwell, 1987, p. 599; Schefold, 1997, pp. 159-160; Eatwell and Milgate, 2011, pp. 348-349).

c) Complementarity between capital and labor

The scholars who dedicated themselves to an extensive investigation of technology (Rosenberg, Freeman, David) showed that there usually exists only one (or very few) best-practice techniques, corroborating the technological assumptions from different traditions of thought and fields of specialization such as the Classical Political Economy (Smith, Ricardo, Marx), Classical Development Economics (Rosenstein-Rodan, Lewis, Nurkse, Prebisch, Furtado), the early Industrial Organization and Heterodox Growth Theories (Harrod, Kalecki, Steindl, Sylos-Labini, Robinson, Kaldor)[57].

Sraffa's technical assumption is convergent with such view, as he assumed inputs to be combined in fixed proportions in the opening propositions of "Production of Commodities". Sraffa presented his system of equations in absolute terms, but it is possible to represent it alternatively using an input-output notation (Pasinetti, 1977, 51-

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Sraffa himself points out, to determine the relative prices of related fixed capital equipments. This the set or prices corresponding to the 'dominant' technique are not influenced by the 'dominated' techniques" (Roncaglia, 1978, p. 29)

[57] The indicated literature is extensive, but some heterodox textbooks discuss the assumption of fixed coefficients in a synthetic way (Blecker and Setterfield, 2019, pp. 13-15; Lavoie, 2014, pp. 53-64). In heterodox growth theory, which refers to the long-period or even very-long-period, there is a higher degree of convergence among the different schools of thought in this subject. In heterodox microeconomics and macroeconomics, the short-period (or a sequence of short-periods) is usually referred to as the logical reference of analysis and the Post-Keynesian literature (broadly defined) achieves a "separation" between prices (determined by cost-plus pricing) and quantities (determined by demand) by assuming that the marginal/average variable costs are reasonably constant in the relevant range of production. This is associated with situations which is possible to increase a variable factor and better occupying a fixed factor not yet fully utilized (for example, hiring new workers to operate previously unused machines). The average cost curve is considered to be L-shaped (perfectly flat after reaching minimum cost), slightly decreasing or flat bottomed during an interval of production and upward sloping after reaching practical capacity (inverted L), so that in neither situation a universal "law of diminishing returns" or a single optimum firm size can be found (as it is the case of U-shaped cost curve from standard neoclassical microeconomics). In the range of production which increasing costs are acknowledged (after most of the excess capacity is eliminated), they are generally explained by overtime payment for workers and more intensive use of capital, which leads to machinery repair costs due to increased wear and wastes in materials due to the more frequent breakdown of machinery (e.g., Kalecki, 1938, p. 101, p. 105; Andrews, 1949, ch. 3; Steindl, 1952, pp. 6-7; Sylos-Labini, 1962, pp. 26-29; Eichner, 1976, pp. 32-33; Koutsoyiannis, 1979, chs. 4, 12; Lee, 1999; King, 2001, pp. 68-70; Lavoie, 2006, pp. 40-44).

52; Kurz and Salvadori, 1995, 43-44). Although a "Leontief technology" was indeed assumed, the technical coefficients from Sraffa's system reflect the dominant techniques and normally will not coincide with the "average" techniques empirically estimated by input-output models (Roncaglia, 1978, p. 27).

It should be noticed, however, that the complementarity between capital and labor does not strictly depend on an assumption[58] that there is only one *modern*[59] method of production. The consideration of an exogenous distributive variable (assumption ii of the classical analytical framework) immediately defines the method of production which is cost-minimizing/profit-maximizing:

> "Classical theory is compatible with the existence of alternative techniques (even an infinity of them) […] The reason why capital and labor are complementary lies in the assumption, fundamental to the surplus approach, that distribution is exogenously determined as mentioned earlier. Therefore, in this approach, the chosen technique is not necessarily the only one available to produce the full capacity level, but, in fact, the cost-minimizing/profit-maximizing one with respect to a given exogenous distributive variable (at given 'factor prices'). The principle of substitution is certainly not in operation. But this is not necessarily because no alternative methods of production are available, but because 'factor prices' do not change." (Serrano, 2001, p. 29, own translation)

We can go further and argue that even when there is more than one method of production and income distribution is allowed to change significantly, as Sraffa (1960, ch. 12) proceeds, there is no guarantee that that more labor (capital) "intensive" techniques will be chosen when the real wage (rate of profit) decreases. As it was shown in the capital debates, a decrease in the rate of profit may encourage the adoption of more labor-intensive techniques (*reverse capital deepening*) and there is the possibility

[58] A very common argument from Classical Development Economics was that, due to 'unlimited' supply of labor, low stock of capital, imported technology and emulation of consumption habits from the centre, technical coefficients in the periphery were considerably more "rigid" (complementary). The assumption regarding consumption patterns is important, because, otherwise, the *aggregate* technical coefficient could be considered variable, due to indirect substitution, even if there is a single method to produce each commodity, as in the general equilibrium models originally developed by Walras and Cassel's followers Schlesinger and Wald (Kurz and Salvadori, 1995, p. 23, p. 412, p. 432). However, even if technology, factor prices and consumption preferences are assumed to be "flexible", the neoclassical theory still presents considerable problems when capital is heterogeneous (even without addressing the "monetary" criticisms developed by Keynes and Kalecki) (Serrano, 2001, p. 29; Serrano, 2011, pp. 10-12; Serrano, 2018).

[59] As it was discussed before in this item, the classical theory assumes the existence of only *one dominant technique* for the production of each commodity, but other methods of production ("superior" and "inferior") which obtain rates of profit above or below the normal level, are considered. The coefficients from Sraffa's equations do not necessarily reflect, however, the algebraic average of technical conditions.

of occurring multiple switches between the same techniques at different levels of factor prices (*reswitching of techniques*). These results have perverse implications for the marginalist theory, as the price flexibility of factors and the substitution at the margin can no longer guarantee a tendency towards full-employment. As the Principle of Substitution is considerably undermined, there is no reason (historical, empirical or theoretical) left to consider a "smooth" production function as the general reference.

For the reasons discussed before, even though fixed coefficients may be considered a somewhat simplifying assumption, "it is better to be approximately right than precisely wrong" (Lavoie, 2014, p. 63).

d) Absence of an assumption about returns

The classical theory of prices does not require any specific pattern of returns because variations at the margin are rule out by assumption. There are no supply and demand functions (price-quantities curves) because quantities are considered as given (they are "points"). This means that not only constant returns to scale, but also increasing and diminishing marginal returns are not assumed (Sraffa, 1960, p. v; Eatwell, 1977; Roncaglia, 1978, pp. 14-16; Garegnani, 1990b, pp. 128-132). In that way, it is not possible to draw the U-shaped average cost curve and to determine the optimal firm size. The equilibrium of the firm is simply not a logical requirement for the development of the classical theory.

The absence of an assumption of constant returns was explicitly warned by Sraffa in the Preface, following the recommendation from Keynes in 1928 when he was presented to the draft with what became later the opening propositions of "Production of Commodities". In the same year, Sraffa showed his formulation to Pigou, who answered that his system of equations could be considered as a special case of the general equilibrium analysis (when conditions of constant returns are assumed[60]) (Marcuzzo, 2001, p. 87; Signorino, 2005, p. 361). This comment from Pigou anticipated for several decades the main neoclassical criticism to the Sraffian theoretical project, whose most prominent critic was probably Frank Hahn (1975, 1984).

[60] According to the *Non-Substitution Theorem* developed by Koopmans, Samuelson, Georgescu-Roegen and other authors, the classical model would consist of a particular case of the general equilibrium model, characterized by constant returns of scale, the exogenous determination of a factor price and the absence of joint production.

In the 1925 article, Sraffa associated the existence of *marginal* diminishing returns (and thus increasing *marginal* costs) with a change of proportions between factors of production, while increasing returns *to scale* (and thus long-period decreasing *average* costs) mainly to variations in the absolute quantity of the totality of factors (Sraffa, 1925, pp. 23-24, pp. 38-39).

The first case depends on the notion that it is possible to increase production by adding labor to a given number of (already fully employed[61]) machines (Lavoie, 2014, p. 148; Shaikh, 2016, p. 147). However, as Hicks (1932, pp. 19-21) pointed out, the concept of "short period marginal product" is questionable even within the marginalist theory, as the operation of the principle of substitution requires a sufficient period of time for capital to change its form: it is only the capital which is "free" (*i.e.*, available for new investments and not already materialized in capital goods) that can be sensitive to the relative price of factors. Returning to Dennis Robertson's metaphor, it takes time for the 9 spades to become 10 smaller spades.

The second case is convergent with most textbook definitions of 'statical' increasing returns to scale (or economies of scale). Yet, as Baumol, Willig and Panzar have pointed out, this definition is very restrictive, as it is does not contemplate the case of non-homogeneous production functions and should not be taken as a synonym of decreasing average costs:

> "Scale economies are often defined to be present when a k-fold *proportionate* increase in every input quantity yields a k'-fold increase in output where k' > k > 1. This definition is certainly stronger than of declining average cost. That is, so defined, economies of scale through output y, but not vice versa. The reason is straightforward. If one wishes to increase any output y* by the factors k', the cheapest way to do need *not* be a proportionate increase in all inputs. Thus, even if average cost does not fall when output is increased by expanding all inputs proportionately, it may nevertheless fall when output is expanded in the most efficient manner, changing input proportion if appropriate" (Baumol 1982, p. 21, emphasis in original)

Most of the examples associated with the economies derived from the "law of large numbers" (some types inputs – doormen, securities, accountants, maintenance

[61] Sraffa (1925, p. 5) remarked that there is a semantic undefinition of what 'fixed' means, as the 'constant factor' cannot be increased but can surely be reduced (*i.e.*, it does not need to be fully employed). Following this reasoning, the addition of labor to an idle equipment give rise to marginal returns or returns to scale (the supply function reflects marginal or average costs)? In other words, the previously unused capital can be considered as a "varying" factor or not? This may seem a pointless observation, but many studies in Industrial Organization that have found reasonably stable "marginal costs" represent situations of increases in capacity utilization.

staff, spare parts, etc. – do not need to be proportionately increased at a higher volume of production) result in a change of proportion between inputs, thus being contradictory to this conventional definition of economies of scale. Also, the fact that larger plants or factories can produce at lower average costs are associated with technological indivisibilities ("lumpiness") and geometrical economies due to the three-dimensional nature of the world (Kaldor, 1972, p. 1242). These findings, however, deprive the production function from the properties of continuity and reversibility.

The consideration of dynamic "economies of scale" (this characterization is even looser), such as technical progress embodied in capital goods and learning effects implies that "any sharp or clear-cut distinction between the movement along a 'production function' with a given state of knowledge, and a shift in the 'production function' caused by a change in the state of knowledge is arbitrary and artificial." (Kaldor, 1957, p. 596).

These are some of the reasons why the microeconomic and industrial organization textbooks which analyzed production and technology with care (rather than presenting only the U-shaped curve or resorting to the imaginative elucubrations of game theory, as, respectively, most microeconomic and 'modern' industrial organization textbooks do), present *descriptive* or empirical cost curves right after discussing the sources of scale economies: no *functional* or theoretical schedules between unit costs and output can be rigorously built (Koutsoyiannis, 1979, pp. 126-137; Scherer and Ross, 1990, pp. 97-108; Carlton and Perloff, 2000, p. 36; Hay and Morris, 1991, pp. 31-47; Iooty and Szapiro, 2013).

Precisely because these relations are so complex and no general, quantitatively exact theoretical relationship between cost and the quantity produced can be ascertained, it is reasonable to build a theory of value which does not require any specific pattern of returns. So, although Sraffa's formulation is originally static, it is not intrinsically static, as it is the case of neoclassical economics which needs simplifying assumptions to draw functional curves in order to explain how prices are determined and income is distributed in market economies.

While Sraffa assumed constant returns to scale as a first approximation in 1926, we could say that in 1960 he opted to consider fixed technical coefficients for a given level and composition of output. If the latter assumption is relaxed, technical coefficients will probably change due to a new configuration in the proportion of inputs, scale of inputs and/or state of the technique. Unfortunately, Sraffa did not warn the

readers that coefficients could change together with quantities, favoring the misconception that constant returns to scale were required despite his introductory remark suggesting the contrary.

1.3.6. Normal degree of capacity utilization

Another important feature of that classical approach to value and distribution is the assumption that the dominant methods of production are operated at the normal, planned or desired degree of capacity utilization. This consideration is convergent to the long-period method, disregarding short-period fluctuations of the level of capacity utilization in the determination of 'normal' prices and distributive variables (Vianello, 1985, 1989b; Kurz, 1986, pp. 37-38; Petri, 1993, p. 180; Aspromourgos, 2007, p. 50; Ciccone, 1986, 1987, 2011; Trezzini and Pignalosa, 2021; Haluska, Summa and Serrano, 2021).

This important analytical aspect was not adequately originally recognized by the classical economists. Only Marx, who rejected the Say's Law and discussed the 'laws of motion' of capitalism (there including what we now call business cycles), investigated the factors that affected the utilization of industrial plants, thus anticipating some elements of the normal degree of capacity utilization (Kurz, 1986, sec. 3; Ciccone, 2011; Trezzini and Pignalosa, 2021, sec. 3). However, as it is well known in the heterodox literature, the most important contribution to development of this concept was given by Josef Steindl.

Influenced by Michal Kalecki, Steindl placed the degree of capacity utilization (u) at the center of his analysis. This concept is defined as the ratio between production and productive capacity. The excess, reserve or idle capacity (1 – u) represents the percentage of unused capacity. Excess capacity can be analytically separated into two categories: unplanned (or undesired) and planned (or desired). The first is related to unforeseen variations in demand, creating a situation of disequilibrium. The second is intentionally maintained by the producers, constituting a situation that persists even in long-period equilibrium (Steindl, 1952, p. 11, p. 13). The author discusses some reasons for the intentional holding of idle capacity.

The first one is related to the existence of fluctuations in demand. Producers seek to conserve sufficient capacity to meet peak demand, which means accepting idle

capacity during the period when demand is close to trough – as Andrews (1949, p. 90)[62] had already pointed out, a firm cannot plan a factory with three shifts, otherwise it will not be able to meet situations of peak demand.

Otherwise, production is unable to keep up with demand in situations of prosperity. It is possible, during a certain period of time, to accommodate a mismatch between production and sales through variations in finished goods inventories and backlog of orders. However, this proceeding faces limits, so that market share losses turn out to be inevitable, either because of unfulfilled orders (which end up being diverted to rival companies) or due to price increases associated with operating the plant beyond its optimum maximum capacity (damaging the company's reputation with its clientele, who may consider that the company is "taking advantage" of a moment of increased demand or, more importantly, encouraging entry). Thus, the deliberate holding of idle capacity proves to be the best long-term strategy for the individual producer (Steindl, 1952, pp. 8-9).

The second reason derives from the fact that the growth in demand[63] for the firm's product is a function of time. Producers undertake competitive strategies to build their own clientele, either by product differentiation or by reducing prices (personalized discounts, sale off, etc.). These initiatives are costly and take time to produce results, so that the market expands gradually ("law of accumulation of goodwill"). While building a goodwill and gaining consumers' trust and loyalty happen gradually, productive capacity cannot be expanded "little by little" (Steindl, 1952, p. 8, pp. 10-11). Steindl exposes the problem in a crystal-clear way:

> "[...] why it is not possible for the producer to expand capacity step by step as his market grows? The reasons for this are obviously the indivisibility and durability of plant and equipment. Only if plants were more easily divisible

[62] In *Manufacturing Business* (1949), P. W. S. Andrews had already analyzed quite satisfactorily why firms maintain planned idle capacity. The author distinguished two main motives: carrying out repairs without interrupting production (keeping extra machines to replace those that are defective) and of a strategic nature (allowing the company to defend its market share when demand increases) (Andrews, 1949, p. 90, p. 92, pp. 117-118). Andrews pointed out that companies maintain not only machinery and equipment reserves, but also land (space to expand the factory) and labor (mainly "indirect" workers - exercising administrative functions, for example - who are more affected by the variation of the workload over the business cycle) (Andrews, 1949, p. 95, p. 97). To these elements can be added the reserve of raw materials, which guarantees the normal progress of the production process when there is a temporary discontinuity in the flow of inputs by suppliers.

[63] Which, following classical lines, can also be thought as a given quantity ("point"), rather than a function ("curve").

> and the economies of large scale did not exist, or, alternatively, if plants were scrapped and rebuilt at shorter intervals, could adjustment of capacity proceed evenly. This possibility exists, to some extent, for the community as a whole, where an expansion of output can be made possible by a gradual extension of capital equipment. But the individualism of a competitive system does not permit this solution" (Steindl, 1952, p. 24)

In this sense, producers establish a policy of "building ahead of demand", creating capacity and hoping that demand will increase so as to occupy the existing capacity, which is reflected in the underutilization of productive capacity during most periods (Steindl, 1952, p. 11).

We can now return to the 'classical model' to clarify that the assumption of given quantities (1.3.2) does not require that productive capacity is completely occupied (Bharadwaj, 1984, p. 9). In fact, the acknowledgement that capital, in addition to labor, is generally not fully employed, not only is compatible to the separability between prices and quantities, but also provides additional elements to extend it to situations 'outside the core', in which production can be increased to meet an expanding demand.

1.3.7. Exogenous distributive variable

a) Asymmetrical theory of distribution

As labor and capital are considered complementary, technological factors cannot determine alone distributive shares. The methods of production define, together with the size of the stock of capital, the demanded *quantities* of inputs. The total income earned by workers and capitalists and their relative shares on the final product also depend on an exogenously determined distributive variable (assumption ii of the surplus analytical framework).

In the conceptual structure of the classical economists, the surplus is determined residually, reflecting the existence of a fundamental *asymmetry*. Capitalists possess the collective ownership of the produced means of production associated with the methods of production. Each technique defines, however, only the real wage-profit rate frontier, while the position ("point") on this line depends on socio-political factors. In other words, productivity (of both labor and capital, as they are complementary) is a necessary but not a sufficient information to explain distribution (shares on the final product are not well-defined as it is the case of marginalist economics, which assumes substitution at the margin).

As the owners of capital are less numerous, more powerful and have the State institutions on their side, the balance of bargaining power usually tilts in their favor. In this sense, the nature of profits is more similar to rent, another property income determined residually and derived from the collective monopoly of a means of production, than to wages. It is the historical accumulation of the means of production on the hands of a small group, rather than the full-employment marginal product of scarce factors to production, that explain the earnings of land and capital owners. Differently from Feudalism and other modes of production in which the extraction of surplus was explicit, in the capitalist system formal legal equality and distribution of surplus through market mechanisms obscures such class antagonism (Kurz and Salvadori, 1995, p. 14, p. 469; Serrano, 2011, pp. 10-12; Garegnani and Petri, 1989, p. 432; Petri, 2021, p. 56).

This view on income distribution was inspired by the classical economists and Marx[64], but makes use of a high degree of interpretative freedom. Even though these results can be inferred from the analytical framework of some classical economists, they were not emphasized by the original authors themselves[65]. Be that as it may, the distributive conflict (dispute among social classes for the appropriation of the social surplus) is considered by the Sraffian approach as a central feature of the workings of capitalism.

b) The real wage and the wage share

The classical political economists considered the real wage to be determined before and independently (*i.e.*, outside the 'core') of the theories of value and distribution (Garegnani, 1983, pp. 311-312; 1984, pp. 292-297). It was conceived as a

[64] Even though the idea of a distributive conflict is milder than the Marxist notions of exploitation or class struggle (particularly if associated with the labor theory of value), the existence of an inverse relationship between real wage and the rate of profit consists of a central piece of Marx's critique of capitalism: "What, then, is the general law which determines the rise and fall of wages and profit in their reciprocal relation? They stand in inverse ratio to each other. Capital's share, profit, rises in the same proportion as labour's share, wages, falls, and vice versa. Profit rises to the extent that wages fall; it falls to the extent that wages rise […] the interests of capital and the interests of wage labour are diametrically opposed." (Marx, 1891, pp. 35-37)

[65] For example, the Physiocracy did not have the concept of profits, Smith did not recognize the inverse relationship between real wage and the rate of profit and the relevant distributive conflict for Ricardo concerned capitalists and landlords.

bundle of commodities (basket of necessary goods) physically[66] required for the long-period reproduction of the labor force, that depended on both natural (climatic and physiological) and social (cultural, political and institutional) factors. The wage rate is considered to be uniform for each level of labor qualification, assuming free mobility[67] of workers between different occupations[68].

The classical conception of the 'labor market' is radically different from the marginalist one. "Supply" and "demand" obviously exist in an economic system in which the most of the labor force is deprived of the means of production, but that does not mean that the real wage and the level of employment are determined simultaneously by the equilibrium between curves of supply and demand (which is the *marginalist* explanation of how the labor markets work). There are no functions associating the quantities supplied/demanded of the labor factor with each price of its service because, as discussed, there are no variations at the margin nor the operation of the principle of substitution.

In the classical framework, in a given historical moment, the supply of labor depends on the size of population, cultural and institutional conditions, while the

[66] Sraffa praised Petty and the Physiocrats for having "the right notion of cost as 'the loaf bread'" (Fratini, 2016, p. 2).

[67] In the past, the term 'Industrial Organization' was sometimes employed to the study of organized labor (Dorfman, 1949, pp. 267-272; Martin, 2010, p. 2), which indicates the existence of intersections between this field and Labor economics. This proximity can be visualized, for example, in two important debates regarding: i) the anticyclical behavior of real wage associated with Keynes' (1936, ch. 2) first postulate, which was contested by Dunlop (1938), Kalecki (1938) and Tarshis (1939) on empirical and theoretical grounds (there including the shape of cost curves and pricing policies), leading Keynes (1939) to reevaluate his original position (Aspromourgos, 1997, p. 121); ii) the critique of the profit maximizing behavior by Lester (1946, 1947), initiating the 'marginalist controversy' in the United States, which aimed to defend minimum wage policies and was promptly replied by Stigler, Machlup, Alchian and Friedman (Prasch, 2007; Mongin, 1997; Koutsoyiannis, 1979, ch. 11).

[68] The classical concept of competition could be more generally defined as mobility of resources. Land is the utmost example of immobility, as it consists of a nonreplicable, non-movable physical input, so that it is no coincidence that it was the first recognized source of rent in economic theory. This dissertation focuses on how restrictions to capital mobility affect capitalists' relative earnings. This classical reasoning has been applied elsewhere to the labor market, in order to explain the determinants of the wage range. Categories of workers engaging in job positions which are protected by higher barriers to entry, such as the requirement of higher scholarity, specific degrees and/or qualification, often present increased bargaining power and receive higher relative wages (for example, the cost of obtaining a physician diploma and the earnings of the medical profession) (Stirati, 1994; Gleicher and Stevans, 1991; Kurz and Salvadori, 1995, ch. 11; Levrero, 2009, 2014; Petri, 2021, ch. 13).

The identification of barriers to mobility of both labor and capital enables the acknowledgement of conflicts not only between social classes, but also among them. Moreover, it permits the recognition of the socio-political nature of both the "general" (minimum) and the "particular" (relative structure of) distributive variables.

demand for labor depends on the stock of capital inherited from the previous period of production and the technical requirements for production (considering the complementarity of inputs and the desired degree of capacity utilization) (Stirati, 1992, pp. 45-53; 1994, pp. 5-9). As all these determinants are independent variables in the classical framework, "supply" and "demand" are given quantities ("points") that will coincide only by a fluke. Even if they do, there is no strictly economic mechanism to determine the real wage, so that it has to be determined, as already mentioned, exogenously.

The classical economists believed that disequilibrium in the 'labor market' incited long-period adjustments of the supply of labor to demand[69] and that the real wage could not remain below the minimum subsistence level for long. There is not, however, a mechanical view that the general wage level will always fall when supply exceeds demand. In Smith's progressive state or in Marx's analysis of the reserve army of labor, wages can even *increase* long before full employment is achieved (a result completely alien to Marginalism), simply because the 'labor market' conditions have become *less* detrimental to workers[70].

Although it is true that classical economists took more in consideration social (cultural, moral, institutional) factors while discussing the determination of the wage rate, it would be an error to interpret such elements as "frictions" that produce rigidity, as wage 'flexibility' (in the marginalist sense that prices have to change until full employment is achieved[71]) has no role in this theory. As Stirati (2010, p. 12) remarked,

[69] In Classical Political Economy, the long-period adjustment of the supply of labor to demand for labor depended mostly on the Malthusian theory of population. This theoretical proposition presents, however, several inconsistencies, to name a few: i) countries whose real wages rose usually experienced a decrease (rather than an increase) in the birth rate, due to greater access of the population to information and contraceptive methods (Roncaglia, 1972, p. 136); ii) increases in real wage often leads to the emergence of consumption of luxury goods, decreasing the mortality rate instead of increasing the birth rate. In the end, there can be an increase in total population (as a result of an extended life expectancy of adults), but not in the sense required by the economic system (as it prolongs the lives of inactive individuals instead of promoting a regeneration of the economically active population) (Stirati, 1992, p. 52); iii) The mortality rate depends on numerous systemic factors (medical-sanitary conditions, violence, etc.), which make it difficult to obtain a functional relationship between this demographic index and the real wage; iv) For some time now, the average income (there including welfare benefits) of many countries fluctuates around a trend considerably above the physiological subsistence level. In this way, the Malthusian cannot operate in the way it was envisaged by some classical authors (even if the problems of the direction and intensity of the adjustments are not raised).

[70] The conflictive nature of distribution is not confined to the negative relationship between real wage and normal profit rate, but also concerns the power relations behind the determination of the distributive variables (there including the ability to influence economic policies).

[71] This definition of flexibility only has meaning in the marginalist framework, which assumes very specific characteristics of technology and demand so that changes in the relative factor prices can produce

"the distinctive character of classical wage theory […] is not in the role played by institutional factors as opposed to market forces, but rather in a different view of what market forces actually are, in the analytical framework of the classical economists".

In "Production of Commodities", Sraffa (1960, pp. 9-10) initially regarded the real wage as a minimum to allow subsistence, but soon introduced the possibility of it being established above such level (and opted to treat the whole wage as variable, rather than separating it into fix and variable components). In the initial situation, the surplus is distributed solely to the property-owning classes, while in the latter situation workers are capable to appropriate part of the surplus.

He then proceeded with two normalizations to transform the nominal wage (w) into a wage share ($\frac{w.L}{Y}$): the total amount of labor employed ($L = \sum L_i = 1$) and the net social product ($Y = \sum P_i.Y_i = 1$). In this way, the nominal wage/wage share (w) is considered to vary between 1 and 0 while, respectively, the rate of profit I varies between 0 and R (the Maximum rate of profit) (Sraffa, 1960, pp. 10-11, p. 22). By decomposing the rate of profit, we obtain R.(1-w).u. Comparing this result with the equation r = R.(1-w) presented by Sraffa (1960, §33) it is easy to perceive that u = 1, which means that the normal, planned or desired degree of capacity utilization is taken as reference for the determination of prices and distribution.

The stability[72] of wage share is recognized not only by heterodox authors – e.g. Keynes (1939, p. 48) and Robinson (1942, p. 81) – but also by the orthodox tradition – Cobb and Douglas (1928) created a specific production function to be compatible with this empirical regularity. Although Sraffa (1960) assumed in the beginning of the book that distribution was given, determined stable technological and socio-political factors, he later admitted a considerable variability in the distributive shares in order to demonstrate the complex and irregular relationships between income distribution and relative prices and its effects on the choice between alternative methods of production.

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a tendency towards full employment. In the classical framework, which considers involuntary unemployment as a feature of the normal working of the capitalist system, such type of 'flexibility' would only harm the reproduction of the labor force and the system, as wages would tend to zero (Serrano, 2001, p. 9; Levrero, 2014, p. 50).

[72] The changes in distributive shares tend to occur sharply and concentrated in time (usually, during neoliberal policies), which puts additional doubts to the marginalist theory explanation of income distribution as a market outcome of the interplay of independent agents with stable objective functions.

c) The interest rate and the rate of profit

Sraffa (1960) initially followed the classical economists, considering the real wage as an independent variable and determining endogenously the rate of profit. In the famous paragraph 44, however, Sraffa (1960, p. 33) suggested that the rate of profit could be considered alternatively as an independent variable, determined from outside the system of production by the level money rate of interest, while the real wage would be determined residually. Regardless of the direction of the causality, an inverse relationship between the two distributive variables can still be obtained.

1.3.8. Competition as capital mobility

In Classical Political Economy, several authors identified properties of the competitive process and stressed its importance for the economic system. Among the pioneers, we can mention Petty, Boisguillebert, Cantillon, Harris and Turgot. The latter even identified that there was a tendency to form a uniform profit rate. It was with Adam Smith, however, that the classical conception of competition was inserted into a more organized theoretical body, connecting it to a theory of price determination (or "value") (Eatwell, 1982, pp. 205-207; Kurz and Salvadori, 1995, p. 39; McNulty, 1967, pp. 395-396; 1987, p. 536).

Smith emphasized the importance of the individual pursuit of gain to the operation of the economy. As it can be perceived by the famous (and controversial) quote "it is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest", Smith (1776, pp. 26-27) believed that capitalism was justified not by the individuals' motivations, but by its results. The achievement of these favorable results requires, however, that certain competitive conditions hold.

With free capital mobility, the migration of capital from less profitable to more profitable activities produce a tendency to the elimination of abnormal profit opportunities and the establishment of a uniform profit rate in the long-period. This competitive pressure regulates the market prices and ensure that they gravitate around natural prices, which possess systematic determinants and can be explained by economic theory. Hence, competition plays a central role in the regulation of the price system, guaranteeing its viability and persistence. Yet this orderly result does not

necessarily imply a full utilization of resources (allocative efficiency) or optimality (Bharadwaj, 1985, pp. 19-20; Eatwell, 1982, p. 284).

Capital mobility is thus the centerpiece of the classical conception of competition, which does not rely on any hypothesis regarding the number of producers in the markets or their respective market shares. When there is the possibility of entry, established producers cannot enjoy extraordinary profits for long, regardless of their absolute or relative size (Roncaglia, 2009, pp. 121-122).

For Smith (1776, pp. 77-78), supernormal profits accrued from competitive advantages such as the possession of industrial and commercial secrets, the ownership of lands with more fertile soils – such as some vineyards in France – or a monopoly granted to an individual or to a trading company. The existence of obstacles to capital mobility – barriers to entry in Industrial Organization's terminology – does not contradict the classical conception of competition. In fact, they were conceived simultaneously (Arena, 1979, pp. 143-144; Eatwell, 1982, pp. 207-208; Roncaglia, 2009, p. 121; Petri, 2020, pp. 16-17).

The identification of barriers to capital mobility enables us to identify limits to the operation of the competitive process, indicating paths for more specific analysis. Many contributions in the Industrial Organization Theory allow us to develop and detail the classical conception of competition, rather than denying it. Here, it is sufficient to recognize that free capital mobility – a hypothesis implied in the "perfect liberty" scenario characterized by Smith (1776, p. 73, p. 79, p. 151) and referred by Ricardo (1817, p. 46) as a situation in which "competition operates without restraint" – is just a particular case (extreme situation) of a more general conception of competition based on *capital mobility* (Roncaglia, 1978, pp. 22-23, p. 32; 2009, pp. 121-122; Arena, 1979, pp. 135-136; Steedman, 1984, p. 123; Bharadwaj, 1985, pp. 19-20; Aspromourgos, 2007, pp. 50-51; Levrero, 2014, p. 74).

The absence of specific competition models in the classical economic thought discussing the manyness or fewness of competitors is not an evidence of primitivism of this economic theory, but the result of a different view on competition that does not consider this aspect as particularly relevant to explain markets' performance. The creation of specific models depending on the number of firms in the market – the conception of competition derived from Cournot – is connected with the marginalist theory of value, that needs to aggregate a given number of firms' supply curves in order to build the industry's supply curve.

Although the classical approach to competition was – and still is – far from complete, there is nothing *essentially* missing from this general analytical framework: the central aspect is the *degree* of capital mobility. There is a wide spectrum of possible situations depending, for example, on the extension and distribution of cost asymmetries between producers and the institutional arrangements established in the markets. Nonetheless, if it is necessary to define two poles, there would be a situation of free competition (absence of barriers to capital mobility) in one side and a market with blockaded entry (institutionalized barriers to entry and exit) on the other. In both situations, there is no necessary relation between the intensity of competition and the number of producers: there can exist free competition with one or few producers and blockaded entry with more than one producer.

Sraffa (1960, chs. 1 and 2) demonstrated that the existence of a physical surplus is a logical requirement for the existence of a positive rate of profit. Thus, in an economic system that produces surplus, the main function of relative prices is to distribute the economic surplus according to the norm of uniformity of wages and profit rate (not consisting in "indexes of scarcity" as in the marginalist theory) (Levrero, 2012, p. 85). Following a simple example where there is a surplus of wheat (575 – 280 – 120 = 175 quarters of wheat), but not of iron (20 – 12 – 8 = 0 tons of iron), this property can be more easily identified:

$$(280\ p_t + 12\ p_f).(1+ r) = 575\ p_t$$
$$(120\ p_t + 8\ p_f).(1+ r) = 20\ p_f$$

However, as both wheat and iron producers should obtain, by hypothesis, the same profit rate I, it is up to relative prices (mediated by competition) to redistribute the physical surplus in a "monetary" form. Given these conditions of production, even a 'man from the moon' would be able to perceive that the solution to this system of equations is $\frac{\text{price of one ton of iron}}{\text{price of one quarter of wheat}} = 15$ or $\frac{\text{price of one quarter of wheat}}{\text{price of one ton of iron}} = 1/15$ and r = 25% (Sraffa (1960, p. 7; Garegnani, 2005, p. 471-473).

The exploration of the conception of competition underlying the classical theories of value and distribution, following the broader project of reinterpretation of the history of economic thought initiated by Sraffa (1951, 1960), was originally carried

out by Clifton (1977), Roncaglia (1978), Arena (1979) and Eatwell (1982)[73]. As Sraffa did not explicitly discuss this subject in the "Production of Commodities", most of this reasoning has to be inferred from his references to long-period prices (natural prices or prices of production) and a uniform rate of profit (Sraffa, 1960, p. 6, p. 9), which are connected to the gravitation process that will be discussed henceforth.

1.4. The restoration of the classical theories of value and distribution

1.4.1. The gravitation of market prices towards natural prices

In Chapter 7 of "Wealth of Nations", Adam Smith made a distinction between absolute demand and effective demand. Absolute demand reflects aspirations of consumption for a given commodity. However, as Smith (1776, p. 73) exemplified, a poor person can wish a coach pulled by six horses, but this desire will not come true in normal circumstances. Effectual demand, on the other hand, consists of the demand of those who are able and willing to pay the commodity's natural price to obtain it. It is a demand backed by purchasing power, a demand that can be materialized. Smith assumes the existence of a certain pattern of consumption habits, taking the effectual demand of each commodity as given.

This concept of effectual demand played a key role in Smith's theory of prices (or "value"), developed in the same chapter. For this, the author distinguished two concepts: the market price and the natural price. The market prices are the actual, observed prices on a day-to-day basis in the market, which are affected by an infinity of causes, many of them unpredictable and untheorizable. They are influenced by the proportion between the quantity brought to the market and the effectual demand (Q^{ED}).

[73] Even though there is not a homogeneous interpretation of the classical conception of competition in the Sraffian perspective. Salvadori and Signorino (2010, p. 2) interpreted that the conception of competition employed by classical economists and early marginalist authors (most notably Marshall) was of as "rivalry in a race" following Smith's metaphor. Ian Steedman (1979) even made use of assumptions pertaining to perfect competition (Semmler, 1984a, p. 9), which gave ammunition for Shaikh (1980, p. 76; 1982, pp. 77-81; 2016, pp. 296-297, p. 313) to extend the notion of "perfect competition" to the Neo-Ricardian/Sraffian school as a whole. Throughout this dissertation, it will be shown that such characterization is unfair, considering that the Sraffian approach: i) rejects the assumption of atomism, a central element of the perfect competition model; ii) acknowledges the existence of persistent cost asymmetries among producers, so that intra-industry, inter-industry and inter-firm profit rates are expected to diverge; iii) recognizes that there is some dispersion of producer's prices within each industry, so that it does not rely on the "law of one price". In this way, producers are not assumed to be totally passive price-takers (an assumption which is derived from the atomistic characterization of competition), even though we are strongly opposed to the standard view that extraordinary profits can be explained by 'price rigidity' and/or the exercise of 'monopoly power'.

For classical political economists, "supply" (the quantity brought to the market) and "demand" (effectual demand) meant single quantities ("points") and not price-quantity relations (functions, curves or schedules) (Garegnani, 1983, p. 312; Aspromourgos, 2007, p. 41).

The market price is subject to most diverse accidental variations, so that it can hardly guarantee equality between the quantity brought to the market and the effective demand. Market prices are thus, in general, disequilibrium prices. If the analysis were to stop here, the market process could be characterized as unstable and apparently chaotic and a rather pessimistic diagnosis about the reproductive capacity of the capitalist system would be expected. There is, however, competitive mechanism that dilutes this initial impression.

Considering that producers always look for the most profitable opportunities, capital tends to flow from less profitable industries to more profitable ones. It is the mobility of capital that adjusts the industries' productive capacity and produces a long-period tendency for the quantity brought to the market to match effective demand. Despite the unpredictable or 'anarchic' (to use Marx's term) nature, they tend to converge in the long-period towards natural prices and to establish a uniform profit rate, imposing an order to the potential chaos.

In the *Principles of Political Economy and Taxation,* David Ricardo expressed great admiration for Adam Smith's gravitation analysis, stating that "In the 7th chap. Of the Wealth of Nations, all that concerns this question is most ably treated" (Ricardo, 1817, p. 89). However, unlike Smith, who proposed a trinitarian or 'adding up' theory of value, Ricardo did not conceive of the natural price as the sum of the natural rates of wages, profit, and rent of land (Sraffa, 1951, pp. xxxv-xxxvi). Considering that the price of corn was determined in the marginal land that does not pay rent, Ricardo was able to exclude it from the determination of price. Additionally, as the wage rate is considered to be uniform for each level of qualification (assuming free mobility of workers between different occupations), all market price variations are expressed solely on the actual rates of profit.

Thus, although "supply" and "demand" do not *determine* the natural price, they affect the markets' rates of profit and guide the displacement of capital migration, which, in its turn, allows the subsequent adjustment of production to the effective demands of each commodity. As Ricardo has put it:

> "It is only in consequence of such variations, that capital is apportioned precisely, in the requisite abundance and no more, to the production of the different commodities which happen to be in demand. With the rise or fall of price, profits are elevated above, or depressed below their general level, and capital is either encouraged to enter into, or is warned to depart from the particular employment in which the variation has taken place." (Ricardo, 1817, p. 87)

Karl Marx undertook an extensive critique of Political Economy throughout his several works. Among the criticisms, one can mention the effort that Marx made to differentiate the category of "value" from the "price" of a commodity, which would have been previously mistakenly taken as synonyms. He recognized, however, the influence of authors (especially Petty, Quesnay, Smith and Ricardo) on his theoretical formulation and condemned the vulgar (post-Ricardian) economists. Regarding the gravitation process, Marx was in agreement with the distinction between the market price and the natural price (or, as he preferred to call, the price of production) and the adjustments of production to effective demand (or, as he preferred to call, social demand).

In this way, despite the idiosyncrasies of each author, it is possible to identify a line of continuity between the contributions of Smith, Ricardo and Marx, contrasting it with the marginalist theory of price determination, founded on an equilibrium between functions (or "curves") of supply and demand (Garegnani, 1983, 1984). This difference can be visualized by a simple, but quite illuminating representation[74] from Garegnani (1983) of the process of gravitation of market prices towards natural prices proposed.

In the cases that the quantity brought to the market (Q) exceeds the effective demand (Q^{ED}), there is an excess of goods that cannot be absorbed at the natural price. Thus, a bargaining process is established between producers and buyers (which, in this situation, leans in favor of buyers) and the market price tends to settle at a level lower than the natural price[75]. In the opposite case, when the quantity brought to the market is inferior to the effective demand, the bargaining power leans in favor of the producers, who benefit from a market price higher above their natural level. In the fortuitous event

[74] This gravitation process will be presented in this section in a schematic way. For a survey of the formal debate about the gravitation process, see Petri (2021, ch. 10).

[75] The representation of market and natural prices as single points does *not* imply that all producers charge the exact same price. In fact, some dispersion of individual prices around such center points should be expected. This dissertation highlights, however, the structural factors that constrain such pricing decisions, which cannot be understood solely on the grounds of routine procedures ('rules of thumb') internal to enterprises (Serrano, 2012; Semmler, 1984, pp. 88-89, pp. 161-166, p. 192).

that the quantity brought to the market coincides with the effective demand, the market price is equivalent to the natural price.

Thus, it is in the interests of buyers that the quantity brought to market recurrently exceeds effective demand, so that prices remain constantly below the natural level. However, this situation results in rate of profit below the natural level (although possibly positive). Thus, it is not advantageous for producers to continue taking this quantity to the market, so that production tends to be readjusted downwards (through the reduction of the quantity produced by each producer, the migration of producers to more profitable activities or due to the bankruptcy of some of them). Consequently, the natural price consists in the lowest price that assures a production sufficient to meet the effective demand in the long period (Smith, 1776, pp. 72-74).

On the other hand, it is in the interest of the incumbent producers that the quantity brought to the market remains permanently below the effective demand, keeping the market price above the natural price and the market profit rate (r_M) above the natural profit rate (r_N). This situation deserves a closer analysis because the economic actors which are responsible for adjustments that drive market price towards the natural price do not have, in principle, "microeconomic" incentives to act in a way as to eliminate such mismatch (producers could maintain the current level of production or even reduce it). As long as there is the possibility of entry, however, new competitors will start producing such commodity in order to obtain the prevailing extraordinary profits. The mobility of capital thus induces increases in the quantity taken to the market until it coincides with the effective demand (Smith, 1776, p. 75).

If the quantity brought to market and the effective demand are equal, the market price and the natural price coincide, as well as the market rate of profit and the natural rate of profit. In this situation, there will be no incentive for producers to change their levels of production or for new competitors to enter the activity, thus creating a situation of "equilibrium" (at this point, the market price and the profit rate have no tendency to change).

These three situations are described by the following relations[76]:

[76] Steedman (1984) questioned the generality of these relationships, arguing that it is possible that branches of production with market prices above (below) the natural price may present a market profit rate below (above) the natural profit rate. Garegnani (1990a) agreed about the possibility of occurrence of such a phenomenon, but he demonstrated that this situation cannot occur for all goods at the same time, so that the gravitation process would not be compromised.

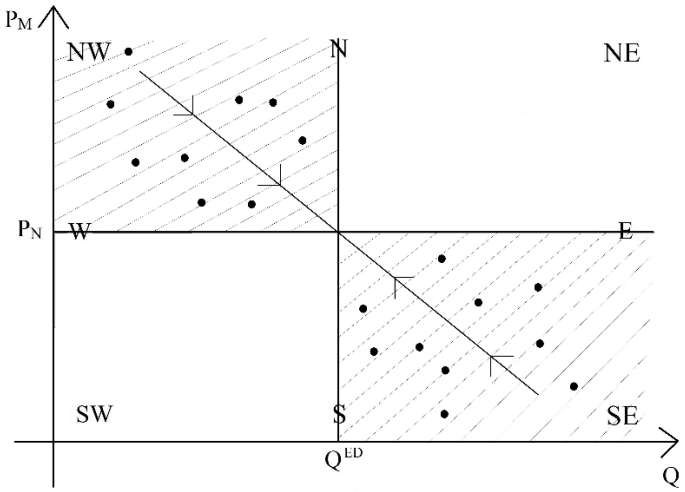
a) $Q < Q^{ED}$ or $0 < \frac{Q}{Q^{ED}} < 1 \Longrightarrow P_M > P_N \Longrightarrow r_M > r_N \Longrightarrow \Delta Q = Q_{t+1} - Q_t > 0$

b) $Q = Q^{ED}$ or $\frac{Q}{Q^{ED}} = 1 \Longrightarrow P_M = P_N \Longrightarrow r_M = r_N \Longrightarrow \Delta Q = Q_{t+1} - Q_t = 0$ (7)

c) $Q > Q^{ED}$ or $\frac{Q}{Q^{ED}} > 1 \Longrightarrow P_M < P_N \Longrightarrow r_M < r_N \Longrightarrow \Delta Q = Q_{t+1} - Q_t < 0$

In Figure 1, *effectual demand* and the quantities brought to the market are represented on the abscissa axis, while the natural price and the market prices are represented on the ordinate axis. Two lines are traced: a vertical one at the level of *effectual demand* and a horizontal at the level of the commodity's natural price. In this way, the first quadrant of this diagram is divided into four areas identified by cardinal directions: Northwest (NW), Northeast (NE), Southwest (SW) and Southeast (SE). The intersection between the directions North-South and West-East occurs at the natural price–effectual demand point.

Figure 1 – The classical process of gravitation



Source: Own elaboration based on Garegnani (1983)

In Figure 1, it is possible to visualize the three relations described in (7). Case a) must be located in the Northwest (NW), the situation b) is located at the effective demand-natural price point and case c) must be located in the Southeast (SE).

Market prices are "points", whose location in "cardinal" terms depends, as discussed earlier, on the ratio between the quantity brought to the market and the effective demand ($\frac{Q}{Q^{ED}}$). However, with the exception of case b), nothing else can be deduced about the location of this "point".

Cases a) and c) can give rise to an infinity of different "points", which are not directly related to the magnitude of $\frac{Q}{Q^{ED}}$ (although they are restricted to the interval defined by the cases themselves). That is, the value of $\frac{Q}{Q^{ED}}$ determines the sign of the deviation of the market price in relation to the natural price (positive, zero and negative for cases a), b) and c), respectively) but does not define (although it can influence) the market price level.

In this way, cases a) and c) are better represented by "areas", which can contain an infinity of possible points. Therefore, in the classical theory, there is no well-defined and negatively sloped demand curve for the commodity as in the marginalist theory (Garegnani, 1983, pp. 309-310).

Deviations of market prices from the natural price stem from an infinity of causes, many of them associated unique, non-recurring events which are not subject to generalization. However, in the presence of capital mobility, there is a tendency for the "supply" to adjust to effective demand in the long period, so that the natural price works as the "center of gravity" of market prices (it is an attractive force). The direction of this adjustment process is indicated by the arrows inscribed on the diagonal line in Figure 1 (which is *not* a demand schedule).

The prices out of equilibrium (*i.e.*, $P_M \neq P_N$) are merely descriptive and do not constitute a demand curve (which require that all points must be associated with consumer's equilibrium). Nor do the arrows situated in the North-West and South-East areas of Figure 1 should be interpreted as a negatively sloped demand curve, as they represent the necessary direction of the production adjustment for the existence of gravitation towards the natural price-effectual demand point. Price variations, in turn, are not associated with consumers' reactions (or an "empirical" demand elasticity), but with the revision of production decisions and specific market characteristics.

It should also be noted that the natural price does not consist of a mere algebraic average of market prices, as could be interpreted by Smith's characterization of the uniform rate of profit as "ordinary" or "average" rates (Smith, 1776, p. 72). The deviations of market prices located in the "Northwest" and "Southeast" of the natural price do not necessarily compensate each other.

The natural price consists of the long-period equilibrium price, which reflects the persistent determinants of the system, not being a simple algebraic average of occasional prices. It is, on the contrary, the erratic and apparently unintelligible

movement of market prices which is subjected to the more general logic of the natural price. Also, even if market prices oscillations could potentially offset each other over a certain period, changes in the natural price (resulting from a technical change, for example) could interrupt this process before it could be completed (Vianello, 1989a, pp. 102-105)

1.4.2. Market adjustments

Although most of the factors that affect market prices are unpredictable *ex ante*, this does not imply that they are necessarily unintelligible *ex post*. In *Wealth of Nations*, Adam Smith had already identified that the greater influence of non-controllable factors on agricultural production, such as the climate, tended to generate greater variability in the quantities of agricultural goods taken to the market and, consequently, a higher market prices' oscillation of these commodities in comparison to industrial ones, which are less vulnerable to the whims of nature. This does not necessarily imply that all agricultural production (let alone industrial production) has to be immediately dumped in the market. Depending on the degree of perishability and the cost of storing, the commodities can be retained hoping for better prices in the future (which introduces an inherently speculative dimension) (Smith, 1776, pp. 73-76; Vianello, 1989a, p. 97; Kurz and Salvadori, 1995, p. 335; Ciccone, 2011, p. 10; Aspromourgos, 2007, p. 48).

In this sense, it is possible to identify some characteristics of the product (susceptibility to spoiling due to fragility and perishability, viability and cost of maintaining the commodity in inventories), characteristics of production (degree of control over the production process, degree of idle capacity, speed of production adjustments, etc.), institutional aspects of the market (product standardization and quality control, the existence of organized auctions, susceptibility to financial speculation, etc.) and even of the economic conjuncture (e.g., the need for companies to obtain revenue quickly in a recession, leading to distress sales) that affect the variability of market prices over time, as well as the type of adjustment that occurs in disequilibrium.

Let us consider that, on a given day, fishermen manage to catch a certain amount of fish, which are then transported to be sold in the market. If this quantity taken to the market exceeds the effective demand, it is expected that sellers accept significant price reductions in the fish market. This is explained by the fact that, although prices are not

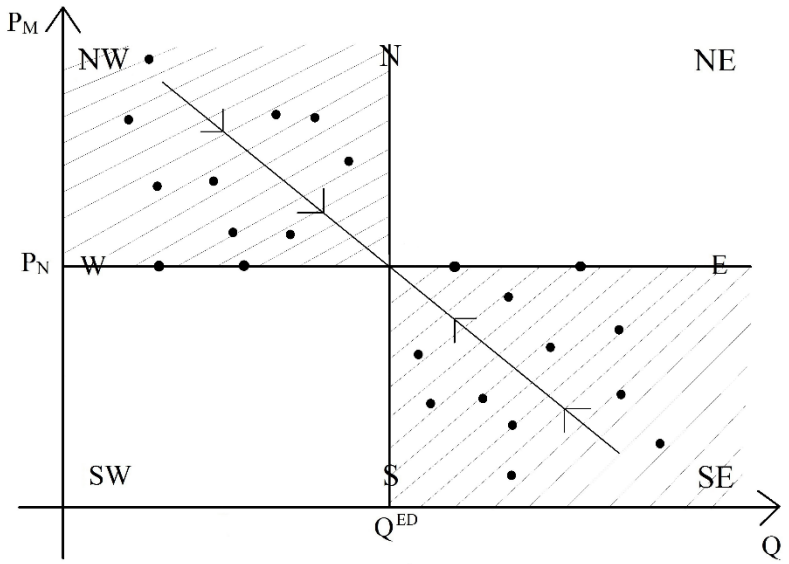
very favorable to the suppliers, it is certainly better to sell at lower prices than seeing its product spoiling. Thus, given the high perishability and high cost of storage (associated with the maintenance of a refrigeration system), the adjustment in disequilibrium tends to occur almost exclusively on market prices (as the seller tries to "get rid of" the commodity)[77] (Petri, 2004, pp. 21-22). In this situation, market prices tend to be located in lower areas of the southeast quadrant of Figure 2.

We can now picture a symmetrical situation in which the quantity brought to the market falls short of the effective demand, due to a crop failure or the isolation of a city due to a natural catastrophe. In these cases, the bargaining process leans in favor of the producers or holders of the goods, so that the market price tends to increase considerably, being more located in higher areas of the northwest quadrant of Figure 2. This situation ends up harming the poorest, who do not have the purchasing power to access the merchandise at such a high price. In this way, the "deficiency" that Smith (1776, p. 74) refers to is not related to the marginalist notion of scarce resources and unlimited desires, but to the physical, absolute impossibility of the quantity brought to the market to meet the needs of all individuals (there including limited ones, such as basic foodstuffs) (Aspromourgos, 2007, p. 38, p. 48). In this case, the price works as a mechanism of indirect rationing.

It is also possible to envisage a situation where producers have the capacity to maintain considerable inventories and the commodity's characteristics do not deteriorate considerably over time (for example, the automotive industry). In this case, differences between the quantities brought to the market and the effective demand tend to be expressed in variations in the quantity sold, in the size of inventories and eventually in the length of the waitlist, with market prices being situated at the level of the natural price on the east and west axes of Figure 2.

[77] It was not by chance that Marshall (1920, p. 290, p. 314) used the fish market as an example for his theory of market prices. It should be noted that, despite a certain proximity between the Marshallian theory of market prices and the classical formulation, important distinctions persist. Marshall's market price is determined by an equilibrium between a downward sloping demand curve and a vertical supply (Ciccone, 1999, p. 66). In classical theory there is no well-defined demand curve and the quantity brought to the market cannot be represented by a vertical supply curve (Aspromourgos, 2007, p. 47) and the market price is usually determined in disequilibrium.

Figure 2 – Market adjustments in disequilibrium



Source: Own elaboration based on Garegnani (1983)

Thus, the equations (7) can be modified in the following way to incorporate the possibility of equality between the market price and the natural price in situations a) and c):

$$\text{a)}\quad Q < Q^{ED} \text{ or } 0 < \frac{Q}{Q^{ED}} < 1 \Longrightarrow P_M \geq P_N \Longrightarrow r_M > r_N \Longrightarrow \Delta Q = Q_{t+1} - Q_t > 0$$

$$\text{b)}\quad Q = Q^{ED} \text{ or } \frac{Q}{Q^{ED}} = 1 \Longrightarrow P_M = P_N \Longrightarrow r_M = r_N \Longrightarrow \Delta Q = Q_{t+1} - Q_t = 0 \quad (8)$$

$$\text{c)}\quad Q > Q^{ED} \text{ or } \frac{Q}{Q^{ED}} > 1 \Longrightarrow P_M \leq P_N \Longrightarrow r_M < r_N \Longrightarrow \Delta Q = Q_{t+1} - Q_t < 0$$

Thus, even though market prices have an inherently unpredictable nature, they are not completely random. Certain factors tend to generate regularities that can be identified and better understood by empirical and/or historical-institutional (inductive) analyses, which are abundant in Industrial Organization. What is proposed here is that discussion about the type of adjustment that takes place in disequilibrium, although very important, is theoretically distinct from the analytical (deductive) determination of long run equilibrium prices. To put in another way, the price-quantity disequilibrium adjustment mix does not affect the viability of gravitation. In any case, producers have the incentives to adjust production towards the level of effectual demand.

In cases that the adjustment occurs entirely via undesired changes in inventories, it is expected that the producer will alter his future production decision in the light of

the result immediately obtained (or a moving average of previous results). In the case of adjustment via price reductions, it is also reasonable to assume that producers will not maintain the quantity previously produced, which did not guarantee a minimum profitability. In the case of adjustment via price increases, there is a tendency for an increase in the industry's production, as entry is encouraged and established companies attempt to defend their market shares[78]. In the infinity of other adjustment possibilities that combine price and quantity variations, the general logic remains the same.

It should be noted that in none of these situations (and not only on the east-west axis) price is able to play a market-clearing role. On the contrary, the very need for a price and/or quantity adjustment stems from the fact that the disequilibrium (quantity brought to the market ≠ effective demand) is irreversible. In a market economy, except for cartel situations, there is no mechanism to guarantee *ex-ante* coordination between producers. Nor can producers perfectly identify effective demand (unlike the Marshallian short-period price that requires firms to know consumers' "preferences"), so that the quantity brought to market by each producer is based on imperfect expectations about the actions of other producers and the pattern of demand, which are unlikely to be materialized. Thus, apart from the fortuitous case in which the quantity brought to the market coincides with the effective demand, adjustments in disequilibrium are inevitable, given that the "supply" is derived from decisions that were taken in the past and cannot be instantly revised.

From a theoretical point of view, what is essential for the gravitation process is, firstly, the direction (the sign) of the deviation of market prices in relation to natural prices and, secondly, the reaction of producers to these disequilibria occurs in the direction of eliminating them (Vianello, 1989a, p. 98). Having already discussed the first point, we can now turn to the nature of output adjustment.

It was argued before that the production of each commodity tends to follow its effective demand in the long-period. It is thus necessary to distinguish between transitory and permanent variations in effective demand. The first one can be visualized by a famous example by Adam Smith. During national tragedies, such as the death of an important authority, natural disasters or war casualties, public mourning can be instituted. On those occasions, the demand for black cloth tends to increase and the

[78] Thus, with the exception of a case of well-coordinated collusion with blockaded entry, producers have an incentive to increase their production until the point of effective demand-natural price is reached.

demand for colored cloth to decrease, raising the price of the former and reducing the price of the latter (Smith, 1776, p. 73).

It is reasonable to assume that some accommodation of production will occur to meet the immediate configuration of demand, but it is unlikely that any producer will make considerable investments to meet this demand founded on such fleeting bases. This picture can be contrasted with an alternative situation in which the change the "tastes" for clothing (or in "fashion") modifies the demand for black cloth over a longer-lasting (or "permanent") period, stimulating the inflow of capital.

Following Vianello (1989a, p. 96), we can consider three ways in which divergences between the market price and the natural price can be eliminated. The first way consists in the spontaneous disappearance of the cause of the disequilibrium. Anomalous situations such as public mourning tend to dissipate over time, causing effective demand to return to its original position. The second way, which precedes the spontaneous disappearance of the cause, consists in the occurrence of transitory flows of capital that allow an immediate response of production. This category includes already established producers diverting their production to meet exceptional demand (tailors who start to work more with black cloth, in Smith's example) or the entry of new producers into the activity when the barriers to exit are not significant. The third way consists in the occurrence of permanent capital flows, which aim to exploit lasting movements in effective demand.

The separation between transitory and permanent factors, defined here at a very high level of abstraction, is not a simple task to be carried out in everyday business practices. One may not know what were the factors that gave rise to changes in demand, which makes it difficult to assess whether such a situation will last or not. Returning to Smith's example, a producer of black cloth who is not aware that there has been public mourning may misinterpret a temporary phenomenon as a permanent change, making investments that will not prove profitable later. Time is, as expected, the crucial factor for demarcating between transient and permanent phenomena. Depending on the period of public mourning, for example, the construction of new productive capacity may or may not be profitable (Vianello, 1989a, p. 93). If such duration is not known in advance, business decisions will need to be guided by the intuition of their owners or managers.

These difficulties can be mitigated, however, by expanding the scope of the mechanisms responsible for adjusting production to effective demand. Until now, it was

considered that, when the quantity brought to the market falls short of the effective demand, the entry of new producers in the activity would produce a tendency to eliminate this divergence. However, as it was highlighted by Roberto Ciccone, adjustments of production to effective demand through changes in the degree of capacity utilization are fully consistent with the classical theory of prices and competition. In fact, variations in the degree of utilization are the most immediate form of capital mobility (allowing a faster response from production than in the form of new investment[79]) (Ciccone, 2011, pp. 3-7).

The adjustment of production through changes in the degree of utilization does not invalidate, however, the possibility of entry by new producers. Both mechanisms contribute to the convergence of the quantity brought to the market to the effective demand.

When the quantity brought to the market exceeds effectual demand, the market price situates itself below the natural price and the lower profit rate discourages production. The subsequent reduction in production can happen by producers exiting the market (as a result of bankruptcy or as an autonomous decision) or by the reduction of the degree of capacity utilization (increase in the unplanned idle capacity). Contrarily, when the quantity brought to the market falls short effective demand, the market price is positioned above the natural price and the higher profit rate encourages production. The increase in the production can happen by the entry of new producers in the market, the addition of new capacity by incumbents or by an increase in the degree of capacity utilization.

There is, in any case, a tendency for the quantity brought to the market to adapt to the effective demand and, consequently, for the market prices to converge to the natural price (situation in which the incentives for capital movements ceases to exist). The existence of capital mobility (or, in other terms, the operation of the classical conception of competition) is thus a precondition to the validity of the gravitation of market prices around the natural price (represented by the arrows situated inside the North-West and South-East areas).

In the classical approach and in the analyses of several industrial economists, such as Andrews, Sylos-Labini and Steindl, prices are calculated at a normal, planned or

[79] Ciccone (1986, 2011) and Garegnani (1990a, 1992) associate the classical hypothesis of profit rate uniformity with *new capital flows* since, as capital already materialized in the form of capital goods presents a low degree of mobility.

desired degree of capacity utilization (Ciccone, 1986, p. 24; Ciccone, 2011, p. 1; Vianello, 1989b, p. 165; Aspromourgos, 2007, pp. 50-51; Freitas and Serrano, 2017, p. 72). This can be interpreted as if all quantity adjustments had already taken place at the (logical) moment of price determination or, alternatively, that produced quantity adjustments do not affect the pricing process, which keeps the degree of normal utilization as a reference. As Freitas and Serrano argue, normal price can be effective even when the degree of utilization is distant from the normal level, as long as there is potential competition (the threat of entry, the willingness of producers to enter the market):

> "Note that we can make the assumption of normal prices at this stage of our analysis even when dealing with situations in which the actual degree of capacity utilization can be quite different from the normal or planned degree, for under classical competition, individual firms do not have the power to sustain higher-than-normal market prices when the actual degree of capacity utilization of a particular firm is below (or very much above) the normal level and their actual unit costs are higher than normal. Indeed, at higher than normal prices other firms already in the market may be operating at the planned degree of utilization and can easily increase their market shares by undercutting the firms that have raised prices above the normal price. Moreover, these higher prices may also attract new entrants to the market, which would also be able to operate their appropriately sized new capacities at the planned degree of utilization and reap higher than normal profits by undercutting incumbent firms that have raised prices to pass along their higher than normal actual average costs to market prices. Thus, both actual competition of existing firms as well as potential competition of new firms would ensure that effective demand will be met at the normal price even if the actual degree of capacity utilization is quite different from the normal or planned degree." (Freitas and Serrano, 2015, pp. 260-261)

It is now possible to better specify the importance of the separation between prices and quantities. In the classical theory of natural prices, it is assumed that the quantities brought to each market are equal to their respective effective demands, so that a uniform minimum rate of profit prevails in all markets, and that prices are calculated to a normal or planned degree of utilization (Vianello, 1989b, p. 165). In this sense, the quantities of each market are considered as "given" but definitely are not random. On the contrary, they must consist of the exact magnitude to match the effective demand and allow the explanation of system prices in terms of long-period equilibrium. In summary, for purposes of determining relative prices, it is assumed that the gravitation process has already occurred.

The analysis on quantity is left to be carried out separately, considering that changes in the degree of utilization, in the expansion of productive capacity, the

addition of new capacity by entrants or the reduction of industry's capacity due to exit of established producers are capable of adjusting the quantity brought to the market to effective demand.

1.4.3. Sraffa's system of equations and the general rate of profit

In the chapter 2 of *Production of Commodities,* Sraffa proposed a solution to the "problem of value", that is, the determination of relative prices. Taking as given the (dominant) methods of production, a distributive variable (real wage or rate of profit), the level and the composition of the social product, it is possible to determine endogenously relative prices and the residual distributive variable (rate of profit or real wage). Considering that the rate of profit I is uniform and that wages are paid *post-factum*[80] (*i.e.*, considering that the rate of profit is not applied to the wage-bill), the system is represented by Sraffa (1960, p. 6) in the following way:

$$(A_a.p_a + B_a.p_b + ... + K_a.p_k)(1 + r) + L_a.w = A.p_a$$
$$(A_b.p_a + B_b.p_b + ... + K_b.p_k)(1 + r) + L_b.w = B.p_b$$
$$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$
$$(A_k.p_a + B_k.p_b + ... + K_k.p_k)(1 + r) + L_k.w = K.p_k$$

$$A_w.p_a + B_w.p_b + ... + K_w.p_k = w$$

Where A_a, B_a, ..., K_a represent, respectively, the quantities of commodities 'a', 'b', ..., 'k' necessary for the production of A units of the commodity "a" ; A_b, B_b, ..., K_b represent, respectively, the quantities of commodities 'a', 'b', ..., 'k' necessary for the production of B units of the commodity 'b'; and thus successively until the last line of the system where A_k, B_k, ..., K_k represent, respectively, the quantities of commodities 'a', 'b', ..., 'k' necessary for the production of K units of the commodity 'k'. The direct amount of labor employed in the production of the quantities A, B, ..., K of the commodities 'a', 'b', ..., 'k' are represented by L_a, L_b, ..., L_k. The quantities of each commodity contained in the consumption basket of workers (necessary goods for subsistence or physical real wage) are represented by A_w, B_w, ..., K_w. The prices of

[80] The payment of wages at the beginning or at the end of the period of production does not greatly affect the theoretical results. In reality, the most common practice depends on the agreed between parties or institutionalized interval of payment (weekly, monthly) and the average duration of the industry's period of production (a film producer might have to advance wages for years before obtaining profits, while a bakery owner can produce hundreds of batches before having to pay the baker).

commodities ‘a’, ‘b’, ..., ‘k’ are represented, respectively, by p_a, p_b, ..., p_k and the nominal wage is represented by w (Sraffa, 1960, pp. 184).

With a few changes in notation, we obtain the following equivalent system:

$$(A_{11}.\ P_1 + A_{21}.p_2 + ... + A_{n1}.p_n).(1 + r) + L_1.w = X_1.p_1$$
$$(A_{12}.\ P_1 + A_{22}.p_2 + ... + A_{n2}.p_n).(1 + r) + L_2.w = X_2.p_2$$
$$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$
$$(A_{1n}.\ p_1 + A_{2n}.p_2 + ... + A_{nn}.p_n).(1 + r) + L_n.w = X_n.p_n$$

$$A_1^w.\ p_1 + A_2^w.\ p_2 + ... + A_n^w.\ p_n = w$$

Where A_{ij} consists in the necessary quantity of the input I for the production of X_j units of the commodity j, L_j consists in the direct amount of labor employed in the production of X_j, A_1^w, A_2^w, ... , A_n^w reflect the quantities of each commodity contained in the real wage and $p_1, p_2, ..., p_n$ are the prices of each commodity. Dividing each of the n equations of the system by X_j, we arrive at:

$$(a_{11}.p_1 + a_{21}.p_2 + ... + a_{n1}.p_n).(1 + r) + w.l_1 = p_1$$
$$(a_{12}.p_1 + a_{22}.p_2 + ... + a_{n2}.p_n).(1 + r) + w.l_2 = p_2$$
$$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$
$$(a_{1n}.p_1 + a_{2n}.p_2 + ... + a_{nn}.p_n).(1 + r) + w.l_n = p_n$$

$$A_1^w.\ p_1 + A_2^w.\ p_2 + ... + A_n^w.\ p_n = w$$

Where a_{ij} represents the quantity of the commodity I needed to produce one unit of the commoditity j ($a_{ij} = \frac{A_{ij}}{X_j}$) and l_j represents the direct amount of labor needed to the production of one unit of the commodity j ($l_j = \frac{L_j}{X_j}$)[81].

The above system of equations has n + 1 equations (n price equations and the nominal wage equation) and n + 2 unknowns (n prices, the profit rate and the real

[81] In this way, it is possible to represent Sraffa’s system with the input-output notation, following for important references such as Pasinetti (1977, ch. 5), Schefold (1989), Kurz and Salvadori (1995) and Petri (2021, ch. 2). The system can also be represented in matrix terms as:

$$A.p.(1 + r) + w.l = p$$

$$w = b.p$$

where $A_{nxn} = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{bmatrix}$, $l_{nx1} = \begin{bmatrix} l_1 \\ \vdots \\ l_n \end{bmatrix}$, $p_{nx1} = \begin{bmatrix} p_1 \\ \vdots \\ p_n \end{bmatrix}$, $b_{1xn} = [A_1^w \quad \cdots \quad A_n^w]$, and ‘r’ and ‘w’ are scalars.

wage). Taking one distributive variable as given, it is then possible to determine the system of prices[82] and the other distributive variable residually.

Sraffa did not provide a mathematical proof of existence, limiting himself to count the number of equations and unknowns. A satisfactory solution can be given, however, with the application of the Perron-Frobenius Theorem (see, for example, Pasinetti, 1977, ch. 5; Kurz and Salvadori, 1995, ch. 4; Petri, 2021, secs. 2.1-2.3).

1.5. Concluding remarks

The Sraffian approach has questioned the internal logic of the marginalist apparatus of supply and demand of both partial and general equilibrium. It also provided an alternative inter-sectorial theoretical framework for determining long-period prices and income distribution, explaining the orderly (although not necessarily efficient or "optimal") outcomes of market processes.

We have examined the basic methodological and theoretical assumptions of the surplus approach to value and distribution, emphasizing that they reveal very different understandings of production, technology and competition compared to the marginalist approach. Next, it was presented the classical determination of relative prices and the general rate of profit and the process of adjustment towards such reference points ("existence" and "stability" of the systemic equilibrium, respectively).

[82] In order to obtain relative prices, it suffices to take a price as a numerary and express all the other prices in terms of this commodity.

Chapter 2 – The emergence of the Industrial Organization field

2.1. Introduction

This chapter provides an overview from the first industrial organization studies from the late nineteenth century to the consolidation of the SCP approach, which constituted the mainstream of Industrial Organization in the post-war period.

The next section highlights the growing social and academic interest in competition during the late nineteenth and the beginning of the twentieth centuries, which were influenced by a series of historical transformations (technological, political, institutional, legal). There was a considerable expansion of studies about real markets in this period, showing that theoretical and methodological eclecticism was a part of the Industrial Organization field even before its official birth.

The third section examines the origins of the two main textbook competition models: monopoly and perfect competition. It is argued that while the former was considerably developed by the late nineteenth century, the latter appeared in a more complete form only in the 1930's. Nonetheless, both models differ greatly from what the classical economists had in mind when they referred to 'monopoly' and 'free competition'.

The fourth section points out that the formulation of a specific model to explicitly deal with competition among few producers appeared relatively early in the history of economic thought, with Cournot's work in 1838. After the Marginalist Revolution, the oligopoly model was reconsidered and discussions about market 'frictions' or 'imperfections' were undertaken by Bertrand, Edgeworth, Wicksell, Marshall, Pigou and others. In the 1930s, the imperfect/monopolistic competition models portrayed a particular type of 'friction' (product differentiation). However, it soon became clear that the simplicity of such models depended on restrictive assumptions, and relaxing some of them would lead back to oligopoly analysis. The latter approach had several deficiencies and could not guide the research in Industrial Organization at that time, a scenario which took nearly half a century to change.

The fifth section presents the early schools of Industrial Organization thought in the 1930's in the United States and Europe. It is also discussed some institutional milestones from the 1940's and 1950's that mark the appearance of Industrial Organization as an independent field.

The sixth section examines the formation of the Structure-Conduct-Performance (SCP) paradigm, which solidified the independence of this branch of knowledge from microeconomics. Its origins can be traced to the Harvard University, particularly Edward Mason's work. It was Joe Bain, however, who achieved the most relevant theoretical advances. He formalized into a simple model the deep-rooted concern with concentration, developed the concept of barriers to entry, and attempted to reconcile both views within the SCP schema. Other authors, however, aimed to ease the initial structuralist message by introducing elements of conduct into the multiple regressions. It will also be discussed the formulation of the limit-price by Bain, Sylos-Labini, Modigliani, and the subsequent debate that gave rise to the B-S-M model, which is commonly presented in Industrial Organization textbooks as representative of this theory.

2.2. The origins of Industrial Organization Thought

In the decades that followed the Marginalist Revolution, this new theoretical approach achieved considerable advances, obtaining growing influence on universities and society. The apparatus of supply and demand then started to be applied in studies about real markets. Alfred Marshall had a great impact on this field: in addition to his most known work *Principle of Economics* (originally published in 1890, but successively edited until 1920), he also showed detailed empirical knowledge in other books such as *The Economics of Industry* (1879) – written in collaboration with his wife, Mary Paley – and *Industry and Trade* (1919). Several other authors – such as John Bates Clark[83], Henry Carter Adams, Richard T. Ely and Charles Bullock – also made important contributions to the application and development of microeconomic concepts (Shepherd and Shepherd, 2003, p. 21; Phillips and Stevenson, 1974, pp. 328-331).

These developments were crucial so that the marginalist theories of value and distribution, which were originally conceived in a very abstract – and unrealistic – manner, could start to be seen as "tools" that could be applied to solve problems that afflicted society. At that time, there was not such a clear contraposition between two

[83] John Bates Clark was concerned with the growing power of trusts and its negative effect on consumers' welfare, being one the first economists to engage into the antitrust debate (Cubero, 2010, p. 32, p. 45). Among his vast writings on this subject, we can cite the book *The Control of Trusts*, originally published in 1901 and later re-edited with his son John Maurice Clark.

rival theoretical traditions or analytical structures – classical *versus* marginalist –, as it is often portrayed by the Sraffian interpretation of the history of economic thought.

One reason for this was that Marshall, unlike the early marginalists, opted for a more diplomatic rhetoric towards the intellectual legacy of Classical Political Economy. According to the author, the Marshallian cross would constitute a more general theoretical framework which combined the Utilitarist tradition (the subjective basis of the demand curve) with the classical analysis of the costs of production analysis (allegedly preserved in the supply curve). The view that Marginalism developed and enhanced the classical theory became very influential[84]. Over time, such interpretation was enlarged and extended to include not only the Marshallian partial equilibrium analysis, but also the general equilibrium approach, the international trade theory[85], etc..

Another reason for the increasing popularity of the neoclassical theory lies on the fact that the most important debates between the last quarter of the 19th century and the beginning of the 20th century regarded not so much as what would be the most adequate deductive model to explain the economic reality but rather if deduction itself was the most adequate method to the economic science. Different schools of thought – such as the German Historical School, the American Institutionalism and the Marxist Schools – criticized the classical and neoclassical economic thought because of their usage of deduction and advocated for more inductive, historical approaches[86].

Arida (1996, p. 22) argued that the marginalist triumph in such methodological debates, together with the theoretical victory over the classical theory of value, were key to the construction of their hegemony in the economics profession. It is possible to argue, alternatively, that one of the biggest strengths of the neoclassical tradition lies on its ability to absorb criticisms without impairing its theoretical core. The field of

[84] Such interpretation was even endorsed, for different reasons, by important heterodox authors such as Veblen (1900), who coined the expression "neoclassical", and Keynes (1936, p. 3), which included the Classical Political Economy and Marginalism in the same category of the "classical theory", despite recognizing the possibility of perpetrating a solecism.

[85] For example, according to the *Non-Substitution Theorem* developed by Koopmans, Samuelson, Georgescu-Roegen and other authors, the classical model would consist of a particular case of the general equilibrium model, characterized by constant returns of scale, the exogenous determination of a factor price and the absence of joint production. The neoclassical Heckscher-Ohlin-Samuelson model of international trade, on its turn, is often presented as a generalization of the "one factor" Ricardian model.

[86] It can be argued that "heterodox" authors at that period took an extremist position, rejecting not only the axiomatic, *hypothetico-deductive* models of the marginalist approach, but also many interesting theoretical elements contained in the works of the classical political economists and Marx (Levrero, 2014, ch. 1).

Industrial Organization illustrate well such "sponginess" (Foss, 1998, p. 3), as historical-institutional elements were combined with the original marginalist apparatus[87] [88]. In this sense, this branch of economics can be regarded as a middle ground in the battles of methods (Howe, 1978, p. 4; Lee, 1985, pp. 2-4; Mosca, 2016, p. 293).

The dissatisfaction towards the rising marginalist economics can be associated with the high level of abstraction and mathematization in which the theory was built, which seemed incapable of explaining the economic processes in a realistic way. Such preoccupation had a lot to do with the rapid and profound industrial and institutional[89] transformations that were taking place at that time. The growing size of industrial plant sizes, the rising number of mergers, acquisitions and vertical integration practices, the expansion of corporations, the increase in markets' concentration and the frequent presence of collusive behavior challenged the neoclassical view that the economic system harmonically conciliated the individual decisions taken by rational self-interested independent agents.

In the United States, the social dissatisfaction reached such a point that the Congress decided to take the initiative and established the *Sherman Act* in 1890, later amended by the *Clayton Act* (1914) (Carlton e Perloff, 2000, pp. 602-603; Motta, 2004, pp. 1-4; Viscusi *et al*., 1995, p. 62). Although traditionally dominated by lawyers, the antitrust analysis drew the economists' attention quite early. Industrial Organization theory has had thus, since its beginning, a close relation to the antitrust policy.

[87] For example, John Bates Clark, a prominent marginalist author (one of the proponents of the marginalist theory of distribution and a pioneer of Industrial Organization), was deeply influenced by American Institutionalism (Hovenkamp, 1991, p. 315; Mosca, 2016, p. 293, p. 295).

[88] Alfred Marshall was particularly skillful in combining deductive with inductive reasoning (adopting not only a theoretical conciliatory position but also a methodological one). There was already a long tradition of British historical economists and Marshall avoided direct confrontations (Spiegel, 1991, pp. 408-409; Colander and Landreth, 2002, pp. 338-339; Ekelund and Hébert, 2014, pp. 475-479; Lee, 1985, p. 3). This type of posture may indicate why it did not occur a methodological battle in Britain, as it happened in the Continental Europe and on the other side of the Atlantic.

[89] Another important technical and institutional factor was the development of metrology. Although the general aspects of this field can be dated way back to the Ancient World, it is clear that it went through considerable progress since the 18th century (spurred by Illuminism and the French Revolution) (Fanton, 2019, pp. 2-4). Great advances were achieved at the second half of the 19th century, so that at the turn of that century many of the industrialized countries had already set up their National Metrology Institutes (Wallard, 2007, p. 14). The higher degree of standardization was crucial to industrial growth, particularly in the case of capital goods. Here may lie an interesting relation between history and theory: the very consideration of particular industries composed by firms that produce goods with close substitutes bears in it a particular institutional background.

In sum, the development of the early studies in Industrial Organization was stimulated by several events:

i) The ascension and diffusion of the marginalist theory;

ii) The occurrence of methodological debates both in Europe and in the United States regarding the deductive and inductive methods;

iii) The changes in the structure of markets (increase in plant sizes, mergers, acquisitions and new technologies which we now recognize as part of the Second Industrial Revolution) and firms[90] (separation between ownership and control, limited liability, vertical integration, new business strategies);

iv) The growing need for economic analyses regarding the economic effects of increasing concentration and certain anticompetitive conducts (which we now know as refusal to deal, tying, price discrimination, etc.) and policy recommendations for improving competition.

So, although the study of industry is as old as economics itself (Phillips and Stevenson, 1974, p. 324; Lee, 1985, p. 1), it can be said that it was in the end of the nineteenth century that a more specialized intellectual production started to appear (although the formal emancipation of the Industrial Organization field was only achieved in the post war period).

2.3. The birth of the standard textbook competition models

2.3.1. The ways towards perfect competition

The way in which the two conceptions of competition were presented in the Introduction may seem a little alien to most readers. The microeconomic and Industrial Organization literature, particularly textbooks, usually address the competition theme by exposing different competitive situations – each one of them characterized by a good

[90] As Schmalensee (1988, p. 643) remarked, "Industrial economics emerged as a distinct field after the rise of the large modern manufacturing corporation around the turn of the century (Chandler, 1977; Hay and Morris, 1979, ch. I)."

number of hypotheses –, which are later compared and evaluated. The benchmark is, as we all know, the perfect competition model.

As it was argued before, Physiocrats, Smith, Ricardo and other classical economists advocated indeed for *laissez-faire*, liberal economic policies, but their theoretical reasoning was very different from the marginalist one. Particularly with respect to competition, the defense of "free markets" certainly was not related to the normative conception of perfectly competitive markets.

From the writings of the early political economists such as Boisguillebert, Cantillon and Turgot to the contributions in the end of the classical period of Cairnes (1874) and Bagehot (1876), competition was examined as mobility of capital and labor between occupations. Even Samuel Bailey and Nassau Senior, Ricardo's influential critics, approached competition in such manner rather than in terms of the demand conditions faced by individual producers (Backhouse, 1990, pp. 61-62; Arena, 1979, pp. 145-147).

The dominant view about competition began to change with the Marginalist Revolution, as Cournot's contribution was recovered, refined and integrated into a new theory of value and distribution. The original marginalists such as Walras, Marshall and Wicksell thus attempted to explain how markets worked by making use of hypotheses derived from two distinct theoretical origins: the (classical) notion of free capital mobility and the (Cournotian) assumption of a large number of producers in the market (Eatwell, 1982, pp. 217-218).

The late nineteenth century economists also discussed other market characteristics that were later listed among the hypothesis of the perfect competition model, such as the 'law of the one price' implied in Jevons's law of indifference, the degree of homogeneity of commodities and the availability of information to traders in Walrasian general equilibrium analysis or the technological assumption of constant returns to scale by Wicksell and other marginalist authors.

It is even possible identify in the writings of marginalist authors that referred to competition as "perfect". Jevons (1871, pp. 86-87) defined a theoretically perfect market as a situation in which there is perfect knowledge and the absence of conspiracies. Wicksell made several references to "perfect competition" in his *Lectures Of Political Economy* (Wicksell, 1901, p. 83, p. 112, p. 120, p. 130, p. 229, p. 265, p. 286). In the *Manual of Political Economy*, Pareto (1906, p. 81) used the expression "more perfect" to gradate the competition's intensity. Edgeworth (1881, pp. 18-19)

listed four conditions for the existence of a "perfect field of competition" while discussing the contract-curve (Backhouse, 1990, pp. 68-70, p. 77; Stigler, 1957, pp. 6-7).

In the first edition (1890) of the *Principles of Economics,* Marshall assumed "… that the forces of demand and supply have free play in a perfect market …" (Marshall, 1890, p. 402). In the eight edition (1920), however, Marshall re-wrote the same sentence (Marshall, 1920, Book V, chapter 3, §4) without the words "in a perfect market" (Groenewegen, 2005, p. 5).

So, although the notion of perfect competition was mentioned by multiple authors with slight terminological variations and distinct analytical depths, there was no consensus about the meaning of such expression. Henry Moore's *Paradoxes of Competition* (1906), the first article explicitly devoted to the issue of competition, serves as an evidence of a lack of agreement regarding the meaning of competition or, more specifically, perfect competition (Mosca, 2016, p. 296).

In this paper, Moore (1906, pp. 213-215) made efforts to systematize the requirements for a perfectly competitive market: (1) "Every economic factor seeks a maximum net income"; (2) "There is but one price for commodities of quality in the same", in line with Cournot (1838, p. 66) and Jevons (1871, p. 91); (3) "The influence of the product of any one upon the price per unit of the total product". Moore (1906, p. 214) attributes to Pareto (1896-97, p. 20) the paternity of the association between free competition and the price taking behavior (Mosca, 2005, p. 6); (4) "The output of any one producer is negligible compared with the total output"; (5) "Each producer orders the amount of his without regard to the effect of his act upon the of his competitors".

The aim of such list was to demonstrate the necessary hypotheses for perfect competition which were usually only implicit in the economic reasoning. Moore considered that the lack of a precise definition facilitated the emergence of what he called a "paradox": "the methodological fallacy which it is wished to mark consists in the extension of the method of reasoning relative to perfect competition, in the sense of the five hypotheses, into territories where only a part of the five hypotheses obtain ..." (Moore, 1906, p. 216). The author objected to the use of perfect competition reasoning while: (i) "approaching the problems of actual industry, - which, to a large extent, is in a state intermediate between perfect monopoly and perfect competition" (Moore, 1906, p. 215) (ii) discussing the doctrine that the laborer gets as wages what he produces. In other terms, Moore argued that the (marginalist) theory of distribution was not

independent of the conditions of competition[91] (being understood, in a Cournotian way, as the number of producers) (Moore, 1906, pp. 212-213, pp. 226-227, p. 229).

However, the development and the diffusion of the characterization of a perfectly competitive market would not be complete until the theoretical developments of the 1920's[92] and 1930's.

Frank Knight's *Risk, Uncertainty and Profit* (1921) is cited by many authors as the first attempt[93] to explicitly define an idealized model of competition, listing some of the necessary conditions for perfect competition and emphasizing its importance to the development of the pure microeconomic theory (Stigler, 1957, pp. 11-14; McNulty, 1967, p. 397; Eatwell, 1982, pp. 217-218; Machovec, 1995, pp. 11-12, pp. 269-270; Gronewegen, 2005, p. 12; Mosca, 2016, p. 296).

Another important milestone for the establishment of the perfect competition model was (ironically) the development of the imperfect and monopolistic competition models by Joan Robinson (1933) e Edward Chamberlin (1933), respectively (O'Brien, 1983, p. 31; Moss, 1984, p. 307[94]; Backhouse, 1990, p. 83; Clark, 1940, p. 241; Blaug, 2003, pp. 403-404). Although these authors worked independently, both contrasted their theories with the perfect competition case[95]. Robinson even wrote a specific article entitled *What is Perfect Competition?* (1934), in which she acknowledged, just like

[91] The same concern can be found in Robinson (1933, chs. 23-26).

[92] According to Machovec (1995, p. 2), "until the 1920s, the criterion employed by economists to evaluate whether or not a market was competitive (*i.e.*, serving consumers) was freedom of entry". Although the generality of this assertion is debatable, as it ignores the differences between the marginalist schools of thought (it was only by the 1930's and 1940s that the neoclassical theory gained a more unified framework) and even between important authors (Bertrand, Edgeworth and Walras were probably more "Cournotian" than Marshall), it is worth to emphasize that certainly there was not a clear conception of perfect competition in the work of the original marginalists, let alone in the classical economists.

[93] Levrero (2014, pp. 73-74) also gives credit to Pigou (1920) for this development, although this author used the expression "simple competition" rather than "perfect competition", as opposed to "monopolistic competition" (Mosca, 2016, p. 296; Backhouse, 1990, p. 71).

[94] "A widely believed story in the folklore of the economics profession is that the theories of perfect competition and monopoly were well established from the time of Marshall or perhaps Pigou's Economics of Welfare, and that the role of imperfect or monopolistic competition theory was to fill in the middle ground between these extremes" (Moss, 1982, p. 307). Scott Moss argued, instead, that "Robinson and Chamberlin created the theory of perfect competition in the course of inventing imperfect and monopolistic competition theory" (Moss, 1982, p. 307).

[95] More exactly, Edward Chamberlin preferred the expression "pure competition" to characterize what Robinson (1934, p. 104) meant by "perfect competition". For Chamberlin (1933, pp. 6-7), "perfect competition" had a broader meaning than "pure competition", including not only that the individual producer does not have any control over price but also that exists "an ideal fluidity or mobility of factors" and "perfect knowledge of the future and the consequent absence of uncertainty".

Moore (1906) had previously done, that "the phrase is made to cover so many separable ideas, and is used in so many distinct senses …" (Robinson, 1934, p. 104).

Robinson (1934, pp. 104-106) criticized other authors' definitions as being too broad: Knight (1921, pp. 76-81) had listed several elements such as rational conduct, full knowledge, absence of frictions, perfect mobility and perfect divisibility of factors of production, completely static conditions, Chamberlin (1933) had included "an ideal fluidity or mobility of factors" and "absence of uncertainty" and Harrod (1934) considered that perfect competition implied free entry. Joan Robinson opted, instead, to define perfect competition as "a state of affairs in which the demand for the output of an individual seller is perfectly elastic" (Robinson, 1934, p. 104).

Robinson's refusal to take into account free entry and her predilection to define market perfection in terms of price taking behavior serves as an illustration that the tension between the atomism and capital mobility (derived from two distinct conceptions of competition) occur not only in the economic thought in general but also within the neoclassical tradition.

Regardless of the exact list of hypotheses required for perfect competition, I think it is safe to say that Robinson and Chamberlin works were crucial to the diffusion of the model of perfect competition. They encouraged the development of the myth that existed two opposite, polar cases (perfect competition and monopoly) which were well-defined in theory but were not capable of addressing the type of competition at work in most real markets, so that imperfect or monopolistic competition theory could come in to fill this gap (e.g., Chamberlin, 1933, p. 1). Stigler's (1957) narrative about the history of perfect competition also contributed to the solidification of such model, as well as the interpretation – not necessarily shared with the abovementioned authors – that it ultimately derived from Adam Smith[96].

2.3.2. The changes in the conception of monopoly

It was argued before that the perfect competition "pole" was not well developed in the original marginalist economics. There was, however, an important turn in the

[96] "Yet, partly as a result of Robinson's and Chamberlin's use of the 'classical' model of perfect competition as a straw man against which their model was favourably compared, and partly as a result of the portrayals in Knight (1964) and Stigler (1957), the economics profession has, by and large, come to accept the erroneous idea that the perfectly competitive model (in various degrees of formal development) has been an implicit pillar of economic analysis since Adam Smith." (Machovec, 1995, p. 11).

meaning attributed to other "pole" – the monopoly situation – with the ascent of neoclassicism.

In the classical political economy, monopolies were generally interpreted as situations with considerable restrictions to capital mobility. It is noteworthy that even authors which were critical to Ricardo's labour theory of value, such as Samuel Bailey and Nassau Senior, followed and contributed to the development of this view (Arena, 1979, pp. 145-147; Backhouse, 1990, p. 61; Machovec, 1995, p. 11, pp. 16-17; Roncaglia, 2005, pp. 216-217).

Bailey (1825, p. 185) considered that commodities could be divided into three classes. The first one was associated to commodities which were monopolized as result of an exclusive privilege. In situations in which the commodity is unreproducible by other producers, such as rare wines and works of art, there is only one interest concerned and there are no forces to drive the price towards the level of the costs of production. In situations in which the commodity is reproducible and there are separate interests in the market, on the other hand, the individuals' attempts to benefit themselves and the difficulties in coordinating collusion restrain abnormal profits.

Bailey also discussed the case in which natural or adventitious circumstances alters the relative state of demand and supply. If, for example, there is a sudden increase in the demand (e.g., Smith's public mourning) or a decrease in the quantity brought to the market (e.g., a crop failure) and commodities require a considerable time for their production, then monopolies emerge. This type of monopoly is, however, only temporary, as it affects solely market prices.

The second class of monopoly considered by Bailey embraced articles of more importance and referred to "commodities, in the production of which some persons possess greater facilities than the rest of the community, and which therefore the competition of the latter cannot increase, except at a greater cost." (Bailey, 1825, p. 185). This type of monopolist that produces any reproducible commodity with an inferior cost will earn extraordinary profits in an analogous way that the owner of the best land obtains a differential rent or that the wage of an artisan with a skill higher than the average will earn an extraordinary remuneration (Bailey, 1825, pp. 194-197).

This kind of monopoly profit is, however, restrained by potential competition, keeping the extraordinary remuneration close to the cost advantage possessed by the monopolist:

> "When a commodity is of a kind which admits of being increased by industry and competition, but only at a greater cost, the possessor of the cheaper means of producing it has evidently a monopoly to a certain extent, and the value of the commodity will depend on the principles already explained, until it reach such a height as will afford the ordinary profit to those who produce it at a greater expense. The same causes will be in operation, but instead of the value of the article having no assignable boundary, it will be limited by the watchful competition, which is ever ready to act upon it the moment it has exceeded a particular point." (Bailey, 1825, pp. 193-194)

The third class was defined by the production of commodities in which competition operates without restrain, following the characterization of "free competition" given by Ricardo (1817, p. 46). This situation of absence of monopoly, in which all producers have equal advantages (the same cost of production), was characterized by Nassau Senior as "equal competition" (Senior, 1836, p. 101, p. 103, p. 111).

Senior also typified four kinds of monopolies: 1) "A monopoly under which the monopolist has not the exclusive power of producing, but exclusive facilities as a producer, which may be employed indefinitely with equal or increasing advantage"; 2) "A monopoly under which the monopolist is the only producer, and cannot increase the amount of his produce"; 3) "A monopoly under which the monopolist is the only producer, and can increase indefinitely with equal or increasing advantage the amount of his produce"; 4) "A monopoly under which the monopolist is the only producer, but has the peculiar facilities which diminish and ultimately disappear as he increases the amount of his produce" (Senior, 1836, p. 111).

Despite the differences in their expositions, it is clear that Bailey and Senior followed the classical conception of competition and they had also not restricted their monopoly analysis to the case of a single producer (Backhouse, 1990, p. 61; Blaug, 1997, p. 67; Mosca, 2016, p. 292).

So, there was an important change in the characterization of the monopoly, from a situation with appreciable restrictions to capital mobility to a situation in which there is only one producer supplying the market[97]. Cournot (1838) was the precursor of this

[97] Aristotle (384-322 B.C., Book I, ch. 11, p. 20) "coined the word 'monopoly' or *μονοπωλία* from *μόνος*, which means 'one', and *πωλεῖν*, which means 'to sell'" (Roover, 1951, p. 492; Ely, 1900, pp.16-17), but its usage was more associated with the description of a particular story than with a systematic analysis. The monopoly concept certainly had many different uses along the history of economic thought (Phillips and Stevenson, 1974, p. 325; Roover, 1951). What was argued before was that, in the classical political economy – the first school to approach the issue of competition in a more analytical manner – this expression was much more related to the degree of capital mobility than with the stricter terminological, numerical meaning of such concept.

new approach, but Marshall (1890) was probably the most responsible for its diffusion among the economics profession[98]. In this sense, not only what economists now think as free competition (*i.e.*, perfect competition) but also as monopoly differ greatly from what it was considered before the ascent of marginalism.

This narrow definition of monopoly (*i.e.*, the case of a single producer) can be found nowadays in most microeconomic textbooks. There are, however, several works in the history of economic thought which one can find this concept employed in a broader sense. Skinner and Maclenman (1984, p. 123, p. 146) gave some examples from the 1920's[99]: Cassell (1923), J.M. Clark (1923), Bowley (1924), Sraffa (1926), Pigou (1928) and Shove (1928). This particular choice of precedents to the use of this concept in the broadest sense was probably associated with the fact that in following decade it appeared a couple of important contributions that popularized its usage.

The first one was the development of the imperfect or monopolistic competition analysis by Joan Robinson (1933) and Edward Chamberlin (1933), respectively. Both authors argued that firms faced a negatively sloped individual demand curve, as result of the differentiated products and consumers' tastes. In this way, each firm could explore a particular "monopoly", being able to elevate prices above marginal cost without loosing all its customers (as it would happen in the perfect competition case).

In that way, the degree of competition prevailing in each market would be essentially related to the number of firms, which affects the slope of the firms' individual demand curve: the steeper one being associated with monopoly, a negatively sloped but more elastic related to imperfect competition and a totally inelastic, horizontal perfectly competitive demand curve (Backhouse, 1990, pp. 61-62). In their textbook, Shepherd and Shepherd (2003, p. 7) present a figure in this exact way.

Influenced by Robinson and Chamberlin, Abba Lerner (1934) made an important theoretical contribution with the development of the "degree of monopoly" concept. He related the ratio $\frac{P-MC}{P}$ to the inverse of the of the firm's elasticity of demand and thus contributed to the empirical operationalization of the concept of monopoly in its broadest sense. In spite of its weak theoretical foundations, the Lerner index proved

[98] Surely, there have been since then some refinements of the monopoly model until reaching the usual textbook representation, being Hicks' *The Theory of Monopoly* (1935) one of the most important ones.

[99] Even so, it was already common in the older antitrust literature to discuss the issues of trusts, cartels and anticompetitive conducts in the general label of "monopolies". This vaguer use of the concept enabled the amalgamation of both views on competition - classical and marginalist - to discuss real economic problems.

to be an important tool in the Industrial Organization emerging literature in the decades that followed, particularly during the dominance of the Structure-Conduct-Performance approach.

Lerner's article was also particularly important to the transition from a notion of competition as a process (fueled by capital mobility and innovation) to the textbook notion of competition as equilibrium states that can be evaluated by comparative statics and welfare economics. Within this framework, extraordinary profits are linked to the exercise of firms' monopoly power and considered to produce welfare losses to society, as it represents a departure from the Pareto optimality condition associated with the perfect competition. As Paul Samuelson remarked, this was a considerable theoretical innovation at that time: "Today this may seem simple, but I can testify that no one at Chicago or Harvard could tell me in 1935 exactly why P=MC was a good thing" (Samuelson, 1964, p. 173).

A great deal of what is taught until today in microeconomic textbooks was developed between the 1920's and 1950's. With respect to the partial equilibrium analysis the first two decades of this period were specially intellectually fertile, marking the transition from the Marshallian[100] to the modern theories of the representative firm and the industry. The laws of returns were used by Pigou (1927, 1928)[101] and Viner (1931) to draw the short-run and long run U shaped average cost curves, respectively, which served to theoretically ground the black-box, production function's conception of the firm. Robinson[102] and Chamberlin also contributed to the development of this

[100] Marshall (1920) considered that real firms were in constant motion ("disequilibrium") and that they tended to the life cycle of their founder (losing vitality with the transmission of control to their heirs, who rarely had the skills needed to manage the business). Marshall's "representative firm" consisted of a firm that had already grown reasonably (enjoyed enough economies of scale), but it had not yet decayed. This intellectual construction would thus represent a "typical" firm of the industry, allowing the construction of the industry's supply curve and the determination of the price of a particular commodity in partial equilibrium. For Marshall, the representative firm was 'representative' of the normal costs of production and normal business profits (Stirati, 2012, p. 6). This is not equivalent to deny the existence abnormal profits, but to consider that the many circumstances that give rise to such effects should be studied separately from the main analytical problem of normal profit and price determination. Neither does it mean that all firms are in equilibrium and operate at the lowest point of the average cost curve U shaped.

[101] Keppler and Lallement (2006) argued that Barone (1908), Edgeworth (1913), Amoroso (1921) and Sraffa (1925) took the first steps in the creation of the U-shaped average cost representation. It was Pigou, however, that brought "into mainstream analysis the geometrical relationship between marginal and average cost" (Corley, 1990, p. 86).

[102] Differently from what happened in the macroeconomic theory, Robinson and Lerner microeconomic works were crucial to the development - rather than the contestation - of the neoclassical orthodoxy. For that reason, we must have caution not to eagerly search for perfectly polished heterodox gems in the early texts of Sraffa and Robinson. In fact, if there are non-orthodox streams of thought today, this has a lot to

"bottom up" (from a firm in equilibrium to the market or group) rather than a "top down" approach (from the industry to an "average", "miniature of the industry" firm), by supposing firms with identical cost and demand curves (Moss, 1984, pp. 313-314) [103].

The models of perfect competition, imperfect competition, oligopoly or monopoly are not only tools more or less adequate to be applied to specific industries (steal, glass, oil, electronics, etc.). They are constitutive parts of a more general analytical body: the (marginalist) theories of value and distribution[104]:

> "[…] Robinson adapted and extended the concept of the equilibrium firm to derive the laws of industry returns and much else that can be analysed by means of cost and revenue functions alone, while Chamberlin adapted and extended the same concept to analyze competitive relations among rival firms. What is important in the present context is that the analytical core of both Robinson's and Chamberlin's books completed the general axiomatic foundation of the theory of product market supply and factor market demand. Together with the completion of the axiomatic foundation of the theory of product market demand and factor market supply by Hicks and Allen, the core of Robinson's and Chamberlin's work provided the axiomatic basis of the theory of value and distribution." (Moss, 1984, p. 314)

2.4. Imperfect competition and oligopoly

Differently from what is usually implied, "intermediary" situations between perfect competition and pure monopoly were not uncommon within the original marginalist approach. This can be verified not only by the fact, discussed in the previous section, that the perfect conception "pole" took a while to appear in its finished

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do with the fact that there existed brilliant economists which were educated in the conventional view, but their growing discomfort led them to criticize it and eventually (gradually or abruptly) propose alternatives. In this way, to identify and to stress the orthodox remnants in the works of Sraffa, Robinson, Lerner, Keynes and even Kalecki is not about establishing a paranoic crusade against Marginalism. In fact, it is about attempting to better follow and develop the path opened by them so that their enormous intellectual effort may not have been in vain. Because, as Keynes (1936, p. xvii) already adverted us, "The difficulty lies, not in the new ideas, but in escaping from the old ones […]".

[103] Moss (1984, p. 313) argued that Pigou (1928, p. 239, §3) "[…] did not assume that the industry was comprised entirely of equilibrium firms, but only that an equilibrium firm could be constructed from the law of returns (increasing, constant or diminishing) obeyed by any industry". This following step would had been given by Robinson and Chamberlin.

[104] Joan Robinson (1933, p. 1) explicitly developed this "tool-box" argument. Shackle's *The Years of High Theory* (1967), on the other hand, brilliantly situates the debates about competition (there including the imperfect competition model) in a discussion about the validity of the neoclassical theory of value.

form, but also because early marginalists and even predecessors had already discussed situations of imperfect competition, duopoly, oligopoly, etc..

Cournot (1838) was, as discussed before, the forerunner of the models of competition with a small number of competitors[105], publishing his work decades before the Marginal Revolution. In his review of the books of Cournot and Walras (an enthusiast of Cournot's work), Bertrand (1883) criticized the idea that oligopolists (more particularly, duopolists) did not decide the price that they charged, but only the quantity they produced. He remarked that the producers competed mainly through prices, thus conceiving an alternative formulation which become known later by his name[106] (Bornier, 1992, p. 623). Despite these specific divergences, Bertrand's review was crucial to the recognition of Cournot's work, as well to the representation of the competitive process by a *given number* of profit maximizing firms (which became more acceptable after the Marginalist Revolution).

Wicksell (1901, pp. 83-97) discussed two main[107] situations of limited, imperfect competition: retail trades and monopoly. He considered that every retailer possessed a sort of monopoly, in the sense that it can take advantage of the customers of the immediate neighborhood of the shop. According to Wicksell, this particular imperfection would not be reduced by a larger number of competitors – on the contrary, this could lead to the "anomaly" of an increase in price (as retailers would elevate profit margins in order to compensate for the smaller turnover). Wicksell (1901, pp. 88) considered that "a still more pronounced divergence from the formation of prices under free competition is provided by monopoly prices proper".

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[105] Backhouse (1990, pp. 74-79) emphasized this new "role of numbers" in competition, Weeks (1981, p. 153) called it "the quantity theory of competition". In the Introduction, we have interpreted this aspect as a distinct conception of competition implicit in Cournot's work.

[106] Even though these disagreements with behavioral assumptions are important, the most startling feature of the Bertrand's 'model' concerns its main outcome: two or more firms that produce homogeneous products will reach an equilibrium where price equals to their marginal costs. The obtention of such result even in situations with few competitors became known as the 'Bertrand paradox', in the sense that it contrasted with the Cournotian view that this outcome would arise only in markets with a large (infinite, at the limit) number of competitors. There were considerable efforts to include capacity constraints (first discussed by Edgeworth, 1897), product differentiation, repeated interaction and numerous other features in a Bertrand's model to solve this "paradox" and to restore the Cournotian notion that "numbers matter" (Dixon, 1989, pp. 135-136).

[107] Wicksell (1901, pp. 83-86) also mentioned the issues of joint demand, which he reduced to a special case of minor importance, and joint supply, which he recognized it could have impact over pricing, but did not develop much further.

However, after presenting formally the equilibrium condition of the monopolist, he remarked that this situation scarcely ever existed in reality (Wicksell, 1901, p. 96). The most common case, according to him, was the presence of two or more competitors in the same branch of production, so that Cournot's model of "duopoly" or "polypoly" would be the most adequate to represent the operation of real. In this aspect, Wicksell was in disagreement with Edgeworth's position that indeterminacy was the central feature of oligopoly (Wicksell, 1901, pp. 96-97; Vickers, 1995, p. 6).

Edgeworth (1881, p. 46) believed that the effect of the number of firms on prices would not be as definite as a Law of Nature. Differently from the action of inanimated atoms, competition is subjected to the human Art of Bargaining, so that an indefinite number of arrangements is possible. Furthermore, the possibility of associations between individuals reinforces the plurality of final settlements.

So, there were several developments in the field of imperfect competition in the neoclassical economics – Cournot, Bertrand, Edgeworth, Wicksell, Marshall, Pigou and others – before the great advances in the 1930s achieved by Hotteling, Chamberlin, Robinson, Kahn, Harrod, Stackelberg. These contributions were, however, usually kept aside from the main body of the theory. They were not integrated, for example, with the general equilibrium approach[108]. Triffin (1940) identified this fragility and advocated for the extension of the theoretical innovation of monopolistic competition to the general equilibrium analysis.

Be that as it may, it seems that the novelty of the imperfect/monopolistic competition revolution did not lie on the originality of the topic addressed, but on the level of attention given to it and the manner in which it was exposed. Particularly

[108] John Hicks recognized in his classic book *Value and Capital* the importance of the supposition of perfectly competitive markets: "[…] it must be remembered that the threatened wreckage is that of the greater part of general equilibrium theory - if we can assume that the markets confronting most of the firms with which we shall be dealing do not differ very greatly from perfectly competitive markets." (Hicks, 1939a, p. 84). Looking in retrospect, this wreck does not seem to have happened, partly because of the contributions from Hicks himself. Hicks (1939a) was the pioneer of the transition from the long-period version of the general equilibrium, which presupposes a uniform profit rate over the capital stock and thus require – among many other things – perfect competition, to a temporary general equilibrium model (that influenced the later intertemporal version in which capital is regarded as heterogenous inputs and the possibility of non-uniform rates of return is accepted). Moreover, there had been multiple initiatives since then to incorporate non-competitive situations into the orthodox economic thinking, such as the discussion of the strategic behavior of oligopolists in the general equilibrium model (for a review, see Bonanno, 1990), the new international trade, the new economic geography and the endogenous growth theories. In spite of this incredible display of flexibility from the research program, it can be noticed that the critiques towards perfect competition left some marks in the marginalist theory of value, which cannot be taken anymore "in the old sweeping, unified, and universal sense" (Shackle, 1967a, p. 12).

important was the development, a few years before, of the marginal gross revenue concept by independent efforts from Yntema (1928), Harrod (1930) and Viner (1931) (Schumpeter, 1954, pp. 1012, pp. 1116-1118; Shackle, 1967a, pp. 23, pp. 27-29). Moreover, this "marginal revenue era" came along a significant increase in the use of graphical expositions of the neoclassical theory. The imperfect/monopolistic competition theory contributed to the generalization of this geometrical/diagrammatic approach by incorporating the supply and demand *curves* to discuss the problem of the firm (Boulding, 1942, p. 792; Skinner and Maclennan, 1984, p. 122).

The similarity between the independent contributions of Robinson (1933), in England, and Chamberlin (1933), in the U.S., signaled a robustness of their formulations and favored the diffusion of such theory[109]. Although this model still is presented by most microeconomic textbook in an uncritical way as part of the economists' toolbox, it has faced some noteworthy criticisms.

Much of them was directed at the definition of "industry" (or "group" in Chamberlin's terminology). Stigler (1949, pp. 15-16), for example, highlighted that the definition of "group" as a set of close substitute products (with a cross-elasticity of demand above a certain predetermined value) is subject to ambiguity: it could lead to unusual conclusions, such as the "group" containing only one company all companies in the economy or even being dominated by a firm outside the "group".

It was also highlighted the contradiction that different products possess the same cost and demand conditions – the "heroic" assumptions, as defined by Chamberlin (1933, p. 8) himself. After all, it is expected that product differentiation requires expenses in R&D and/or in sales promotion (which would imply different cost curves between producers) and to affect consumers' perception of product quality (which would imply firms' demand curves with different slopes) (Hay and Morris, 1991, pp. 7-12)

The criticisms developed by Kaldor (1934a, 1935) deserve a closer look because of the destructive implications they produce not only for the theory of imperfect/monopolistic competition but also for most of the Industrial Organization literature.

[109] Phillips and Stevenson (1974, pp. 333) remarked that "Joan Robinson's *Imperfect Competition* had less of an impact in Britain than Chamberlin's *Monopolistic Competition* had in the United States". Chamberlin also had a direct influence over his Harvard colleague, Edward Mason, which had a major influence on the development of the whole industrial organization field.

Kaldor (1935, pp. 34-36) stated that the imperfect or monopolistic competition model was based on four main hypotheses:

i) there are a large number of independent producers, each one selling a single "slightly different" product which is highly sensitive to the prices charged by the others, yet this sensitiveness is never so great as to compel all producers to sell at the same price.

ii) consumer preferences are reasonably distributed among the different varieties of products. This implies that increases (decreases) in the price of a given firm lead to decreases (increases) in its quantity sold which are, in the aggregate, exactly offset by increases (decreases) in the quantities sold by all the other competitors;

iii) entry of new producers is free and unimpeded (no producer possesses an institutional monopoly);

iv) the long-run cost curves are decreasing (*i.e.*, there are "economies of scale") up to a certain level of production where diminishing returns start to kick off. The author points out that Chamberlin assumes a U-shaped cost curve, but doubts the legitimacy of this hypothesis[110].

It is initially considered that certain products have finite positive cross-elasticities of demand (thus excluding the possibility of zero and infinite values related to monopoly and perfect competition, respectively). By defining a "considerable" value for it, it is possible to select a set of products which presents high substitutability among themselves, in order to include them within the same "industry" or "group". Given the demand conditions of the industry and the homogeneous distribution of preferences among "slightly different" products, it can be concluded that eventual variations in the quantity sold by a particular firm will generate a compensatory and equitable effect on

[110] In a previous article, Kaldor (1934b) discussed in more detail the foundations of the long-run cost curve.

the rest of the firms. Given the large number of firms, isolated variations in price and, therefore, in the quantity sold by individual producers would produce negligible effects on other competitors, so that they would not have incentives to change their initial actions (Kaldor, 1935, p. 35).

Kaldor also highlighted the unrealism one of the "heroic" hypotheses that consumers do not evaluate certain products as closer substitutes than others (*i.e.*, that the cross-elasticities of demand are identical). A simple counter-example is a locational model. In a situation with geographic dispersion, it is inevitable to consider that variations in the price of a given producer will affect its "neighbors" more directly than the more distant producers. Furthermore, new entrants need to occupy a "place" within this area, which will inevitably affect established producers distinctly[111] (Kaldor, 1934a, p. 40). In short, the abandonment of the two ingenious but unrealistic initial hypotheses makes it no longer possible to escape from the analysis of the interaction between the firms' decisions.

The most serious formal implication of this is the complete impossibility of deriving a demand curve for the individual firm. This happens because the variation in price (and, supposedly, in the quantity sold in the opposite direction) would affect its "closest" competitors (in terms of degree of substitutability) in a non-negligible way, inciting reactive behaviors. Thus, the interdependence between the decisions of the firms will be inexorable, so that the prices and quantities of the rest of the producers simply cannot be kept in a *ceteris paribus* clause when the firm decides its own price (Kaldor, 1935, pp. 39-40).

In this way, it is impossible to consistently sustain the existence of a function that describes a continuous, monotonic and negatively sloped relationship between the price charged and the quantity sold by each producer. This analytical and objective demand curve, called by Kaldor (1935, p. 40) a "real demand curve", is simply indeterminate[112]. Consequently, the concept of elasticity of individual demand loses all its meaning.

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[111] Kaldor used a situation of spatial dispersion to illustrate, in humorous way, the arbitrary character of the concept of "industry": "If the demand for cigarettes in a particular village shop is more affected by the price of beer in the opposite public-house than by the price of cigarettes in the shop at the nearest town, which of the two would Mrs. Robinson lump together into "one industry": the seller of cigarettes plus the seller of beer in the village, or the seller of cigarettes in the village plus the seller of cigarettes in the town?" (Kaldor, 1934a, pp. 339-340).

[112] The "imagined demand curve", in its turn, have a subjective nature, reflecting the expectations of entrepreneurs regarding the effects of the variation of the prices charged by on their quantities sold

In addition to the downward-sloping individual demand curves, the theory of monopolistic/imperfect competition assumes the existence of U-shaped long-run cost curves[113]. If there are supernormal profits in the industry, there is an incentive for new firms to enter. This implies that established firms will have to reduce their outputs to adjust to a new market division. The final equilibrium occurs at the point where the new demand curve of the firm tangentially intersects the long-run cost curve.

As each firm is pushed back to the descending segment of the cost curve, an 'excess capacity' arise, defined as the difference between the equilibrium quantity and the quantity that would be produced at the minimum point of the long-run cost curve. The main result of this model of competition representing a long-run situation with free mobility of capital and 'differentiated' products (in a limited sense, as discussed), firms set prices above marginal costs but only obtain normal profits due to due to inefficiency (a cost higher than the minimum)[114] stemming from operating at a sub-optimal scale (Koutsoyiannis, 1979, pp. 212-214). However, if the theory refers to the long run, why are not firms able to reduce their capital stock and operate at the minimum cost point of a smaller plant?

As mentioned earlier, Nicholas Kaldor rejected the U-shaped cost curve (hypothesis iv) and emphasized the existence of indivisibilities and non-eliminable economies of scale (Kaldor, 1935, pp. 35-36, pp. 42-43). The author argued that the possibility of reconciling economies of scale with fragmented markets collapses alongside the firm's demand curve when considering the heterogeneity of consumers' preferences. In these circumstances, product differentiation affects firms' sales differently, inevitably leading the "industry" to an asymmetric situation. The presence of economies of scale reinforces this performance differential between firms, producing cumulative and non-eliminating advantages for producers of goods initially considered

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(including there the possible reactions of rivals). This "imagined" curve may or may not be continuous, but it will always exist as long as endures the producer's imagination (Kaldor, 1934a, p. 341; 1935, p. 40).

[113] Even though Sraffa (1926) indeed contributed to the conception of a descending firm's demand curve in the "constructive" part of his 1926 article, he rejected outright the existence of increasing costs (the ascending part of the U-shaped curve), as we have discussed in the section 1 of the previous chapter.

[114] Even though the imperfect/monopolistic competition model generates normal profits similar to the perfect competition model, the latter results in misallocation of resources and social welfare losses. This outcome is interpreted as the cost society bears for the existence of differentiated products.

to be superior. It creates competitive advantages not only among established firms, but also between established firms and potential entrants[115].

With the flexibilization of the initial hypotheses, the apparatus of the "supply" and "demand" becomes progressively less useful as the conditions of continuity, symmetry, etc., begin to disappear. The endeavor to combine characteristics of monopoly and perfect competition in a simple general model thus faces insurmountable difficulties. One of the possible conclusions is that, as Grether (1970, p. 87) has clearly put, "the general case, in terms of microtheory, really is oligopoly, even under the large numbers of monopolistic competition, when allowance is made for spatial and product and service differentiation and market segmentation.".

Commenting on Kaldor's article, Wolfe (1953, p. 181) stated "[…] that oligopoly was, in fact, the most common condition". In his book *Oligopoly and Technical Progress,* Paolo Sylos-Labini reproduced Wolfe's phrase – complementing that "the theory of oligopoly represents, with respect to the theory of imperfect competition, a further approximation to reality" (Sylos-Labini, 1962, p. 35) -, as well as John Kenneth Galbraith's assertion that "oligopoly is the appropriate assumption in dealing with industrial markets in the United States" (Galbraith, 1948, p. 107).

The problem was that the oligopoly theory available at that time – Cournot (1838), Bertrand (1883), Edgeworth (1897), Chamberlin (1933)[116], Stackelberg (1934) – , had several deficiencies – the obtention of indeterminate results or determinate results only under simplifying/unrealistic hypothesis; the existence of a considerable diversity of assumptions and models, not being able to provide a unified framework; the high mathematical complexity; the consideration of a fixed number of competitors, not dealing adequately with capital mobility and with size-distribution of producers (what would be preferable, for example, a market in which 1 producer has a market share of 91% and the nine remaining producers have 1% of market share each or a market in which each one of the four producers have 25%?), to name a few – leading to

[115] Nicholas Kaldor discussion about potential competition (Kaldor, 1934a, pp. 41-42) and institutional monopolies (arising from patents, copyrights, trade-marks or even trade-names) (Kaldor, 1935, pp. 44-45) anticipated many aspects of the discussion about barriers to entry later developed by Joe S. Bain.

[116] In his book, Chamberlin discusses not only monopolistic competition ("large group" model), but also the duopoly and oligopoly ("small-group") models (Chamberlin, 1933, ch. 3). This contribution belongs to a lineage of thought that can be traced back to Cournot (Chamberlin, 1961, p. 520; Phillips and Stevenson, 1974, pp. 333; Skinner and Maclenman, 1984, p. 131; Shubik, 1987b, p. 710).

operational difficulties in applying these models to real cases (Leontief, 1954, p. 221; Koutsoyiannis, 1979, p. 288; Possas, 1985, pp. 25-26; Cubero, 2010, p. 19).

In short, the theories of imperfect/monopolistic competition and oligopoly influenced the development of microeconomic theory, but were incapable of organizing a research program and guiding the emerging field of Industrial Organization[117]. This role ended up being played by the so-called Structure-Conduct-Performance (SCP) approach.

2.5. The (partial) emancipation of Industrial Organization Theory from neoclassical microeconomics

Just as macroeconomic issues were already discussed by economists under different categories (money and banking, business cycles, public finance, international trade, just to name a few) before Keynes "proclaimed independence" of the field, the study of industry was also developed along a variety of names, such as 'industry and trade', 'business economics', 'commerce', 'economics of industry', 'industrial economics' and 'industrial organization', before its autonomous existence was recognized (Scitovsky, 1984, p. 1556; Lee, 1985, p. 1; Barthwal, 1984, p. 1).

The official beginning of the Industrial Organization (or Industrial Economics) as a sub-discipline of economics was traced back to the 1930's by Mosca (2016, p. 297). She identified three particular birthplaces of the discipline: i) Cambridge (UK) with Joan Robinson (1933); ii) Harvard (US) with Edward Chamberlin (1933) and Edward S. Mason (1939); iii) Chicago (US) with Henry C. Simons (1934)[118]. It could be added to this selection the developments occurred in Oxford (UK), particularly as a result of the activities of the Oxford Economists' Research Group, among them were Roy Harrod, Robert Hall, Charles Hitch and P.W.S Andrews (Lee, 1999; Arena, 2008, 2011).

[117] Such contributions were developed in a much more formalized way in the 1970s with the appearance of the New Industrial Organization theory, which will be discussed in the sub-section 3.5.

[118] In the 1920s and 1930s, authors of the Original or First Chicago School such as Frank H. Knight, Henry C. Simons and Jacob Viner showed a deep concern with increasing market power. The intellectual dominance of such authors began to dissipate in the 1950s with increasing influence from Aaron Director (a law professor) and economist George Stigler (who arrived in 1957) (Shepherd and Shepherd, 2003, p. 22, p. 28; Martin, 2010, pp. 6-10; Mosca, 2016, p. 299; Roncaglia, 2019, p. 130).

Although significant contributions were made in the 1930's in Britain, on theoretical – such as Sraffa (1926), Harrod (1931, 1934), J. Robinson (1933), E. A. G. Robinson (1935), Kaldor (1935), Hicks (1935) –, empirical – such as G. C. Allen (1933) and Andrews (1937) – and on more policy-oriented grounds – such as Florence (1933), "an English Edward Mason did not arise" (Phillips and Stevenson, 1974, p. 333). The United States had a long history of social animosity towards abusive business practices and instituted, with the Sherman Act, one of the first antitrust policies in the world. The corporation was also much more widespread in the US than in Great Britain.

In spite of these significant antitrust interventions in the United States *vis-à-vis* other countries, many authors blamed the excessive liberty of big business for the Great Depression. In their famous book *The Modern Corporation and Private Property* (1932), for example, Adolf Berle and Gardiner Means[119] argued that stickier prices in more concentrated industries contributed to the economic crisis (Tsoulfidis and Tsaliki, 2019, p. 213).

Franklin Roosevelt's reformist agenda included, as part of the New Deal, the creation of an agency – the *National Recovery Administration* – aiming to preserve competition. It was also established by the American Congress a *Temporary National Economic Committee* (1938-41) to discuss the Concentration of Economic Power (Grether, 1970, p. 83; Bain, 1947, p. 130). Similarly to what happened in macroeconomics, the economic reality and the political scenario favored the emergence and diffusion of ideas in Industrial Organization that questioned the belief that free enterprise would necessary lead to optimal outcomes and that advocated for a greater state intervention.

In spite of these common political and economic influencing factors, there were theoretical differences between the schools of the early Industrial Organization thought. Particularly, they had varying degrees of discontentment with neoclassical theory. The Oxford approach was probably the most "heretic" of the four. The most notable author of this group, Phillip Andrews, was a fierce critic of the path that partial equilibrium analysis took after the death of Alfred Marshall, with the new conception of the representative firm, the reduced importance of increasing returns and the consolidation of the static analysis (Andrews, 1964, pp. 13-15). In their famous article, Hall and Hitch

[119] Gardiner Means was a colleague of Edward Mason at Harvard and had also a profound impact over the Industrial Organization theory. His most known contributions were related to the theory of the firm, regarding the importance of the corporation in American capitalism, but he developed other important ideas, such as the doctrine of administered prices (see, for example, Lee, 1999, chs. 1 and 2).

(1939) also questioned the ability of firms to estimate marginal cost and marginal revenue, an assumption of the new microeconomic orthodoxy.

Be that as it may, the emergence of Industrial Organization (or Industrial Economics) was not a complete rupture from the general marginalist theory. It represented a discontentment with the axiomatic theory of equilibrium that advanced considerably in the late 1920s and 1930s. This formalist development suppressed many theoretical elements which were present in the original neoclassical theory. In doing so, it gave room to the appearance of a branch of economics dedicated to the study of real markets, a subject that the new-fashioned pure theory had even more difficulty in accomplishing. The neoclassical theory became so impractical that industrial economists had to abandon (at least part of) this approach in order to be able to investigate the reality[120] (Glick and Ochoa, 1988, pp. 1-2).

In the United States, this branch of knowledge was referred to as the Industrial Organization, largely due to the influence of the Harvard School. In 1941, it was recognized by the *American Economic Association* as a subdivision of economics (Phillips and Stevenson, 1974, p. 324). In Europe, the field was most known as "Industrial Economics". The creation of the *Journal of Industrial Economics* in 1952 is an important milestone of the emancipation process of the discipline, which was increasingly becoming a specialist subject (Mosca, 2016, p. 295; Andrews, 1952; Corley, 1990, p. 88; Barthwal, 1984, p. 1, p. 6; Arena, 2011, pp. 158-159)[121].

In conclusion, although the first schools of thought appeared in the 1930's, it was only by the 1940's and 1950's that the Industrial Organization achieved more prominence and independence from microeconomics.

[120] John Maurice Clark's concept of workable competition is linked to this issue. He pondered, for example, that when demand fluctuates, so does the average fixed cost. If firms always charged a price equal to marginal cost, then they would present losses during the period of low demand/higher degree of undesired idle capacity. In that way, the equality between price and marginal cost could not be considered as a condition of workable competition as it was in the case of perfect competition (Clark, 1940, p. 250). This remark shows a concern with the unrealism of the new notion of the equilibrium of the firm.

[121] Henceforth, we will make use of the two terms interchangeably without implying any significant differentiation in connotation.

2.6. The Structure-Conduct-Performance (SCP) paradigm

2.6.1. The Harvard School

The consolidation of the Industrial Organization field was greatly influenced by the developments that took place at the Harvard University. Edward Chamberlin's influential *The Theory of Monopolistic Competition* (1933) was derived from his Harvard's PhD thesis from 1927 (Chamberlin, 1961, p. 515). This book had not only a stronger direct impact in the United States than Robinson's *Imperfect Competition* had in Britain, but it had also an indirect influence over the emerging field through his colleague Edward S. Mason (Chamberlin and Mason even taught a course together) (Phillips and Stevenson, 1974, p. 333; Corley, 1990, p. 87; Grether, 1970, p. 83).

Mason was a pioneer in the development of case studies and in the use of the market structure as a unit of analysis to discuss business conduct and economic performance. Even though he is usually considered as an empiricist[122], a practical economist, Mason economic reasoning owed much to Cournot (Grether, 1970, p. 83; Philips and Stevenson, 1974, p. 336; Corley, 1990, p. 87). The long-lasting impact of Edward Mason has to do not only with his influential publications, such as the articles from 1939 and 1949, but also because he influenced many younger scholars, the most noteworthy of them being Joe S. Bain.

Another scholar from Harvard who had a profound impact over the Industrial Organization rising field was Gardiner Means. His most known work was more related to the theory of the firm, regarding the importance of the corporation in American capitalism (Berle and Means, 1932), but he had other contributions, such as the doctrine of administered prices (see Lee, 1999, chs. 1 and 2).

As a result of several intellectual developments occurred between the 1930's and 1950's, it can be acknowledged that "the label, 'Industrial Organization', and the initial form and impetus came out of Harvard" (Grether, 1970, p. 83).

[122] Mark Glick and Eduardo Ochoa asserted, in their very interesting article about classical and neoclassical elements in Industrial Organization, that "the structure-conduct-performance paradigm […] was developed as an inductive generalization of purely descriptive industry studies done in-the past (e.g., Berle & Means, 1938, and case studies by Edward Mason's Harvard group during the late 30's and early 40's)" (Glick and Ochoa, 1988, p. 13). We consider, instead, that there is an implicit Cournotian inspiration and it consists on a significant neoclassical element of Industrial Organization Theory.

2.6.2. The basic structuralist hypothesis

Bain's *Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940* (1951) was a seminal work for the structuralist approach. From the methodological and empirical points of view, it marked the transition from the predominance of cases studies to the analysis of statistical aggregates. From a theoretical point of view, it systematized the idea of market concentration as an independent variable.

Formally, Bain's 1951 model can be summarized by a simple regression that correlates the (average) rate of profit to the degree of seller concentration within the manufacturing industries considered (Geroski, 1989, pp. 168-170; Reid, 1987, p. 15, p. 211; Semmler, 1981, p. 44):

$$r = \beta_0 + \beta_1.CR_8 + u \qquad (9)$$

Where

r = average rate of profit
β_0 = intercept coefficient or "constant", which can be interpreted as a minimal rate of profit ($\bar{r}$)
β_1 = regression coefficient or slope
CR_8 = concentration ratio of the eight largest producers
u = residual, which reflects all other factors which affect the industry's average profit and are not related to the concentration ratio.

The results showed the existence of a positive relationship between the two variables. There would be, according to Bain (1951, pp. 314-315), a discontinuity around 70% of the CR_8, so that the average profit rates of the industries above this level proved to be much higher than in the industries below it. This percentage was considered by Bain (1951, pp. 323-324) as a critical concentration level.

The theoretical hypothesis of the article was derived from the conventional theory (Bain 1951, p. 294), associating concentration to higher margins, prices and aggregate profits. This article can be considered as a landmark in the development of the SCP approach, even though the dimension of business conduct was not explicitly elaborated (Reid, 1987, p. 15, p. 211).

The role played by potential competition was clearly neglected in this article, an absence that was recognized by the author himself (Bain, 1951, p. 295, pp. 323-324). In

other two very important works, however, Bain (1949, 1956) made considerable contributions to this subject while discussing limit pricing and barriers to entry.

2.6.3. Barriers to entry and limit-pricing

2.6.3.1. Bain

a) Potential competition and barriers to entry

In *Barriers to New Competition*, however, Bain (1956, pp. 1-2) has placed potential competition[123] at the center of the analysis, discussing its essential role in disciplining the conduct of already established firms. His theoretical development can be regarded as a return to the classical conception of competition and as an implicit disagreement with Cournot's conception of competition. While the latter believed that "[...] as the monopoly of such commodity is divided between two, three, or more producers, the commodity will gradually fall in price [...]" (Cournot, 1838, p. 135), the former considered that "[...] neither available evidence nor a priori logic support the notion that significant improvements in market performance would likely to stem from turning a two-firm industry into a four-firm industry, or a four-firm industry into a six-firm industry [...]" (Bain, (1956, p. 218, emphasis in original). Therefore, Bain (1956) rejected the existence of a decreasing monotonic relationship between the number of producers and the "intensity" of competition.

The existence of obstacles to capital mobility had already been recognized by classical and marginalist economists, but it was only in *Barriers to New Competition* that an explicit analysis of barriers to entry appeared[124]. Bain (1956) attempted to associate the intensity of competition with the height of barriers to entry, which he

[123] We must be cautioned with the usual differentiation between actual competition and potential competition. This characterization often implies that the number and size distribution of producers affects actual competition (restricted to shorter terms), while entry and the threat of entry (potential competition) is a longer-term phenomenon. Such reasoning attempts to conjugate rival (irreconcilable) conceptions of competition in the same analytical scheme. The classical approach considers that competition depends on *both* the actual entry (inflow of capital) and the threat of entry ("potential competition").

[124] Bain's four sources of barriers to entry (absolute capital requirements, absolute cost advantages, economies of large scale and, most importantly, product differentiation) indicate that obstacles to capital mobility can emerge from the very functioning of the capitalist system, not being restricted to governmental restrictions (feudal, mercantilist or even the State in capitalism) or natural factors (climate, land fertility, etc.).

identified as stemming from four main sources (Bain, 1956, pp. 15-16, p. 157, p. 204, p. 216) [125]:

i) absolute cost advantages: producers enjoy inferior costs at all levels of output due to the control of superior production techniques (via secrecy or patents), ownership or control of strategic resources or purchase of materials, hiring of labor under more favorable conditions and ability to obtain loans at lower interest rates;

ii) absolute capital requirements: the amount of resources that need to be raised to make the construction of an efficient plant viable;

iii) economies of large-scale: producers whose activities involve production and distribution at a large-scale are favored by real economies (lower quantities of inputs per unit of product), strictly pecuniary economies (due to the greater bargaining power of large buyers) or combinations of both types of economies (as usually occurs in the cases of advertising and other sales promotion);

iv) product differentiation: producers of differentiated products have competitive advantages as a result of their brand names and company reputations, control of superior product designs, ownership or contractual control of distributive outlets.

Even though barriers to entry reflect cost advantages mainly of established producers with regards to potential entrants, Bain (1956, p. 7) noted that such asymmetries also exist among established producers in the industry. Hence, those

[125] After work the seminal contribution from Bain (1956), other authors, such as Mann (1966), Qualls (1972) and Stonebraker (1976), built multiple regression models to measure the relation between barriers to entry and industrial profit rates, such as the following equation:

$$r = \beta_0 + \beta_1.X_1 + \beta_2.X_2 + \beta_3.X_3 + \beta_4.X_4 + u$$

where X_1 measures product differentiation, X_2 economies of scale, X_3 absolute cost advantages, and X_4 the capital requirement in industries (Semmler, 1981, p. 45).

established producers with lower costs compared to the least efficient ones and potential entrants will attain extraordinary profits.

b) Limit-pricing theory

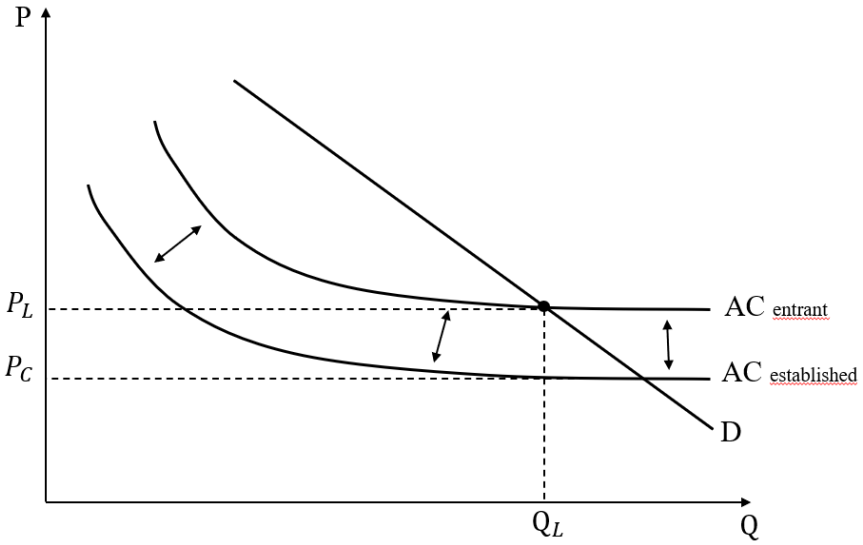
In the same book, Bain developed the idea, which he had previously discussed in an article from 1949, that the most efficient producers can set the price that guarantees extraordinary profits without encouraging entry. The maximum entry forestalling or preventing price, which is aligned with the assumption of long-run profit maximization, was called ‘limit’ price (Bain, 1956, pp. 93-94, p. 172).

Bain (1956, p. 107) conceived the determination of a commodity's limit price in terms of equilibrium between an L-shaped[126] industry supply curve and a negatively sloped market demand curve.

In the cases where barriers to entry result from absolute cost advantages, the limit price is determined exclusively by the long-run average costs of entrants, while extraordinary profits earned by established producers stem strictly from their cost advantages, as represented in Figure 3.

[126] The decreasing initial segment of the long-run average cost curve expresses the occurrence of 'economies of scale' due to real and pecuniary reasons (Bain, 1956, p. 53, pp. 57-58, p. 107). Once the optimal scale is reached, the average cost curve becomes horizontal. Given the absence of 'diminishing returns' of any kind, a series of optimal scales is obtained (and not just a single optimal scale as in the U-shaped curve from microeconomics textbooks) (Bain, 1956, p. 20, p. 58, p. 107). It is worth noting that the average cost curve represents costs under 'normal' (theoretical) conditions, not necessarily reflecting the actual or effective costs incurred by firms (Bain, 1956, p. 7, p. 63).

Figure 3 – Bain's limit-pricing under absolute cost advantages



Source: Own elaboration

In other cases, however, the level of the limit price depends on both the cost curves of potential entrants and established firms and the slope of the market demand curve. Therefore, in general, Bain's concept of the limit-pricing relies not only on cost asymmetries but also on the elasticity of demand.

In spite of this book's title, Joe Bain stressed more the *effect* of the different 'heights' of entry barriers over the level of price than the concept itself. He proceeded in this way through the concept of condition of entry (E), characterized as "[…] the extent to which established sellers can persistently raise their prices above a competitive level without attracting new firms to enter the industry" (Bain, 1956, p. 3). The author proceeded to express such condition in terms of percentage above the competitive level ($E = \frac{P_L - P_c}{P_c}$, where P_L = limit price, the highest price that does not attract entry and P_C = competitive price)[127].

Bain (1956, pp. 21-22) then proposed four stylized situations of immediate[128] condition of entry:

[127] Rearranging, we arrive at the alternative presentation $P_L = P_C.(1 + E)$ (Koutsoyiannis, 1979, pp. 289; Kupfer, 2013, p. 82). Given the (marginalist) determination of price in terms of equilibrium between supply (even though "L-shaped") and demand curves, the steeper the slope of the demand curve, the higher the limit price that established long-run profit-maximizing firms can charge (see, for example, Bain, 1956, pp. 105-107).

[128] Bain establishes two complementary concepts: the immediate entry condition and the general entry condition. They are associated with the idea that there is a 'queue' of entrants, organized in an increasing

1 - Entry is characterized as 'easy' or free when barriers to entry are negligible, so that the long-run price cannot deviate from the competitive price without attracting entry.

2 - Entry is characterized as 'ineffectively impeded' when barriers to entry are not sufficient to make limit-pricing, which would remain very close to the competitive price. Under these circumstances, established firms find it more profitable to set a price higher than the limit price in the current period, obtaining considerable extraordinary profits, and accept the price convergence towards the competitive level in subsequent periods due to the inevitable occurrence of entry[129].

3 - Entry is characterized as 'effectively impeded' when the presence of barriers to entry creates a considerable difference between the limit price and the competitive price, making the entry deterrence strategy advantageous.

4 - Entry is characterized as 'effectively blockaded' when entry barriers are so significant that firms can practice a monopoly price without fearing challenge to their established market positions.

Bain associated the 'height' of entry barrier with price levels and profitability differentials between industries, so that his limit price is usually situated between the competitive price and the monopoly price ($P_C \leq P_L \leq P_M$) (developing the argument initially proposed in his article from 1949). In the classical approach, however, entry barriers derived from cost advantages can lead to intra and inter-industrial profitability differentials, but not to supra-competitive prices, which ultimately depend on the cost conditions of potential entrants (associated with the dominant technique).

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order of costs – which highlights that the presence of cost asymmetries is a widespread phenomenon, occurring not only among established firms and between established firms and potential entrants, but also among potential entrants. Immediate entry is related to the entry of the first firm in the 'queue', that is, the firm with the lowest cost and the highest likelihood of successfully entering the market (Bain, 1956, pp. 9-10). General entry is associated with a succession of firms aiming to enter the market, an effort that becomes progressively more challenging as the entry process unfolds (Bain, 1956, pp. 9-10, p. 23). Thus, the general entry condition is defined from a succession of values of the immediate entry condition, which increases as the process of entry of new firms unfolds (Bain, 1956, p. 10, p. 23).

[129] The comparison between profits in each period must obviously involve an intertemporal discount associated with risk and interest rates (Bain, 1949, p. 450).

c) Behavioral assumptions

For Bain (1956, p. 54), the hypotheses of established firms about the behavior of potential entrants are an important step in assessing the significance of economies of scale as a barrier to entry. Depending on the type of reaction from already established companies, the entrant may face different price and/or cost conditions. In this scenario of interdependence, the potential entrant needs: (a) to develop conjectures regarding the reaction of established firms; (b) to decide whether or not to enter the market (Bain, 1956, p. 94).

The author listed six possible cases or conjectures of potential entrants (Bain, 1956, pp. 97-98):

(1) The potential entrant decides to enter the market with an insignificantly small scale, even if it presents higher unit costs. In this situation, its entry goes unnoticed by established firms, which will not change the quantity produced, thus maintaining an unchanged price.

(2) The potential entrant decides to enter the market on a significant scale and assumes that established firms will aim to maintain the pre-entry price level and reduce their quantities to 'make room' for him, thus avoiding a price war. This conjecture would reflect an accommodating stance by established firms.

(3) The potential entrant decides to enter the market on a significant scale and assumes that established firms will keep their pre-entry productions constant, accepting the price reduction resulting from the addition of capacity by the entrant. Bain (1956, p. 98) considers this case as the simplest model, although not the most realistic.

The hypothesis from this scenario later became known, by the influence of Modigliani (1958), as the 'Sylos' Postulate'. It is intriguing that Modigliani attributed this hypothesis to Sylos-Labini, while Bain discussed the behavioral hypotheses underlying economies of scale barriers and limit pricing theory in much greater detail than Sylos-Labini did. Should the 'Sylos' Postulate' had been called the 'Bain's Postulate' instead? Probably not, Bain (1956, pp. 97-98) did not consider conjecture (3) as the most likely, despite undertaking a detailed analysis of its empirical results based

on this hypothesis: “all this discussion proceeds on the supposition that entrants expect established firms to hold their outputs constant (case 3, p. 97)” (Bain, 1956, p. 105).

(4) The potential entrant decides to enter the market on a significant scale and assumes that the reaction of established firms occurs in an intermediate situation between cases (2) and (3). That is, established companies reduce the quantity produced compared to their pre-entry level, but not enough to fully accommodate the new capacity of the entrant. Thus, there is a price drop, although to a lesser extent than what would occur in case (3). Bain (1956, p. 98, p. 109) considers this case the most likely and realistic.

(5) The potential entrant decides to enter the market on a significant scale and assumes that established firms will increase their production compared to the pre-entry level, resulting in a sharp price drop. This conjecture would represent the most aggressive stance possible from established firms (reflecting a “retaliation” if entry occurs), thus constituting the most pessimistic expectation for the entrant to adopt.

(6) The potential entrant decides to enter the market on a significant scale and assumes that established firms will reduce their production by an amount greater than its capacity, allowing the entrant to operate (at least) at the minimum efficient scale and still benefit from higher prices. This would be the most optimistic scenario for the potential entrant.

d) The structural nature of barriers

Differently from what is usually suggested in most of the Industrial Organization literature, Joe Bain did *not* believe that the barriers to entry were permanent, immutable or absolutely exogeneous in relation to business strategies[130]. He recognized that absolute cost disadvantages can be circumvented (or absolute cost advantages created) by discovering new natural resources, by vertical integration strategies, by better training employees and by seeking new means of financing. Process innovations, in turn, can alter the “state of the art” of technology and decrease costs of production,

[130] So that there is a high degree of injustice in Salop’s (1979b) characterization of the entry barriers in the pre-Game Theory literature as 'innocent' barriers (Gilbert, 1989, p. 108; Lyons, 1988, pp. 31-32).

affecting the barriers associated with absolute cost and/or large-scale advantages. Product differentiation barriers can “expire” along with the product patent, they can be overcome by aggressive advertising strategies, by the establishment of exclusivity agreements with distributors or by the introduction of a new product (which can destroy an unfavorable barrier, create a new one in favor of the innovative company or even create a new market).

His main point is that all these initiatives take time and require resources, which makes it reasonable to consider that established producers will be able to earn extraordinary profits for a while (after all, at some moment producers have to be benefited from competitive advantages they built in the past - if appropriability was always nil, there would be no incentives for new business efforts). So, while discussing long-run price determination, barriers can be considered as a structural datum. Business strategies affect equilibrium prices only to the extent that they affect these structural conditions, but the treatment of this issue is left to be conducted at a different level of analysis (Bain, 1956, pp. 17-18, p. 145). In this aspect, Bain's analysis can be considered 'structural' (focused on capital mobility), although not necessarily 'structuralist' (related to concentration).

2.6.3.2. Andrews

Philip Andrews was an influential author of Industrial Economics, having been responsible for introducing in 1952 the first specialized journal, *Journal of Industrial Economics,* as well as for popularizing the name of the discipline in Europe (Andrews, 1952; Arena, 2011, p. 250, p. 260; Barthwall, 1984, p. 1; Mosca, 2016, p. 295).

a) The rejection of the neoclassical theory of the firm

Andrews participated in the *Oxford Economists’ Research Group* (Lee, 1999, chs. 4-5; Arena, 2008, 2011), which was concerned with the behavior of prices and output throughout the trade cycle, and submitted questionnaires to business men to better understand the determinants of their decisions. Some of these results were reported and interpreted by Hall and Hitch (1939). In this seminal article, it was argued that there was little evidence to support that firms equalized marginal cost and marginal revenue (profit maximization hypothesis) while determining prices and output.

Businessmen had great difficulty estimating marginal cost curves since they often produced a wide variety of products. Regarding the marginal revenue curve (firm's individual demand), the main difficulties stemmed from the fact that firms did not know consumers' "preferences" nor the rivals' reactions to changes in their prices. Regarding the latter, there was only an intuition that these reactions tended to be asymmetrical, with competitors following price reductions (because of the fear of losing sales volume and market share) but not price increases (in order to gain sales volume and market share).

Such asymmetry would be formally expressed in a discontinuity in the firm's marginal revenue curve, leading to a "kink" or "break" separating the two segments with different slopes (more elastic regarding increases than for price reductions) of the individual demand curve, which was called the "kinked demand curve"[131] (Hall and Hitch, 1939, pp. 22-23). It was up to the authors explaining the level at which this "kink" occurs.

b) The full-cost principle and normal cost price

Hall and Hitch proposed an alternative pricing theory, the *full cost principle*[132]: they considered that the price was set by the addition of a margin over the prime or direct unit cost (contemporarily, average variable cost), which must be sufficient to cover the overhead or indirect unit cost (contemporarily, average fixed cost) and still provide a profit considered "satisfactory" (Hall and Hitch, 1939, pp. 18-20).

Many authors from this Oxford tradition were critical to the changes in partial equilibrium analysis that took place in late 1920's and early 1930's, which they

[131] The proposition of an individual firm demand curve with this format occurred simultaneously with Sweezy (1939) – who ended up taking the "credit" in the literature for the nomenclature proposed by Hall and Hitch. Sweezy's exposition is inferior to that of Hall and Hitch, not only because he provides fewer details regarding the implicit rationality behind the "kinked demand curve" but also because he did not try to explain what determines the price-quantity point. Not to mention the hasty conclusions that the author tries to draw from such a limited instrument, for example when he states that "[...] a successful strike for higher wages may be without influence on either price or output. Trade-unionists who believe that the only effect of higher wages is lower profits may have more truth on their side than economists have been willing to grant." (Sweezy, 1939, p. 570)

[132] "Full cost" in the sense that the price should cover not only the marginal cost or direct/average variable cost direct cost (which is equal to the marginal cost if it is constant), but also the indirect cost (average fixed cost) (Possas, 1985, p. 27; Sylos-Labini, 1962, pp. 25-26). To avoid potential misunderstandings (that each commodity's price would have to cover the total costs of the company, which would not make any sense), Koutsouyiannis (1979, p. 271) opts to use the term 'average-cost pricing'.

believed had suppressed essential aspects of the Alfred Marshall's original formulation[133]. The apple of discord was the new conception of the representative firm, that eliminated the evolutionary notion of firms in perpetual motion and change by postulating an equilibrium of the firm.

In his most famous book, *Manufacturing Business,* Andrews used the *full cost principle* to criticize the short-term profit maximization hypothesis associated with the Pigouvian interpretation of Marshall's work (Arena, 2011, p. 254). The author introduced, however, an important modification in the full cost principle, which he called *normal cost price*: it considered that the firm defines a sort of average production level throughout the economic cycle (*budgeted output*), taking into consideration the accumulated experience of previous years and their expectations for the future, while defining pricing (Andrews, 1949, p. 136, p. 161, pp. 164-165).

c) Emphasis on the central role of potential competition

With regard to the level of the profit margin, Andrews considered that economists tended to underestimate the disciplining effect of potential competition. For him, the threat of entry would set a limit to the price that could be charged, which would converge to the cost of production (there including normal profit) (Andrews, 1949, pp. 23, pp. 170-171, p. 272).

In a later work, Andrews (1964, p. 16) exposed his adherence to the classical conception of competition in a clearer way while asserting that "the essential characteristic of an industry which is in open competition, as I define it, is nothing more than that such an industry is formally open to the entry of new competition" and even anticipated the perfect contestability reasoning that "[…] an industry with only one firm in it might well have to be analyzed as though it were competitive".

[133] P. W. S. Andrews was the most prominent figure from the Post-Marshallian School, which also had contributions from authors such as Dennis Robertson, Peter Newman, J. N. Wolfe, George Richardson, Brian Loasby and, more recently, Peter Groenewegen, Tiziano Rafaelli and Marco Dardi. Time, organization, knowledge, evolution and other important features of Marshall's complex intellectual legacy were revitalized. There are also important intersections between the Post-Marshallian, the Neo-Schumpeterian and the Neo-Austrian perspectives such as the importance they attribute to uncertainty, historical time, discontinuities, disequilibrium processes, path dependency, irreversibility and so on.

In his textbook, Gavin Reid (1987, ch. 5) provided an interesting presentation of this theoretical tradition. It is possible to draw a parallel between the Post-Marshallians attempt to rehabilitate the most original contributions from Marshall and the efforts made by Post-Keynesians (such as Paul Davidson, Fernando Cardim de Carvalho, Hyman Minsky and Jan Kregel) to refute the neoclassical interpretation of Keynes and to restate him as a heterodox author.

2.6.3.3. Sylos-Labini

a) The search for an objectivist theory and the classical conception of competition

Paolo Sylos-Labini became known, as Bain, for developing the concept of barriers to entry and the 'limit' pricing theory. This theoretical contribution was carried out in the book "Oligopoly and Technical Progress" (*Oligopolio e Progresso Tecnico*, in Italian). The first edition in Italian was published provisionally and privately in 1956 (in the same year, therefore, as the publication of Bain's *Barriers to New Competition*). Sylos-Labini sent this version to some friends, among them Alfred Kahn and Franco Modigliani. This first edition was reprinted in 1957, followed by the second edition in 1964 and third edition in 1967. After the book was translated into English (recommended by John Kenneth Galbraith), the book was published in 1962, followed by a second edition in 1969 (Sylos-Labini, 1962, p. ix; Roncaglia, 2006, p. 8; Rancan, 2012, p. 12).

Despite the similarity of their work, these authors had different theoretical starting points. While Bain had a more conventional orientation, Sylos-Labini searched in the works of Adam Smith, David Ricardo, Karl Marx and Joseph Schumpeter for inspiration to build an alternative microeconomic foundation for the Keynesian view of persistent involuntary unemployment. Two main features were derived from these references: the search for an objective price theory and the centrality of technological change in the dynamics of capitalism.

Sylos-Labini realized that the Cournotian conception of competition, which considers a fixed and unalterable number of firms, leads us to place disproportionate emphasis on the demand curve (and thus on demand elasticity) or on psychological hypotheses from the neoclassical oligopoly models (Sylos-Labini, 1962, pp. 31-32). The "reaction curves" and "conjectural variations" conduct the theorist to a galaxy of possibilities:

> "One method often used to put some sort of order into the galaxy of hypotheses and solutions is to star with the simplest case of oligopoly, duopoly, and to distinguish between Cournot-type and Edgeworth-type solutions. The former end up with the conclusion that price is determinate and equilibrium is stable, the latter with the conclusion that price is not necessarily stable. Both types of solution rest on abstract hypotheses of an essentially psychological nature. More and more complicated assumptions have been made about 'reaction curves' and 'conjectural variations'. The production of such hypotheses and solutions has assumed alarming

> proportions; Stackelberg, one of those who were busy in this field, eventually made the discovery that 'a disconcertingly large number of possible cases' was involved.
>
> The truth is that there is no stopping on the path of conjectural variations (*Cred' io ch'ei credette ch'io credesse*). Solutions can be proliferated to infinity and the manufacture of such hypotheses and solutions can become a sort of profession. It is all remarkably like working out the chess problems in a weekly magazine (white to play and mate in three moves) or, on a higher plane, like writing a manual of chess strategy." (Sylos-Labini, 1962, p. 20, emphasis in original).

To escape from this "fantastic world […] where everything might and nothing need happen"[134], Sylos-Labini resorted to the conception of competition from classical economists, especially Ricardo, whose main distinguishing feature was the condition (or 'ease') of entry (Sylos-Labini, 1962, p. 32, p. 34, p. 52).

b) Barriers to entry and oligopoly

He then proceeded to investigate the three main barriers to entry that hindered the operation of such process: i) technological; ii) product differentiation; iii) patents and special technical methods. While Bain (1956, p. 204, p. 206) considered product differentiation as the main cause of barriers to entry, Sylos-Labini has put technological barriers at the center of his analysis.

Technological barriers depend on technological discontinuities and the extension of the market. Sylos-Labini associated "technological discontinuities" to the coexistence of firms with different sizes (small, medium and large, in the specific case presented by the author) which are inversely correlated to the average cost of production (Sylos-Labini, 1962, pp. 38-39). Koutsoyiannis (1979, p. 306) re-interpreted Sylos-Labini's "model" in a more adequate way through three plant sizes. A large multi-plant and multi-product company may have, for example, a small or medium-sized plant in one of the markets in which it operates, which does not guarantee it the lowest average cost among competitors in that market. Thus, it is preferable to associate the average cost with the method of production (unit of production, plant or factory).

[134] It is almost comical that Sylos-Labini, an author who searched for objective and structural bases for microeconomics and had such clear and incisive statements of disapproval towards neoclassical oligopoly models and their subjective foundations, became mostly known by a *behavioral* assumption – the "Sylos' Postulate" – attributed to him by Modigliani (1958).

All existing methods of production (each one viable at a different level of production) are represented by fixed technical coefficients, not allowing the continuous substitutability of factors (Sylos-Labini, 1962, pp. 35-36). The existence of an interaction between average cost and quantity produced (associated with different methods of production) can be represented in a two-dimensional graph by three discrete points (one for each size of "plant", "factory" or method) placed in a descending sequence, but not a continuous downward sloped average cost curve. In this case of "economies of large scale", the consideration of given methods of production, the size of the market and producers' market shares is sufficient to determine the cost structure of the industry.

Although influenced by the classical tradition, Sylos-Labini utilized the concept of oligopoly, typified into three categories: homogeneous or concentrated oligopoly, differentiated or imperfect oligopoly, and mixed oligopoly (Sylos-Labini, 1962, pp. 12-14). While discussing Sylos-Labini's contribution, Roncaglia (2006, p. 4) attempted to reinterpret the meaning attributed to 'oligopoly' in the following way:

> "The idea of oligopoly based on barriers to entry is a *general* theory of market forms. Actually, both competition and monopoly turn out to be peculiar cases – the two extreme cases in which the barriers to entry are either non-existent or insuperable – of the more general situation in which barriers to entry are indeed present but can be overcome, albeit at some cost. The proper study for the theory of oligopoly – or, more generally speaking, of market forms – is therefore the nature and dimensions (or, better, the factors determining the dimensions) of the barriers to entry." (Roncaglia, 2006, p. 4, emphasis in original)

Alessandro Roncaglia thus simply 'renamed' the classical notion of competition, associated with mobility of capital (and the obstacles to its operation), as 'oligopoly'. Following this characterization, we could define concentrated or homogeneous oligopoly as a market structure where technological barriers predominantly prevail, differentiated or imperfect oligopoly as a market structure where product differentiation barriers are predominant, and mixed oligopoly as a market structure where both technological and product differentiation barriers are substantial.

However, if we abandon the Cournotian (number of firms), structuralist (concentration), and behavioral (Sylos' Postulate or reaction curves) aspects of oligopoly, what is left from this concept? Probably very little, since the small number of firms, high concentration, and acknowledgment of interdependence by firms are constitutive elements of the oligopoly concept.

It is deemed that it is better not to combine the concept of barriers to entry with an expression that refers to a series of theoretical references incompatible with the classical approach. For these reasons, we choose to completely abandon the concept of oligopoly and directly follow the classical conception of competition.

c) The entry-preventing price and the role of entry

Assuming that the cost conditions of the entrants and least efficient established producers are associated with small plants, Sylos-Labini (1962, p. 40, p. 59) expressed the price associated with the minimum profit rate (r_m) in the following way: $p_m = (\frac{k}{x} + v).(1 + r_m)$, where k is the total fixed cost, v the total variable cost and x the output of each of these producers. He then defined two cases of pricing: the entry-preventing price ($v < p < p_m$), in which potential entrants will not be interested in entering the market and there will be a gradual exit of established producers with small plants; the elimination price ($v < p$), in which not only there will be no entry, but producers with small plants will be forced to close their activities and producers with medium plants may gradually leave the industry if they are unable to make at least normal profits.

Sylos-Labini (1962, p. 21, p. 58) presents the full cost principle by the formula $p = (1+q).v = v + vq$ or, more precisely, $p = v + q'v + q''v$, so that that the profit margin (q) must cover both the average fixed cost ($q'v = k/x$) and the rate of profit ($q''v = r$). Two main analytical problems arise from this price determination: i) the output level (x) that must be considered for the calculation of the average fixed cost (k/x); ii) the determinants of the rate of profit (r). Sylos-Labini's treatment of both issues were deeply influenced by the work of P. W. S. Andrews[135] (Sylos-Labini, 1962, p. viii).

The consideration of a normal level of production (x_n) – Andrews' *budgeted output* – consists of a solution to the first analytical issue underlying Sylos-Labini's entry-preventing price (Sylos-Labini, 1962, p. 22, p. 26, p. 58). Regarding the second analytical issue, Sylos-Labini also acknowledged Andrews' influence[136] for considering

[135] In the Preface to the revised edition, Sylos-Labini acknowledged the strong intellectual influence that Andrews had on him: "[...] I owe much to Phillip Andrews, especially as regards the ideas formulated in the first part of this book – much more, certainly, than might appear from occasional footnote references. In my view Andrews book, *Manufacturing Business,* which appeared in 1949, was the first major organic contribution to that I have called the new theory of the firm" (Sylos-Labini, 1962, p. viii).

[136] Despite identifying the possibility of restrictions to entry (arising from economies of scale, patents, product differentiation) before Bain and Sylos-Labini, Andrews (1949, pp. 23-24, pp. 171-175, p. 201, p.

that the price would be set in the entry-preventing level, keeping the industry's profit margin (q)/rate of profit (r) close to the minimum:

> "Andrews starts from the full-cost principle to work out a theory of normal cost. He is the first to have looked at this principle in analytical terms and to have attributed to the conditions of entry an essential part in explaining the behavior of the firm in a situation of concentrated oligopoly. According to Andrews, the margin q, which he calls the costing margin, can be explained with reference to the entire industry to which the firm belong, in terms mainly of the conditions of entry of new firms and of mutual market invasion by existing firms.
>
> Bain, who has contributed the most significant writing on the problem of oligopoly, rightly emphasizes the importance of studying the conditions of entry […] Our analysis of price determination, like Andrew's and Bain's, will concentrate on the conditions of entry" (Sylos-Labini, 1962, pp. 31-32)

d) The role of demand elasticity

To discuss the determination of the price limit under technological barriers to entry, however, Sylos-Labini proceeded in a 'clumsy' way, exposing his arguments through numerical examples. The author initially envisions a market structure created randomly. He assumes a certain number of plants of each size, their respective cost structures, a minimum profit margin to be added to the costs, and an initial price. If the price obtained from the costs, already added with a minimum profit margin, is lower than the initial price, there will be an incentive for entry to occur. Conversely, if the initial price is lower than the price that ensures the minimum profit, smaller plants will close. In this way, the productive capacity adjusts to the market demand[137].

The price level of the (homogeneous) product would therefore depend on: i) the absolute size of the market; ii) the elasticity of demand; iii) the technologies; iv) the prices of variable 'factors' and of machines (Sylos-Labini, 1962, p. 50).

The methods of production and the price of 'factors' and machines jointly define the average cost of each type of plant. The extent of the market, in turn, determines the number of plants of each size that can be 'accommodated' in the market: there is a

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272) considered, unlike the other two authors, that *even the largest companies* would enjoy normal profits in the long period.

[137] The author describes his expository strategy in the following way: "To deal with the problem of the equilibrium price over a long period and in conditions of oligopoly, we shall proceed rather like Walras with his *prix crée au hasard*. We shall start out from a given structure of industry and from a given price, and ask ourselves whether that structure and that price are in equilibrium and can remain unchanged. If not, we shall look for the equilibrium" (Sylos-Labini, 1962, p. 36, emphasis in original)

variety of possible configurations, but this aspect is important as it affects the size of the highest-cost plant in operation in the market. The role played by the elasticity of demand in price determination, however, remains an enigma. The treatment given by Sylos-Labini to the elasticity of demand is ambiguous, if not contradictory.

At first, the author is extremely critical of the marginalist attempt to express the profit margin (q) in terms of demand elasticity (η):

> "[...] q and η can be resolved into each other only at the cost of a complete perversion of the meaning of demand curve and elasticity of demand, which are and can be founded only on the tastes of consumers. Moreover, the essence of the problem of oligopoly is how q is determined and what its limits are. To assume *a priori* that q can be translated into terms of elasticity of demand means to take as given precisely what is to be solved" (Sylos-Labini, 1962, p. 31, emphasis in original)

Later on, the author proposes an 'empirical' notion of demand elasticity ($e = \frac{p_1.x_2}{p_2.x_1}$, where p_1 = lower price, x_2 = larger output, p_2 = higher price, x_1 = larger output), and compares it as follows with its theoretical counterpart: while the conventional concept of demand elasticity ($\eta = \frac{\frac{dx}{x}}{\frac{dp}{p}}$) has infinitesimal properties, the 'empirical' demand elasticity only reveals the direction of revenue variations (depending on whether 'e' is less than, equal to, or greater than 1) (Sylos-Labini 1962, pp. 37-38).

The notion of an 'empirical' demand makes sense within the scope proposed by Kaldor (1935), related to real firms and the need to make decisions based on some expectation, which can be represented by an imagined demand curve. It is difficult to understand how an 'empirical' market demand curve can contribute to the analytical determination of a long-period price.

It would be more consistent with the classical conception of competition and the objectivist conception proposed by the author that movements toward the equilibrium price occur through capital mobility, with subsequent production adjustments, rather than through any movement along the demand curve. The magnitude of market demand can indeed influence the market price, as long as it affects the choice of the dominant technique. However, in the classical conception, the market demand consists of a 'point' rather than a 'curve'.

e) The source of extraordinary earnings

Sylos-Labini's attempt to combine irreconcilable theoretical elements reflects the tension between two distinct views about the source of extraordinary earnings: rents derived from cost advantages relative to the dominant technique and extraordinary profits arising from supra-competitive prices, which shows that the author did not manage to completely scape from the simultaneous determination between prices and quantities.

The presence of technological barriers is related to the fact that there are few methods of production (rather than an infinity of them), each associated with a specific level of production (so that it is only possible to increase production by multiples of each plant) and which exhibit different productivities (the larger the plant, the lower the average cost).

In the classical view, extraordinary earnings are treated as 'Ricardian' differential rents arising from the possession of more efficient production methods (with lower average costs). The limit price will be established at the level of the cost of production of the method available to potential entrants (e.g., small plants), while established producers with medium or large-scale plants are able to earn non-eliminable extraordinary profits (or 'Ricardian' differential rents[138]) without inducing entry.

In the marginalist view, extraordinary profits arise when the industry's output remains below the level it would be produced in a perfect competition situation. If the size of the minimum-sized plant constitutes a relevant portion of the market, additions to capacity produce a significant increase in the industry's output, thus causing a considerable price reduction that makes entry economically unfeasible. In this situation, the level of the limit-price begins to depend on the minimum efficient scale to be adopted by the entrant, as well as on the slope of the industry demand curve (elasticity of demand) and the expected post-entry output of established producers (thus introducing subjective considerations regarding the behavior of competitors).

[138] "È esatto affermare che i profitti, superiori al minimo, goduti dalle imprese maggiori, hanno un carattere differenziale" (Sylos-Labini, 1967, p. 82).

These theoretical elements from the supply-and-demand apparatus, which were present in a ‘timid’ way in Sylos-Labini's original formulation, were exacerbated by later interpretations of neoclassical authors, as we will discuss below.

2.6.4. The Sylos’ Postulate: origin and controversies

2.6.4.1. Modigliani (1958) and the subsequent debate in the *Journal of Political Economy*

Rancan (2012) accessed Modigliani's papers available at Duke University and evaluated the content of the correspondence between the author and Sylos-Labini. According to her, Modigliani received from Sylos-Labini the provisional version of the book O*ligopolio e Progresso Tecnico* in 1956, with whom he had maintained correspondence since they met in Chicago in 1948. After reading Sylos-Labini's book, Modigliani wrote a 14-page letter with comments to his friend, focusing most of his analysis on the numerical examples and the hypothesis of constant production after entry, considering the latter as Sylos-Labini's most original contribution (Rancan, 2012, p. 4, p. 7).

Despite Modigliani's detailed comments and suggestions, Sylos-Labini introduced few changes to the microeconomic part of the book, which was reprinted in 1957. Although Sylos-Labini did not agree with many of the comments, not incorporating them into the final version of the book, he asked his friend to review it (Rancan, 2012, pp. 9-10). Modigliani accepted the invitation, largely relying on his notes from the preliminary version of the book, and the review was published the following year in the *Journal of Political Economy*.

Modigliani began his article *New Developments on the Oligopoly Front* emphasizing that despite Joe Bain and Paolo Sylos Labini having independently written their books (*Barriers to New Competition* and *Oligopolio e Progresso Tecnico*, respectively) and having published them almost simultaneously, there were striking similarities in their basic models and methods of analysis (Modigliani, 1958, p. 215). After a brief comparison of the works of the two authors, Modigliani (1958, p. 216) pledged to give primary attention to Sylos-Labini's work (a promise that the author did not fulfill, maintaining recurrent references to Bain's work).

Modigliani considered that the most significant contribution of Bain and Sylos-Labini resided in their emphasis on the role of entry, which was excluded by assumption in monopoly and oligopoly models (under the influence of Cournot):

> "Until quite recently little systematic attention has been paid in the analysis of monopoly and oligopoly to the role of entry, that is, to the behavior of potential competitors. This neglect is justified for monopoly, which is generally defined as the case of a single actual as well as potential producer whose demand curve is not significantly influenced, either in the short or in the long run, by his price policy. Oligopoly could also be defined to exclude entry, fewness being then the result of the impossibility, for firms not now in the group, of producing the commodity-whether for physical or legal reasons. And, undoubtedly, the impossibility of entry is frequently at least implicitly assumed in the analysis of oligopoly, following the venerable example of Cournot, with his owners of mineral wells. But such a narrow definition leaves out the far more interesting case where fewness is the result of purely economic forces, entry being prevented by - and within the limits of - certain price-output policies of existing producers. This is precisely the essence of homogeneous oligopoly analyzed by both Sylos and Bain." (Modigliani, 1958, p. 216)

Modigliani considered that, in a situation where potential entrants have access to the same long-run cost function as established firms, and the minimum efficient scale is insignificant, the entry of new firms is a sufficient condition for a competitive price. However, this does not happen when the optimal size of the firm (sic) represents a "non-insignificant" fraction of pre-entry output (Modigliani, 1958, p. 216).

In this way, Modigliani acknowledges, like Sylos-Labini, the role of "economies of scale" as a barrier to entry. However, two striking differences stand out at this point: i) Modigliani conceives the existence of a long-run cost curve, while for Sylos-Labini, only 'points' existed; ii) Modigliani assumes that all firms, established and potential entrants, have access to the same long-run cost curve. As previously discussed, Sylos-Labini considers that established firms can have plants of three different sizes (small, medium, and large), with progressively lower average costs as one transitions from smaller to larger plants.

Modigliani focused his analysis on homogeneous oligopoly and barriers to entry arising from economies of scale. Considering the relevant price for a potential entrant as the price after entry, Modigliani asserted that the oligopoly theorist cannot escape analyzing the inherent strategic interaction in the entry problem. He proposed the hypothesis that the entrant assumes established firms will maintain their production quantity after its entry (equivalent to Bain's "conjuncture 3") and labelled it the "Sylos' Postulate" (Modigliani, 1958, pp. 216-217)

According to Modigliani (1958, pp. 216-217), this hypothesis would be explicitly or implicitly present in Sylos-Labini's work and would be justified as the most pessimistic scenario for the firm to adopt[139]. Bain, on the other hand, would have preferred a less belligerent hypothesis. Under the assumption of constant pre-entry quantity of established firms, the increase in quantity produced relative to the addition of capacity by the entrant would induce a reduction in the market price. The centrality occupied by Sylos's Postulate in Modigliani's formulation is associated with the possibility of obtaining a definitive solution to the problem of determining an upper limit for the price that prevents entry (P_0) and the corresponding quantity (X_0). The logical foundation is that potential entrants are interested only in the post-entry price. Thus, in a situation where entry with minimum efficient scale leads to a price which is equal to lower than the competitive price, entry will not be considered profitable and will not occur.

The demand curve is expressed as X = D(P). The pre-entry demand curve is given by X' = D(P'), where P' is a price that prevents entry by being below the long-run average cost. The highest price that prevents entry (P_0) is the limit price or, "critical price" in Modigliani's terms, is associated with the "critical" quantity (X_0) and the market demand curve $D(P_0)$ (Modigliani, 1958, p. 217). We can now discuss the factors that affect the limit price (P_0). The competitive price (P_C) is equal to the minimum average cost (k) and has "X_C" as the corresponding quantity produced. In this way, the quantity produced under competitive conditions consists of $X_C = D(P_C) = D(k)$. The size of the market (S), in turn, is represented by the ratio $\frac{X_c}{\bar{x}}$, where $\bar{x}$ consists of the minimum efficient scale (Modigliani, 1958, pp. 217-218).

The lowest level of output of established producers that prevents entry (X_0) can be obtained by subtracting the minimum efficient scale (minimum production required for a company to enter the market without prohibitively high costs) from the quantity associated with the competitive price. Thus, Modigliani (1958, p. 218) arrives at the following equation: $X_0 = X_c - \bar{x} = X_c.(1 - \frac{\bar{x}}{Xc}) = X_c.(1 - \frac{1}{S})$ (10).

Modigliani asserts that the limit price corresponding to X_0 can be obtained from the demand curve or by solving the equation $X_0 = D(P)$. Following the first alternative, the relationship between P_0 and the competitive price (P_C) can be approximated in terms

[139] Which is not entirely correct, as the most pessimistic hypothesis would imply an expectation of retaliation from established firms, with increased production post-entry (Bain's scenario 5).

of the elasticity of demand in the neighborhood of P_C. Starting from the definition of demand elasticity ($\eta = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{Q} \cdot \frac{P}{\Delta P}$) and assuming the Sylos' Postulate ($\Delta Q = \bar{x}$), we obtain $\eta = \frac{\bar{x}}{Q}.\frac{P}{\Delta P}$. As we are interested in the difference between the limit price and the competitive price, ΔP can be replaced by $P_0 - P_C$. Calculating the elasticity of demand in the neighborhood of P_C, we arrive at the following expression:

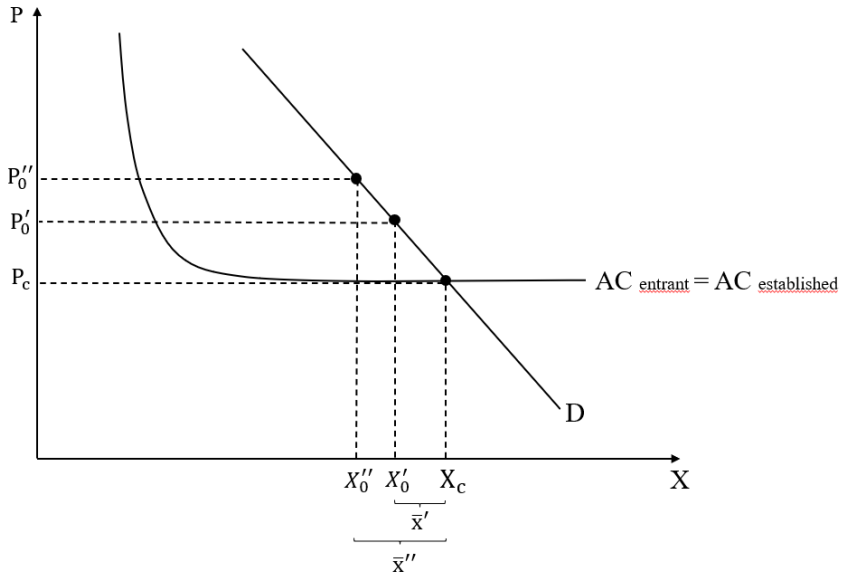
$$\eta = \frac{1}{S} \cdot \frac{P_c}{P_0 - P_c}$$

$$\eta . (P_0 - P_c) = \frac{P_c}{S}$$

$$\eta . P_0 = \eta . P_c + \frac{P_c}{S} \implies P_0 = P_C (1 - \frac{1}{\eta S}) \quad (11)$$

The level of the limit price is inversely related to the elasticity of demand (η) and to the ratio between the market size and the minimum efficient scale (S) – and thus directly related to the minimum efficient scale ($\bar{x}$) –, as it can be visualized in Figure 4 below.

Figure 4 – Modigliani's limit-pricing model



Source: Own elaboration

The predominantly 'empirical' notion associated with the elasticity of demand by Sylos-Labini has certainly been abandoned with the formalization proposed by Modigliani. In this way, demand has been restored to its role as a co-determinant of price alongside costs - in an equilibrium between 'supply' and 'demand'.

Modigliani's intervention contributed to shift the price theory away from Sylos Labini's objective claim, drawing attention to behavioral hypotheses. The divergence between the theoretical influences on the two authors helps explain the differences between their formulations. While Sylos-Labini studied with Schumpeter, worked with Robertson, and knew Sraffa, Robinson and Kaldor, Modigliani was a mathematical economist, familiar with developments in Game Theory and a protagonist in the mainstream macroeconomics of the time[140] (Rancan, 2012, p. 11, pp. 13-14).

However, it is important to emphasize that Modigliani did not interpret Sylos-Labini's work as a Cournot model in his seminal article of 1958. This association arose from two notes – Farrar and Phillips (1959) and Fisher (1959) – about this review.

Farrar and Phillips (1959, p. 414) begin their comments by praising Modigliani's ability to synthesize and formalize the common elements in the works of Bain and Sylos, referring to the contribution of the three authors as a whole[141]. Despite acknowledging that the model achieved "spectacular victories" in the field of oligopoly theory, the authors considered that the fragility of Sylos' Postulate ultimately compromised its consistency. It is in this context that Farrar and Philips (1959, p. 414) state that the analyzed model is clearly reminiscent of Cournot's (1838) mineral water duopoly model, as both models share the characteristic that established firms and potential entrants have access to the same long-term cost curve. The theoretical innovation of the model would have been the substitution of Cournot's horizontal cost curve (equal to zero) with a variety of U-shaped cost curves. In doing so, Bain-Sylos-Modigliani would have discovered that the "premium" that oligopolists can obtain above the competitive price grows "directly" with the importance of economies of scale and "inversely" with the size of the market and the elasticity of demand (which, again,

[140] Around 1955, Modigliani was working on the relationship between non-competitive markets, real wage rigidity, and involuntary unemployment (Rancan, 2012, p. 2, pp. 13-14). Modigliani's (1958) incorporation of barriers to entry into a supply-and-demand apparatus can thus be considered as an extension of the neoclassical synthesis, searching to improve the microfoundations of macroeconomics (Roncaglia, 2006, p. 8, p. 11).

[141] The authors successively change the order in which the authors are mentioned, referring to the model as Bain-Sylos-Modigliani (Farrar and Phillips, 1959, p. 414), Modigliani-Sylos-Bain (Farrar and Phillips, 1959, p. 415), and finally, Sylos-Bain-Modigliani (Farrar and Phillips, 1959, p. 415).

would reflect an evident "Cournotism" on the part of the authors) (Farrar and Phillips, 1959, p. 415).

The authors focus their criticisms on Sylos' Postulate (which is not a small objection, given the status to which Modigliani elevated such a proposition). Once again, they emphasize the similarity of the analyzed model to Cournot's pioneering formulation. In Cournot's model, firms make quantity decisions considering that their actions do not alter the production plans of their rivals. The essence of oligopoly, the mutual interdependence among producers, would thus be eliminated by assumption. The model of Bain, Sylos-Labini, and Modigliani would have extended this reasoning even further, proposing independence not only among established firms but also between established firms and potential entrants. This would be the only justification for a potential entrant to face only the residual demand and not the entire market (Farrar and Phillips, 1959, pp. 416-417).

Condemning the 'bad psychology' of Sylos' Postulate, the authors identified the association between market size and optimal firm size as the major contribution of the model by Bain, Sylos-Labini, and Modigliani. Thus, the analyzed model is not just the addition of any cost curve to the Cournot model but the addition of a cost curve with specific properties. It is the discontinuity in the quantity addition, given by the characteristics of the technology, that allows established firms to practice supra-competitive prices under product homogeneity and uniformity of cost conditions (Farrar and Phillips, 1959, p. 417).

Fisher (1959) also associated the Bain-Sylos model, as presented by Modigliani (1958), with the Cournot model, going as far as stating that it gives a feeling of *déjà vu*. For convenience, the author confines his analysis to the case of homogeneous oligopoly, adhering to assumptions of a constant long-term average cost for quantities larger than the minimum efficient scale (and prohibitive for quantities below it) and that established firms tacitly or explicitly agree to maintain the quantity produced (Sylos' Postulate). The author arrives at the same formula (10) as Modigliani but emphasizes that the result is independent of the shape of the demand curve, relying only on the point of intersection between the demand and average cost curves (Fisher, 1959, p. 410).

Fisher asserts that Sylos's Postulate looks somewhat familiar (to those accustomed to the Cournot model). However, contrary to Farrar and Phillips (1959), Fisher considers it to be less (not more) restrictive than Cournot's assumptions. While Sylos' Postulate implies that the potential entrant assumes that the production of

established members in the industry is independent of their own decision to enter, the Cournot model assumes that each member assumes that other producers will keep their quantities unchanged (Fisher, 1959, p. 411).

Recognizing that Cournot did not considered entry, limiting himself to the number of competitors, Fisher aimed to extend the Cournot model to allow for the potential entry of firms, creating four possible cases (Fisher, 1959, pp. 411-413). The results of the 'enlarged' Cournot model were, however, disappointing. The equilibrium at the production level X_0 is achieved only exceptionally (by chance) or with the imposition of arbitrary assumptions, such as S being an integer. This outcome leads the author to conclude that, in general, the industry's equilibrium production will be higher, and the price lower in the enlarged Cournot model than in the Bain-Sylos model presented by Modigliani. Moreover, the enlarged Cournot model predicts an equilibrium number of sellers and their respective market shares, while the Bain-Sylos model does not even attempt such a prediction. Fisher concludes his intervention by stating that the results of these models are indeed different (Fisher, 1959, p. 413).

Modigliani then wrote a response to his commentators, which was published simultaneously with the two notes in the *Journal of Political Economy*, Vol. 67, No. 4, 1959. Modigliani (1959) focuses the defense of his original article on attempting to dissociate his model, which he now refers to as S-B-M, from the Cournot model. Modigliani's response is primarily directed at Farrar and Phillips (1959), whose comments were more critical. The author reaffirms the distinction between Bain and Sylos's (classical, as we have defined it) notion of competition associated with the possibility of entry, and the Cournotian conception of competition, associated with a fixed number of firms in the market:

> "I am primarily concerned with their allegation that 'the similarity of … [the] ... major conclusions' of the S-B-M model 'to those of a slightly amended, long-time predecessor' – the Cournot model – 'rob it (at least partially) of its originality'. Apparently, the authors have failed to realize that the two models, and hence their conclusions, refer to quite different phenomena. To speak of similarity of conclusions is therefore not merely wrong, it is meaningless. The Cournot model deals with market price, aggregate output, and its distribution between firms under conditions in which the number of firms is given and entry is impossible. On the other hand, the S-B-M model deals with price and aggregate output when there are no natural or legal restrictions to entry, and it is only tangentially concerned with the issue of the distribution of output between firms. The major conclusion of the Cournot models is that the relation between oligopoly and competitive output depends (at least under simple conditions) on the number of firms, which is a datum of the problem. The major conclusion of the S-B-M model, on the other hand,

> is that ‘the maximum premium the oligopolist can command over the competitive price [...] tends to increase with the importance of economies of scale and to decrease with the size of market and the elasticity of demand.’ As far as I am aware, these conclusions are nowhere to be found in Cournot or his elaborators, nor could they possibly be derived from a model in which entry is excluded. There is, therefore, no similarity of conclusions or procedures.” (Modigliani, 1959, p. 418)

The attempt by Farrar and Phillips (1959, p. 414) to support the existence of a continuity line between Cournot's and Bain-Sylos-Modigliani's models by proposing that in both models established firms and potential entrants would have access to the same long-term cost curve is a completely nonsensical: there are simply no potential entrants in the Cournot model!

The similarity between Sylos' Postulate and Cournot's hypothesis, according to Modigliani (1959, p. 418), is merely formal, as both assume constant quantities of their rivals. However, the specific characteristics of the decisions in which each of these behavioral hypotheses is embedded are quite different. In the Cournot model, it applies to a given group of established firms, while in the S-B-M model, it applies only to potential entrants. In other words, there is nothing in the S-B-M model that requires incumbents to behave in the doubtful fashion postulated by Cournot (Modigliani, 1959, p. 419).

Modigliani takes the opportunity to defend the psychological foundations behind Sylos' Postulate, arguing that it makes more sense to assume a constant production by established firms than to imagine that they would 'roll out the red carpet' for the entrant and passively accept a new market division (Modigliani, 1959, pp. 418-419). Finally, the author evaluates Fisher's (1959) extension of the Cournot model to a situation with entry of new firms - a proposal that Modigliani (1959, p. 419) suggests Cournot would not approve. According to him, the assumptions necessary for the 'enlarged' Cournot model to achieve results equivalent to the Bain-Sylos-Modigliani model are excessively restrictive, undermining the attempt to establish a correspondence between the two.

Ironically, Farrar and Phillips (1959), who proposed a closer association between the Bain-Sylos-Modigliani model and the Cournot model, found that its major contribution was not Sylos's Postulate (as they considered it fragile), but rather the technological discontinuities. In this regard, the responsibility for linking the 'action and reaction' to Sylos-Labini’s price theory should fall entirely on Modigliani.

In summary, concerning interpretations of Sylos-Labini's work, there is no general relationship between the acceptance of Sylos' Postulate and the Cournotian interpretation of his model. Yet, in both instances, there is a shift towards highlighting subjective elements - whether it be the behavioral hypothesis associated to potential entrants or Cournot's 'reaction curves'.

2.6.4.2. Sylos-Labini and the Sylos' Postulate

Having passed away in 2005, Paolo Sylos-Labini had the opportunity to observe all the events discussed here. It is worth discussing the author's stance, including his position regarding the 'misuse' of his name by Modigliani. In this regard, a passage from the Preface to the First Edition provide some clarification:

> "In the June 1958 issue of the *Journal of Political Economy*, Franco Modigliani published a paper, "New Developments on the Oligopoly Front", in which he worked out some of Bain's and my points mathematically. Considering the sciencific value of Modigliani's analysis and the original approach to certain specific problems and their solution, his paper is to be regarded as more than a critical review of the two books; it is a new and significant contribution to the theoretical problem of oligopoly. Modigliani's article was followed by a long and interesting debate, which was published in the August 1959 issue of the *Journal of Political Economy*" (Sylos-Labini, 1962, p. ix, emphasis in original)

This excerpt suggests that Sylos-Labini: i) considered Modigliani's article (1958) to be an original contribution, not merely a simple review or synthesis of ideas proposed by him and Joe Bain; ii) was aware of the debate that followed the publication of Modigliani's review in the Journal of Political Economy.

The so-called Sylos' Postulate certainly did not have the same relevance for Sylos-Labini as it did for Modigliani (perhaps calling it Modigliani's Postulate would be more accurate). As reported by Rancan through an analysis of correspondence between the authors:

> "Despite Modigliani's detailed comments and suggestions, Sylos introduced only minor changes to his microeconomic analysis in his 1957 definitive edition. In fact, many of Modigliani's comments are followed by Sylos' notes of disagreement. In particular, with reference to Modigliani's discussion of entry conditions and the hypothesis of constant output, Sylos wrote: «This is not my hypothesis, the interpretation of this point is not correct» (ibid., my translation)." (Rancan, 2012, p. 9)

Only in the 1962 English edition did Sylos-Labini introduce an explicit mention of the assumption that established firms would keep their output constant if entry of new firms occurred.

> "If new firms enter the market, the existing ones continue to produce as much as before. They do so not only to discourage the entry of new firms, whose additional output in these circumstances necessarily depresses the price and so makes the whole market less profitable, but also because by lowering their output the existing firms would raise their total average cost (since on our assumptions total average cost is decreasing up to the limit of plant capacity). For the sake of simplicity, we have ruled out any reduction of output by existing firms as a result of the entry of new firms; if existing firms decide to produce less than maximum output, they do so not under pressure of new entry, but on the basis of independent economic calculations" (Sylos-Labini, 1962, p. 43)

Why, then, did Sylos-Labini not publicly express his discontent with the so-called Sylos' Postulate? One possibility is that, although Sylos-Labini did not consider the hypothesis as fundamental to the overall argument of his book, he found it reasonable from an empirical standpoint, as a kind of stylization of firms' behavior (Roncaglia, 2006, p. 11; Rancan, 2012, p. 12). Another hypothesis, not necessarily exclusionary with the first, is that his friendship with Modigliani restrained him from making public statements against the author. This is particularly valid regarding the review: Sylos-Labini held great appreciation for Modigliani, an already renowned macroeconomist at the time, for writing the review that sparked interest in his book. It was this review that made it possible numerous editions and translations into various languages, enabling its worldwide dissemination (Roncaglia, 2006, p. 8; Rancan, 2012, p. 12).

Some authors who attempted to reclaim Sylos-Labini's heterodox contributions sought justifications for the validity of the so-called Sylos' Postulate. Roncaglia (2006, p.11), for instance, argued that when there is an indefinite number of game repetitions, it is impossible to adopt a backward reasoning. In this way, the rational action of established producers would be a tough response to entry, rationally grounding the Sylos' Postulate. We consider that this argumentative strategy is not just innocuous, but potentially harmful. It implicitly admits Modigliani's interpretation, if not because of the centrality that Sylos' Postulate plays in Sylos-Labini's entire contribution, at least in its need for the construction of a limit-price theory.

Surely, Sylos' Postulate does not display the general character proposed by Modigliani[142]. In this regard, the literature of the New Industrial Organization has its fair share of reason. It is argued, however, that the very posing of such a question stems from a specific trajectory that the history of economic ideas has taken, which is not necessarily the only path to be pursued[143].

The consideration of behavioral hypotheses is inevitable once economies of scale, defined as the relationship between the minimum efficient scale and the market size, are deemed as sources of barriers to entry. In these circumstances, the post-entry output of established producers (which implicitly act in perfect collusion) is relevant insofar as it affects the market price and the residual demand (and hence, the cost of production) of the entrant. Thus, established firms indeed have the capacity to influence whether entry will be profitable or not.

Sylos-Labini's silence about the necessity of Sylos' Postulate for the validity of his price-limit theory probably did not solely arise from an intention to avoid contradicting his friend Modigliani. It is likely that the author did not have a compelling response to refute it. Even though Sylos-Labini did not conceive a continuous supply curve, a general relationship between price and quantity persisted in his analysis.

The incorporation of 'dynamic' elements also does not seem a sufficient condition to shield Sylos-Labini's theory of price limit from customary criticisms, particularly because what the author understands as 'dynamic' is not precisely defined. Sylos-Labini (1962, p. 52) characterizes, for instance, price variation as a 'dynamic' problem. It is questionable whether the deficiencies in his theory of equilibrium prices (under 'static' conditions, therefore) can be resolved merely by shifting towards a 'dynamic' scenario. The factors affecting price variation have markedly distinct determinants, so that a mere change in costs stemming from an increase in nominal wages, for instance, can hardly be put on the same footing with technological progress (which indeed possesses complex, multifaceted, interactive, and cumulative properties, deserving the 'dynamic' classification in a stricter sense).

[142] In this sense, except for the lineage attributed to Sylos-Labini, Modigliani's proposed nomenclature is not entirely inaccurate. For Sylos' Postulate to always hold true, one must indeed postulate.

[143] In chapter 4, we will return to the discussion on entry barriers and limit-pricing from a classical perspective.

2.6.5. The consolidation of the SCP framework

In the introduction[144] of his textbook *Industrial Organization Theory*, Bain (1959) proposed that industries should be studied by means of three main concepts – Structure, Conduct and Performance – and listed the condition of entry together with the degree of concentration among the aspects that characterized the market structure[145]. By doing this, the author combined his revolutionary idea of barriers to entry with the concept of concentration which "depended strongly upon the received economic theory" (Bain, 1959, p. viii). This view was endorsed by Richard Caves's influential book *American Industry: Structure, Conduct, Performance* (1964), who was a colleague of Joe Bain at Berkeley.

The market concentration does not directly reflect any of the conceptions of competition set out in this dissertation. Nor could it, after all the very definition of concentration depends upon the empirical discussion about its measurement. The Herfindahl-Hirshman index, for example, is not strictly Cournotian, as it reflects not only the number of companies, but also the inequality between them. The Gini coefficient, on the other hand, is not Cournotian at all, as it consists only of a measure of relative size. The concentration ratio – CR_k – is associated with the number of companies, but not in the exact Cournotian sense, as it ignores the remaining n – k companies[146].

There is, however, the "intuition" that the number and the market distribution of competitors is a key determinant of the degree of collusion (Fellner, 1949; Kaysen, 1959, p. 115; Phillips, 1962, pp. 29-30; Williamson, 1965, p. 600; Scherer, 1980, p. 199-200; Sawyer, 1985, p. 56; Carlton and Perloff, 2000, p. 121; Motta, 2004, p. 166;

[144] Bain (1950; 1956, pp. 13-17) acknowledged the influence of J. M. Clark concept of workable competition over his work.

[145] Mann (1971), for example, built a simple model capturing the effect of these two components of the market structure – concentration and barriers to entry – on the rate of profit (which measured the performance dimension) (Reid, 1987, pp. 15-16).

[146] By not accurately reflecting either the number of companies or the barriers to entry, a precise economic meaning of concentration is difficult to ascertain: As Mário Possas stated "[...] concentration is not a very explanatory variable in itself; and I add: it is nothing more than a 'variable' without any precise concept as support, and therefore complex and difficult for economic interpretation" (Possas, 1989, p. 166, own translation). Also, "[…] concentration is more a complex outcome of the interaction of multiple determinants than an 'independent variable'" (Possas, 1985, p. 129, own translation). With this in mind, it is not surprising the enormous theoretical and empirical problems faced by the structure-conduct-performance paradigm, which will be addressed in the next chapter.

Lipczynski *et al*., 2005, p. 184; Martin, 2010, p. 190). Scherer (1980, pp. 199-200) pointed out three main reasons why larger number of sellers and smaller individual producers make collusive practices more difficult: i) The smaller the size of the competitor, the greater the chance that rivals will ignore its conduct; ii) The greater the number of competitors, the higher the probability of existing at least one maverick - a competitor with more aggressive pricing policy - in the market; iii) The greater the number of competitors, the higher the probability of diverging opinions about the most advantageous price.

This higher propensity to collusion (tacit and/or explicit) is an essential feature of the argument against concentrated industrial structures, even though the structuralist literature itself has identified several countervailing effects - mistakes in the estimations of demand and costs, slow processes of cartel negotiations and price adjustments, degree of concentration of buyers, divergence of cost conditions, product characteristics and opinions among the companies of the group, bluffing in negotiations and incentives to cheat after the deal is sealed, the wish for autonomy and a good public image, expansion of demand, the fear of entry and government interference, among others -, thus recognizing that collusive agreements are often unstable (Koutsouyiannis, 1979, pp. 240-241; Scherer, 1980, pp. 200-202; Motta, 2004, pp. 166-170; Martin, 2010, pp. 188-193). More recently, Motta (2004, pp. 169-174) emphasized that many characteristics, such as demand elasticity, multi-market contacts, inventories, and excess capacities, can have ambiguous effects on the sustainability of collusion.

Regardless of the specific impact of each of these characteristics, a discussion that has been raised to an even higher level of complexity in the Game Theory literature, what is essential to bear in mind is that is that the condemnation of such practices ultimately stems from the marginalist explanation of extraordinary profits: the restriction of the industry's supply, thus enabling prices to be increased above marginal costs.

Despite incorporating important theoretical breakthroughs, the Industrial Organization theory preserved many aspects of neoclassical economics. Among them, one can mention the analysis of the profit margin-to-price ratio in terms of the inverse of demand elasticity à la Lerner (1934), the interpretation of the HHI's *empirical measure* through the Cournot's *theoretical* model, the prominence of Sylos' Postulate in limit pricing theory, and the centrality of concentration in the characterization of market structure.

The SCP framework was thus conceived with a good dose of theoretical eclecticism, in a similar way to what happened at the same period in macroeconomics with the ascent of the neoclassical synthesis. The lack of a formal development of the theory may be considered as a pragmatic way to deal with market situations which were close to the oligopoly models without the need of assessing their theoretical fragilities[147].

Regardless of the many criticisms which this approach can be subject to, it is undeniable its enormous fertility, which guided the research agenda of the field for more than two decades. Along the years, contributions from authors such as Carl Kaysen, James Mackie, Jesse Markham, Morris Adelman and Frederic Scherer were added to the original contributions from Mason and Bain, contributing to the development and consolidation of the SCP paradigm, that become the mainstream of Industrial Organization in the post-war period.

There was a multitude of empirical developments discussing the interrelationships between structure, conduct and performance, most of them using cross-sectional statistical analyses – Weiss (1971, 1974), Semmler (1981) and Schmalensee (1989) provided interesting surveys about such empirical researches. Industrial economists were initially more concerned with detailing the unidirectional flow of causality from market structure to the conduct of firms and their economic performance. Over time, more publications started to recognize the possibility of reverse causalities. These models can be generically represented by the following equation:

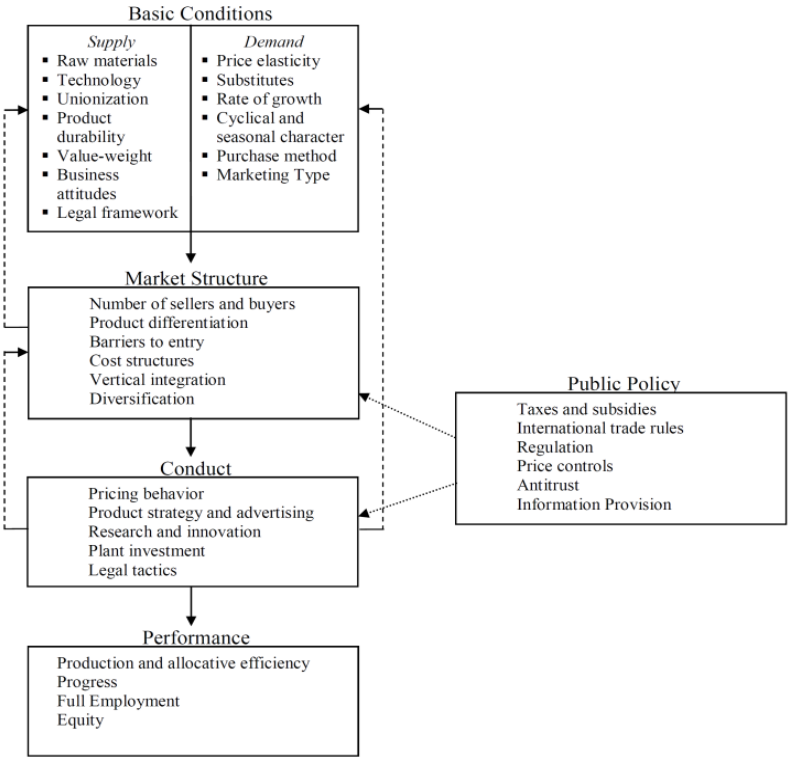
$$r = \beta_0 + \beta_1.X_1 + \beta_2.X_2 + ... + \beta_n.X_n + u \qquad (12)$$

The independent variables (X_1, … X_n) can encompass different combinations of factors, such as of concentration indexes, proxies of entry barriers, capital/output ratio, productivity, firms' assets/capital stock, rates of growth, advertising/sales ratio, R&D expenditures/sales, import intensity, export intensity, etc. (Semmler, 1981, p. 45; Geroski, 1982, p. 147; Reid, 1987, p. 32).

[147] "There is no oligopoly theory. There are bits and pieces of models: some reasonably well analyzed, some scarcely investigated. Our so-called theories are based upon a mixture of commonsense, uncommon sense, a few observations, a great amount of casual empiricism, and a certain amount of mathematics and logic." (Shubik, 1970, p. 415)

The famous representation of the SCP approach, reproduced in the Figure 5 below, was developed by Frederic Scherer in his *Industrial Market Structure and Economic Performance* (the first edition was published in 1970, the second edition in 1980 and the third edition, in partnership with David Ross, in 1990) which became the most prestigious[148] textbook under the structuralist hegemony[149].

Figure 5 – The SCP heuristic framework



Source: Scherer and Ross (1990, p. 5)

The inclusion of dashed arrows indicating reverse causalities between conduct and structure and between conduct and basic conditions reflected a concession to behaviorism, softening the initial message of structuralist determinism (Cubero, 2010,

[148] "The research output of this period is brilliantly surveyed in Scherer's (1970) textbook. This summarizes the developments made in the subject with an awe-inspiring knowledge and command of the literature, skillfully intertwining and interpreting other case study and cross-section evidence. The strength of this text does not lie in any great originality; but as a summary of the work of a generation of economists working in a specific field, it is an invaluable bible." (Davies and Lyons, 1989, p. 4)

[149] Other textbooks from that time were, for example, Howe (1978), Needham (1978), Hay and Morris (1979), Reekie (1979) and Devine *et al*. (1985) but the more recent textbooks normally devote a part of the book (often not very extensive and faithful to the originals) to present the SCP approach (Reid, 1987, ch. 2, Davies and Lyons, 1989, chs. 1-3; Ferguson and Ferguson, 1994, ch. 2; Lipczynski *et al*., 2005, ch. 1; Martin, 2010, section 1.2; Tirole, 1988, pp. 1-3).

p. 313). In this sense, Scherer contributed, paradoxically, to simultaneously disseminating the structure-conduct-performance literature and diluting its original message (Silva, 2004, p. 154; Kupfer, 1992, pp. 5-6).

In any case, the SCP approach was extremely influential not only in the academic field but also in the establishment of "microeconomic" public policies. In the US, this approach became "a basis of analysis and for judgments in much of the work in the antitrust field in both the Department of Justice and the Federal Trade Commission" (Grether, 1970, p. 86). Market concentration had been a concern for quite some time in the economic literature, the courts of law and even the common sense, but it was only under the structuralist hegemony that the correlation between concentration and market performance became specified and schematized into a theoretical 'model'.

2.7. Concluding remarks

Industrial Organization has served, even before its official birth, to reduce the level of theoretical abstraction of applied microeconomic theory, incorporate historical and institutional elements, and to pursue empirical investigations. As neoclassical theory became progressively more axiomatic between the 1930s and 1950s, this branch of knowledge gained impetus to rise as an autonomous field.

The SCP theoretical framework combined classical and neoclassical elements. The limit-pricing theory and the concept of entry barriers were used to explain the possibility for established producers to earn extraordinary profits without inducing entry. Bain and, to a lesser extent, Sylos-Labini, continued to attribute a role to demand in co-determining equilibrium prices.

The structuralist explanation of extraordinary profits was hybrid, attempting to reconcile cost differentials among producers with the existence of 'monopoly power' arising from the number and size distribution of sellers, which were all condensed into the concept of structure. Elevating market concentration to the level of an independent variable, however, gave rise to theoretical and empirical inconsistencies, favoring the contestation of this approach in the 1970s and 1980s.

Chapter 3 – The neoclassical schools of Industrial Organization Thought

3.1. Introduction

The SCP paradigm can be interpreted as a conciliation between neoclassical microeconomics and other more realistic theoretical elements, building a framework capable of substantiating an economic policy with active state intervention, similarly to what also happened in macroeconomics in the same post-war period. In the 1970s, however, this compromise solution was attacked on several fronts and encountered growing difficulties, losing its hegemonic position. In the 1980s, a new mainstream in Industrial Organization Theory finally emerged.

The next section explores the different factors (methodological, theoretical, empirical, and political) that challenged the dominant position of the SCP paradigm in the 1970s and 1980s. This contestation led a relatively pluralist configuration in the Industrial Organization literature, with the rise of the Chicago School, the Contestability Theory, the New Industrial Organization, the Neo-Austrian and Neo-Schumpeterian schools. The first four approaches, of neoclassical descent, will be discussed in the subsequent sections.

It was suggested along this work that there is an ever-present tension between the classical and the Cournotian conceptions of competition and that the pendulum has swung a couple of times between these two views throughout the history of economic thought. In this chapter, it is argued that this tension can also be observed within the neoclassical research program.

The third section presents the main theoretical propositions of the Chicago School, contrasting them with those of the Harvard School. Both schools were contemporaneous, and the latter was hegemonic for most of the confrontation. However, in the 1970s, the balance of power began to shift, giving strength to the former.

The fourth section explores the Contestability Theory, which rejected the utility of neoclassical models of oligopoly and sought to develop a structural approach based on capital mobility. It is argued that such developments contributed to the development of the classical conception of competition.

The fifth section argues that despite the emergence of a diversity of perspectives, a particular neoclassical school gained prominence and became the new mainstream in the 1980s: the New Industrial Organization, which revived the neoclassical oligopoly

and imperfect competition models. It is suggested that Cournot's conception of competition and Nash's concept of equilibrium provided a common theoretical and methodological foundation for the modernized general equilibrium and 'partial equilibrium' analyses. It is also stressed that the rise of this new mainstream reflects not only an appearance of new ideas but also a reinterpretation of the old ones.

The sixth section discusses the Neo-Austrian approach, which emphasizes the 'dynamic' aspects of competition. It is argued that such contributions fostered more realistic discussions regarding the evolution of markets, business conducts and innovation, while preserving the foundational tenets of the marginalist theories of value and distribution.

3.2. The decline of SCP hegemony and the rise of the neoclassical schools of Industrial Organization Theory

3.2.1. The formalist revolution in microeconomics

While the 1930's marked the transition from predominantly verbal to more graphical expositions of the theory, the 1940's and 1950's introduced mathematics as a fundamental language of the economics profession. John Hicks' *Value and Capital* (1939) was groundbreaking, but it was probably Paul Samuelson's *Foundations of Economic Analysis* (1947) and his simpler textbook *Economics* (first published in 1948, but reedited multiple times since then) that popularized the use of a single method, the constrained optimization from differentiable calculus, to present the rational maximizer agent behavior – firm and consumer – that underpin the neoclassical theories of supply and demand (Ekelund and Hébert, 2014, pp. 626-627; Rizvi, 2003, p. 378; Colander and Landreth, 2002, pp. 408-409; Roncaglia, 2019, pp. 126-127).

Hicks and Samuelson were also responsible, together with other authors such as Cassel, Schultz, Hotelling and Lange, for the rehabilitation of the Walrasian approach. Yet, they were unable of providing a satisfactory solution for the general equilibrium equations. A rigorous demonstration of the existence general equilibrium was only given several years later, by Arrow and Debreu (1954). They used an axiomatic approach and new mathematical methods (set theory, instead of calculus). The fixed-point theorem, which proved to be essential to the existence proof, was introduced in

Economics by John von Neumann in his growth model (1937, published in English in 1945) (Blaug, 1997, p. 77; 2003, p. 400; Rizvi, 2003, pp. 379-381; Walker, 2003, pp. 288-291).

Von Neumann also developed the first principles of game theory in the seminal book *The Theory of Games and Economic Behavior* (1944), written in collaboration with Oskar Morgenstern. John Nash (1950, 1951) had also provided a negative, fixed-point justification for the equilibrium. As it is well known today, in the Nash equilibrium, each player's strategy is optimal, taken as given the decisions of other players. Originally, there was no explanation of the processes that conducted a game towards a situation of equilibrium, the equilibrium was derived directly from the definition of rationality. This approach deeply influenced Kenneth Arrow and Gérard Debreu intertemporal equilibrium approach (Arrow and Debreu, 1954, p. 273; Arrow and Hahn, 1971, pp. 10-11; Blaug, 2003, pp. 397-399).

In spite of the refinements of game theory concepts in the 1960's by Schelling (1960), Selten (1965) and Harsanyi (1967-68) and others, game theory continued to be kept apart from the main body of economic theory. Similarly to what happened in macroeconomics with the rise of the new classicals, it was only by the 1970s and 1980s that the formalist developments from the 1950s began to influence the Industrial Organization theory.

It may seem strange that the increasing enthusiasm occurred just when the Sonnenschein–Mantel–Debreu results had put a considerable obstacle to the General Equilibrium theorists' quest for generality. As Rizvi (2003, pp. 384-389) has interestingly suggested, the growing interest in game theory was an ingenious way of turning a defeat – the impossibility of proving the uniqueness and stability of general equilibrium even in a toy economy – into a victory, acknowledging the possibility of multiple equilibria as the outcome of strategic interaction of rational agents and giving room to pluralism in a "controlled environment".

The SCP paradigm consisted of a compromise solution between neoclassical theory and more realistic elements. However, as the "mainstream flooding" (Possas, 1997) advanced in the 1970s and 1980s, the room for such formulations (whose contradictions stemmed, to a large extent, from their own conciliatory natures) was extinguished, giving way to the imperative of axiomatic microfoundations.

3.2.2. Theoretical and empirical inconsistences of the SCP model

The simpler models, such as the one developed by Bain (1951), attempted to establish a bivariate correlation between concentration measures and market profitability, represented by the equation 9 in the previous chapter. The residue of these models usually contained other elements correlated with concentration, in such a way that the estimator became biased. The attempts of setting up multiple regressions introducing other elements of structure (entry barriers, capital-output ratio, efficient minimum scale, etc.) and/or conduct (advertising, R&D expenses, pricing behavior, etc.) into the empirical models, expressed through the equation 12 in the previous chapter, frequently incurred in multicollinearity problems, as several independent variables were connected to each other (Mancke, 1974; Reid, 1987, p. 32; Geroski, 1989, p. 171; Schmalensee, 1988, pp. 648-649).

The main fragility of SCP model consisted, however, in the endogeneity problem. The structuralists were alarmed by the increasing concentration because they considered it allowed producers to elevate prices and thus obtaining higher profits. It is possible to regard, on the other hand, that firms with the most successful competitive strategies exhibit, *ex post*, larger market shares and profits. As concentration and profitability are jointly determined, it is not possible to determine any simple causal relation between them (Brozen, 1971; Demsetz, 1973; Phillips, 1976; Geroski, 1989, pp. 177-178; Schmalensee, 1989, pp. 953-956; Kupfer, 1992, pp. 6-7).

Just as Robert Lucas criticized the econometric models of the neoclassical synthesis that guided macroeconomic policies, the econometric developments of post-war Industrial Organization faced considerable contestations (Snowdon and Vane, 2005, pp. 264-266; Colander and Landreth, 2002, pp. 476-479; Schmalensee, 1983, p. 254).

3.2.3. Business pressures for changes in antitrust policy

The de-concentration policies that were implemented during the structuralist hegemony produced, along the years, a growing discomfort. Controversial legal decisions, such as “in *Brown Shoe* (1962), the Supreme Court rule against a merger that would have given the emerging firms a market share of 5%” (Motta, 2004, pp. 7-8), were extreme examples of a certain exaggeration of antitrust policy in the 1960s.

In the 1970's, the voices which stated that the excessive intervention had perverse efficiency effects started to become louder. It was argued that antitrust policy had a considerable responsibility for the loss of competitiveness and innovativeness of the American industry *vis-à-vis* their German and Japanese rivals (Martin, 2010, pp. 869-870; Jorde and Teece, 1992, p. 12).

3.2.4. Political changes in the United States

At last but not least, the election of Ronald Reagan brought neoliberalism in full scale to the United States (after the earlier experiments in Latin America and the Thatcherism in England). In the 1980s, there was a wave of deregulation and the antitrust policy became more tolerant with mergers, acquisitions and business conducts (Motta, 2004, p. 4; Viscusi *et al.*, 2000, pp. 27-28; Cubero, 2010, p. 82; Mosca, 2016, p. 301).

3.2.5. The anti-structuralist revolution and the neoclassical schools

All the previous factors contributed, with greater or lesser relative weight, to the emergence of an anti-structuralist reaction that took place both in the fields of theory and of policy. In spite of the existence a common dissatisfaction – the structuralist determinism[150] – the New Industrial Organization, the (New) Chicago School, the Contestability theory, the Neo-Austrian and Neo-Schumpeterian approaches had considerable differences with respect to the delimitation of the object, the method and the tools of analysis employed (Shepherd, 1990; Shepherd and Shepherd, 2003, pp. 23-26; Ferguson and Ferguson, 1994, pp. 1-6; Reid, 1987, p. 211; Davies and Lyons, 1989; Martin, 2010, pp. 1-3)[151].

The New Industrial Organization, the Chicago School, the Contestability theory and the Neo-Austrian approach, can be considered as developments of the neoclassical

[150] At that time, the structuralist determinism was, in a certain way, already recognized as a problem by the participants of the SCP approach, so much that they tried to explore the reverse causalities.

[151] The selection of streams of thought in Industrial Organization/Economics along this whole dissertation has clearly an anglo-american bias. On the theoretical developments in other regions in Europe, some references are, for France/Belgium (Chevalier, 1977; De Bandt, 2007), Italy (Marchionatti and Silva, 1992; Bianchi, 2007), Scandinavia (Foss and Møllgaard, 2007), the Low Countries (De Jong, 2007b) and the German language area (De Jong, 2007a).

research program, while the Neo-Schumpeterian aimed to develop an alternative microeconomic theory. The first four approaches will be evaluated in this chapter, while the latter will be discussed in the chapter 6.

3.3. Chicago School

Even though the SCP paradigm was hegemonic for more than two decades, it did not remain uncontested. The strongest intellectual force of opposition of the Harvard School was the (New or Second) Chicago School. The new generation of Chicago economists – George Stigler, Harold Demsetz, Sam Peltzman and Yale Brozen – held a more permissive position towards market concentration than the previous one. Liberal jurists such as Richard Posner, Robert Bork, Frank Easterbrook endorsed the anti-interventionist discourse of this stream of thought, henceforth referred simply as the "Chicago School" (Reder, 1982; Shepherd and Shepherd, 2003, p. 22, p. 28; Martin, 2010, pp. 6-10; Elzinga, 1991, pp. 119-120).

The most known divergences between Harvard and Chicago[152] are related to policy recommendations. There are, however, important theoretical and empirical discordances which are noteworthy:

> "The Harvard School draws up models with practical application for non-abstract business issues; the main theoretical tool is econometrics, its analysis is as well known as the Structure-Conduct-Performance paradigm, and is referred to as the Bain-Sylos Labini-Modigliani limit price. On the other hand, the Chicago School drafts mathematical models into theoretical neoclassical economics where the markets work freely" (Cubero, 2010, p. 65)

3.3.1. Industrial Organization and neoclassical microeconomics

As discussed in the previous chapter, the Industrial Organization emerged as a specific branch of knowledge, gaining a certain independence from microeconomics, under the Harvard/SCP hegemony. The Chicago School, on the other hand, criticized

[152] "Bain was the founder of Harvard School but worked his whole life at Berkeley University, California. George Stigler was a professor at Columbia University when he became associated with the Chicago School [Harold Demsetz also taught at the UCLA for most of his academic life] … We make a distinction between the Harvard and Chicago schools, while keeping in mind that some issues are common to other schools, and some authors are hard at work trying to place them in a specific school." (Cubero, 2010, p. 65). Martin (2010, p. 8) also pointed out that: "Nor has the location of the Chicago School always been Chicago, manifestations having been documented at various times at the University of California at Los Angeles and at the University of Rochester".

the excessive empiricism of this approach and advocated for higher theoretical formalization of the field[153]. George Stigler (1968, p. 1), the main exponent of Chicago School, even stated that "there is no such subject as industrial organization" and defended the use of standard microeconomic theory, which he called the *Theory of Price.*

3.3.2. The concept of barriers to entry

Another divergence between Bain and Stigler concerned the concept of barriers to entry, probably the most important theoretical breakthrough of the literature of that time. As we have discussed in the previous chapter, Bain (1956) associated the concept with supra-competitive prices, which reduces its generality. George Stigler (1968, p. 67), on the other hand, asserted that "a barrier to entry may be defined as a cost of producing (at some or every rate of output) which must be borne by firms which seek to enter an industry but is not borne by firms already in the industry." So, although the concept of entry barrier was proposed by Bain, Stigler's formulation is theoretically more precise and more adequate to the classical interpretation developed in this dissertation.

3.3.3. Perfect competition as a good approximation

Also, while Harvard scholars showed substantial concerns with respect to barriers to entry and concentrated markets, many Chicagoans believed that the perfect competitive model could still be used to analyze real economies[154]. This reasoning became known as the "good approximation assumption" (Reder, 1982).

[153] The New Industrial Organization and the Contestability Theory took this recommendation to an unimaginable level. As Martin (2010, p. 10) ironically remarked that the Chicagoans seemed "Like Pandora, who loosed the ills of the world and found they could not be closed up again".

[154] "Nevertheless, there is a substantial literature of Chicago contributions to the analysis of non-perfect competition stemming from Stigler's work, summarized in 1968. Chicago has not failed to work on imperfectly competitive markets; but it has refused to treat the economy-wide allocation of resources as the outcome of interaction among imperfect competitors" (Reder, 1982, p. 15)

3.3.4. The critique of the SCP econometric models

The most important objection to the structuralist approach consisted in the *efficiency critique* (Demsetz, 1973, 1974; Peltzman, 1977; Brozen, 1982), which argued that the most efficient firms tended to grow faster and to increase their market share. In this way, higher market concentration and larger profits could be interpreted as the result of business efficiency, rather than inefficiency caused by the exercise of 'monopoly power'. The Chicago School thus believed the market structure to be endogenously determined by the market process, rather than an independent variable as it was considered by the Harvard School (Reid, 1987, p. 16; Martin, 2010, p. 8)

The *survivor technique* proposed by Stigler (1958, pp. 54-57; 1968, pp. 72-73) was related to Chicago's efficient structure doctrine, as it considered that the industry's cost structure reflected the 'survival of the fittest'. In other words, it contained a reverse causality between structure and performance (endogeneity of market structure), contrasting with the most naïve, unidirectional version of the SCP model.

3.3.5. Social welfare and the distribution of surplus

In the usual textbook contrast between the situations of perfect competition and monopoly, there is a transfer of surplus[155] from consumers to producers (a group of individuals becomes better off by making others worse off) so that Pareto's criterion is violated. To enable welfare comparisons without incurring in a logical contradiction, Hicks (1939b), Kaldor (1939) and Williamson (1968) developed analyses centered on the total surplus. This position focusing on allocative and productive efficiencies (and disregarding distributive efficiency) was enthusiastically embraced by the Chicago School - for example, Bork (1978, ch. 5), who cynically called it 'consumer welfare standard'-, while the Harvard School showed more concerns with the distribution of the

[155] It is important to note that the neoclassical concept of surplus significantly differs from the classical one we have discussed thus far: i) The classical theory does not exhibit quantity variations at the margin, so surplus is not measured by the areas above the supply curve and below the demand curve, as it occurs in neoclassical theory; ii) The classical theory does not include "normal profits" into the costs of production as something that economic actors are "entitled" due to the owning of capital as a factor of production and/or as an "opportunity cost"; iii) In neoclassical theory, there is no producer surplus when costs are constant and prices are competitive. In classical theory, however, the property-owning classes can appropriate the surplus even in free competition (absence of competitive asymmetries); iv) In neoclassical theory, the consumer surplus - unlike the producer surplus - does not consist of effectively generated income (value added), as it is only implicitly computed.

surplus between consumers and producers (Viscusi *et al*., 1995, p. 74; Possas, 2004, sec. 2; Corrêa, 2009, ch. 2).

One implication of the Chicago School's reasoning is that there is no reason to oppose mergers and acquisitions, not only because equilibrium prices tend to conform to costs of production, but also because there is no concern about whether the productivity gains obtained by companies will be shared with the rest of society or not.

3.3.6. Defense of more permissive microeconomic policies

For a long time, George Stigler and other members of the Chicago School had been defending the pro-competitive effects of several business conducts and condemning the de-concentration policies carried out under the SCP hegemony. It was only in the 1970s and 1980s, however, that they gained more influence in Industrial Organization Theory and microeconomic policies. We can draw a parallel with what happened in macroeconomics, where Milton Friedman had been an early critic of the Keynesianism but it was only in the 1970s that his prestige grew considerably in economic theory and policy (Cubero, 2010; Budsinski, 2007, pp. 299-301).

3.4. Contestability Theory

Also similar to that what happened in the macroeconomic field with the ascent of the New Classicals after the appearance of Monetarism, other voices in Industrial Organization Theory joined the Chicago School defense for less interventionist economic policies in the late 1970s and beginning of the 1980s. The Contestability or Contestable Markets Theory (Baumol, Willig, Panzar, Bailey and others) was probably the most important contribution in this sense. Even though the *laissez-faire* policy implication was indeed formulated and defended by these authors, we are more interested here in outlining some of the theoretical contributions from this approach.

William Baumol, John Panzar and Robert Willig had a vast intellectual production in the 1970s and 1980s, both separately and in co-authorships. The book *Contestable Markets and the Theory of Industry Structure* (1982) consolidated the main propositions of their work.

Those authors sought to provide a unifying pure theory of industrial organization with substantial implications to value and social welfare theories (Baumol, Willig and Panzar, 1982, p. 1, p. 3, p. 15). They developed a structural framework largely independent of behavioral assumptions or conjectural variations, escaping from the indeterminacies that plagued oligopoly theory since Cournot and Bertrand (Baumol, Willig and Panzar, 1982, p. xxi, p. 2, p. 8, p. 11, p. 28, p. 45, p. 321, p. 345).

At the centerpiece of their proposal is capital mobility, considered as the operative force that drives prices towards costs of production. It is the degree of barriers to entry and to exit[156] that explains the prices charged and the level of profits obtained in the industry, rather than any consideration regarding the number firms or market concentration (the "degree of monopoly" of producers) (Kupfer, 1992, p. 7; Ekelund and Hebert, 2014, p. 618). The role of potential competition to restrain the behavior of producers already in industry was emphasized.

The contestability theory rejected the neoclassical oligopoly models due to their implausible hypotheses, indeterminate results and inability to deal with entry and developed a structural framework that was largely independent of behavioral assumptions or conjectural variations (Baumol, Willig and Panzar, 1982, p. xxi, p. 2, p. 8, p. 11, p. 28, p. 40, p. 45, pp. 320-321, p. 332).

The number of firms and market concentration are deemed to be endogenous to the process of market selection. Moreover, when the U-shaped curve is discarded and the cost curves are assumed to be flat-bottomed or decreasing, a reduced number of producers in a market may well be the result of efficiency rather than a source of market power. The number of firms that makes the industry "naturally competitive" (that minimizes industry cost) depends mostly on the nature of production techniques and the size of the market (Baumol, Willig and Panzar, 1982, p. 16, p. 24, p. 97, p. 101, p. 113).

If the minimum efficient scale is large enough to supply the whole market, a single producer can produce more cheaply than any other industry configuration, which implies that the cost function is subadditive. In this situation, there is a natural monopoly. In other circumstances, the number of producers can be equal to or greater

[156] The development of the concept of barriers to exit, often related to sunk costs, was another important contribution from the contestability school. Baumol, Willig and Panzar (1982, p. 290) recognized the influence of Caves and Porter (1977) on this matter.

than two[157]. The authors asserted, contrarily to the conventional microeconomic wisdom, that in any of these cases, efficient outcomes can be achieved as long there is frictionless entry and exit (Baumol, Willig and Panzar, 1982, p. xx, p. 16).

Baumol, Willig and Panzar investigated thoroughly economies of scale (resultant mostly from the existence of fixed costs in the single-product case) and economies of scope[158] (arising from shared inputs, indivisibilities and other cost complementarities in the multi-product case with joint production, which the authors called *trans-ray convexity*). The widely employed concept of subadditivity combines economies of scale with forms of cost complementarities (Baumol, Willig and Panzar, 1982, pp. 79-81, p. 177, p. 285).

The contestability theory did not consider economies of scale as barriers to entry. The authors argued that fixed costs do not raise barriers, unless they are sunk. Sunk costs are those costs which cannot be eliminated even by a total cessation of production. In the presence of such barriers to exit, potential entrants will require additional expected revenue as a compensation for the unrecoverable entry costs, so that existing producers are able to earn a pure profit (rent) to the extent of such advantages without attracting entrants (Baumol, Willig and Panzar 1982, p. xxii, p. 280, pp. 289-291).

The contestability theory also rejected the perfect competition model as the benchmark, ideal type, normative reference of efficiency and social welfare. The existence of economies of scale and scope are at the basis of the processes of large-scale production and product diversification. These sources of the immense material progress has achieved by capitalism in the last centuries and have not been, however, adequately addressed by the neoclassical orthodoxy[159], which considered them as obstacles to the obtention of a competitive equilibrium. They were seen essentially as flaws that led to market failures that deviated the economic system from the social optimum.

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[157] Even though the results of the Bertrand model for at least two producers is identical to one achieved by perfectly contestable markets (price equals to marginal cost), the nature of such model is radically distinct: the number of firms is fixed (not admitting entry) and "highly dependent upon the assumption that marginal costs are constant *and* equal to average costs throughout the relevant range" (Baumol, Willig and Panzar, 1982, p. 44, emphasis in original).

[158] The concept of economies of scope had been previously discussed by Panzar and Willig (1975, 1981).

[159] As Shaikh (1982, p. 78) remarked "The infinite divisibility of each input trivializes the very notion of fixed capital, the *sine qua non* of capitalism's 'Industrial Revolution', while the infinite divisibility of output excludes the very notion of a minimum scale of production".

In this sense, Smith, Marx and Schumpeter were better at praising those virtues of capitalism (yet they also recognized the contradictory nature or the conflictive, destructive side of such processes) than the neoclassical orthodoxy. For these reasons, the defense of the pro-competitive effects of mergers, acquisitions, vertical integration and other conducts were usually carried out by legal or less formal economic analyses with high ideological content, such as it was the case of the contributions from Chicago[160] and Austrian Schools. The contestability theory produced an amazing achievement in formal microeconomic theory in defining the necessary and sufficient conditions to obtain efficient outcomes without the assumption of a large number of competitors (Baumol, Willig and Panzar, 1982, p. xix).

Baumol, Willig and Panzar then proposed an alternative model to perfect competition to be taken as the normative reference of efficiency and social welfare: the perfectly contestable market, in which there are no barriers to entry and to exit. This new competitive benchmark requires two conditions, feasibility and sustainability (Baumol, Willig and Panzar, 1982, pp. 24-25, p. 313).

In a feasible industry configuration, the production techniques are employed to meet the industry demand at the prevailing prices in such a way that no firm yield nonnegative economic profit:

$$\begin{cases} \sum_{i=1}^{n} y^i = Q(p) \\ p.y^i - \mathrm{C}(y^i) \geq 0 \\ y^i \geq 0 \text{ for I } = 1, \dots, \mathrm{n} \end{cases}$$

A sustainable industry configuration requires (in addition to the conditions defined above) that the prevailing prices are such that, if maintained, no potential entrant (e) will be able to enter the market and earn positive economic profits:

$$\mathrm{p}^e.\, y^e - \mathrm{C}(y^e) \leq 0 \qquad \forall \qquad \mathrm{p}^e \leq \mathrm{p} \text{ and } \mathrm{y}^e \leq \mathrm{Q}(\mathrm{p}^e)$$

Frequently, the authors omitted the adverb “perfectly” to characterize this idealized type of market. Shepherd (1984, p. 573) rightly criticized this informal and ambiguous use of the concept, that gave rise not only to confusions between the

[160] Differently from the Chicago School that not only accepted the perfect competition model, but also considered it to be a good approximation to reality (Reder, 1982, p. 12).

theoretical and empirical dimensions, but also to doubts about the generality of such theory. A possible way to eliminate such misunderstandings is to consider the expression "contestability" as a synonym of "capital mobility", which is subject to gradation, and to recognize that *perfectly* contestable markets (or, as William Shepherd calls it, ultra-free entry and exit) is just an extreme case of capital mobility.

That being said, it should be stressed that Contestability theory rejected the neoclassical oligopoly models due to their implausible hypotheses, indeterminate results and inability to deal with entry (Baumol, Willig and Panzar, 1982, p. 8, p. 11, p. 28, p. 40, pp. 320-321, p. 332) and has contributed for a revival of the classical conception of competition, which considers the intensity of competition dependent on the *degree* of capital mobility. The perfectly contestable market thus consists of a formalized reinterpretation of the classical notion of free competition (Backhouse, 1990, pp. 80-81; Aspromourgos, 2007, pp. 50-51; Levrero, 2014, pp. 78-79; Roncaglia, 2019, pp. 137-138).

The acceptance of this more general economic concept must not need to imply, however, that perfect contestability can be easily found in real markets – as Baumol, Willig and Panzar (1982, p. 14, p. 35, p. 345) had already remarked –, nor that antitrust and regulatory interventions must be minimal. The contribution of the contestability school has a broader analytical dimension than it is usually considered, partly due to the exposition by the original authors themselves, which putted too much emphasis on perfect contestability and used it to advocate for "microeconomic" liberalism.

The measurement of the degree of contestability (or capital mobility) in real markets and the adequacy of it to the case of perfect contestability is an issue to be carried out by empirical research, though additional theoretical formulations may also be necessary. The results are also obtained in a case by case basis and broader considerations are probably difficult to be made.

3.5. New Industrial Organization

In spite of the renewed interests in neoclassical oligopoly theory with the works of Hotteling (1929), Chamberlin (1933), Stackelberg (1934) and the developments in

the field of Game Theory – Von Neumann and Morgenstern (1944)[161], Nash (1950, 1951) and Schelling (1960) – the formal contributions along these lines – such as Shubik 's *Strategy and Market Structure* (1959) – were kept aside the core of the post-war theory of Industrial Organization. This scenario started to change in the 1970's.

Having encountered inescapable difficulties in the General Equilibrium Theory, many mathematical economists searched for new specializations. Industrial Organization was, from a formalist point of view, an extremely underdeveloped field, giving room to promising new theoretical advances. There were successive refinements in Game Theory, such as Selten's subgame perfect equilibrium (1965) and perfect equilibrium (1975), Harsanyi's Bayesian Nash equilibrium (1967-68), Kreps and Wilson's sequential equilibrium (1982) and the theory of repeated games (Friedman, 1971; Aumann and Shapley, 1976; Rubinstein, 1979; Green and Porter, 1984). Such breakthroughs made possible modern restatements of the neoclassical oligopoly and monopolistic competition models (Tirole, 1988, pp. 1-2; Vives, 1999, pp. 6-7; Martinez-Giralt, pp. 1-6).

In the 1980's, this new approach, characterized by Schmalensee (1980) as the New Industrial Organization (Spence, Dixit, Stiglitz, Dixon, Clarke, Waterson, Schmalensee, Tirole and others), became the mainstream of the Industrial Organization field. Jean Tirole's *Theory of Industrial Organization* (1988)[162] and the first two volumes of Handbook of Industrial Organization (Schmalensee and Willig, 1989) contributed for the consolidation and diffusion of this theoretical framework, which have been guiding most of the IO research since then.

The foundation of such project lied on the reinterpretation of oligopoly theory using a game-theoretical approach. As it is well known, Nash's equilibrium consists of a situation in which each player adopts their best strategy, given the strategies specified for the other n-1 players. This concept was thus used to reinterpret the assumption contained in the original oligopoly models that producers do not take into consideration the effect of the chosen level of their strategic variable – quantity produced (Cournot's

[161] John von Neumann and Oskar Morgenstern's seminal work was influenced by the original Austrian tradition (Menger, Böhm-Bawerk), although some Neo-Austrians – such as Stephen Littlechild (1979) – were critical to the game theoretical approach (Reid, 1987, pp. 96-102).

[162] Other examples of textbooks from the New Industrial Organization approach are Friedman (1983), Waterson (1984), Jacquemin (1987), Krouse (1990), Norman and La Manna (1992) and Vives (1999).

model) or price charged (Bertrand's model) – over its competitors (and, consequently, their possible response to it).

This assumption implied in the oligopoly models, which was originally conceived to exclude the complications arising from the strategic interdependence in order to obtain an equilibrium solution and had been accused from postulating a myopic behavior of competitors ever since, gained with game theory an elegant rational choice underpinning. The new game-theoretic approach enabled the displacement of the comparison between the assumed conduct and real firms' behavior to a definitional[163] concept of rationality, leaving an eventual discussion to the way the "game" was built (similarly to what happened in macroeconomic theory with the rational expectations' revolution).

Nash's equilibrium was also used in theoretical developments about product differentiation. Chamberlin's (1933) was reclaimed by Spence (1976) and Dixit and Stiglitz (1977). These two papers influenced Krugman (1979, 1980) to include monopolistic competition in a general equilibrium framework and deducing inter-industry and intra-industry international trade patterns in what later became known as the New Trade Theory (Brackmand and Heijdra, 2004; Cinquetti, 2016, pp. 338-339). Hotelling's (1929) locational model was recovered by Salop's (1979a) model about horizontal differentiation, while vertical differentiation was proposed by Shaked and Sutton (1982) (for a more detailed exposition about the product differentiation literature, see Hay and Morris, 1991, ch. 4).

The reinterpretation of the neoclassical competition models by the game-theoretical approach surely produced a gain in importance of the subjective elements (beliefs, commitment, reputation, etc.) in explaining the conduct of economic actors and, thus, the evolution of the markets' structure and performance. It should not go unnoticed, however, that the establishment of the Cournot model as the basic framework of the discipline has also had a crucial objective dimension: it formalizes the economists' "intuition" that "numbers matter" (competition decreases with fewer firms). In other words, the Cournotian conception of competition lies at the heart of New Industrial Organization Theory (Schmalensee, 1988, p. 645; Dixon, 1989, p. 135).

[163] Although there have been important contributions in the direction of explaining the convergence process towards equilibrium/equilibria, such as the case of infinitely repeated games with low discounting factor - *Folk Theorem* (Fudenberg and Maskin, 1986). In this sense, game theory has been shown to be an important instrument in illustrating the stability of equilibrium (the Achilles' heel of General Equilibrium Theory).

This whole theoretical turn cannot be, however, fully understood without considering the developments in pure microeconomic theory in the 1950's and 1960's. Arrow and Debreu's general equilibrium model produced a shift[164] from the original long-period method (that differentiated accidental from persistent effects) to an intertemporal method (which is based on all moments in time and all states of the world). While the former version of general equilibrium identified a long-period tendency of prices to gravitate around their normal or long-period equilibrium values (while recognizing that real economies are always is disequilibrium), the latter represents the trajectory of an economy (with complete future markets for contingent commodities and perfect information) as a sequence of very-short-period equilibria, but it had failed to provide an adequate explanation about the process of convergence towards such equilibria (Garegnani, 1976, p. 28, p. 38; Roncaglia, 2019, p. 124).

With regard to the capital theory, the main feature consists on the change of measurement of capital as a given magnitude (associated with the conception of capital as a 'factor of production' allegedly capable of changing its 'form' without changing its total 'quantity') and the formation of a uniform rate of profit on the supply prices of capital goods to given heterogenous physical inputs, admitting non-uniformities of rates of return (Garegnani, 1990b, 2011; Petri, 2004).

As to the conception of competition, what most interests us here, while the long-period general equilibrium theory combined free capital mobility (originated from Classical Political Economy) with atomism (derived from Cournot's unlimited competition), the intertemporal version preserved only the Cournotian assumption of a given number of firms[165]. In doing so, it produced an important inflection point with respect to the competition analysis from the original marginalist tradition (Walras,

[164] The shift to very-short-period equilibria was not so sudden though. The first steps in this direction were taken by Hayek (1928), Lindahl (1929) and Hicks (1939a) (Milgate, 1979; Eatwell, 1982, pp. 220-221; Petri, 2004, sect. 5.3; Dvoskin, 2013).

[165] Although the original neo-Walrasian models (Arrow and Debreu, 1954; Debreu; 1959; Arrow and Hahn, 1971) assumed atomism, Cournot's unlimited competition (agents were price takers), there have been since then important efforts to include Cournotian non-cooperative interactions/imperfect competition in the general equilibrium model - see, for example, the surveys written by Mas-Collel (1983) and Bonnano (1990).

Pareto, Wicksell, Marshall)[166] (Eatwell, 1982, pp. 219-220, p. 223; Petri, 2004, p. 76; Roncaglia, 2019, p. 121)

This new definitional, axiomatic definition of equilibrium also brought with it a new notion of rationality, in which behaviors associated with disequilibria processes are ruled-out as a logical impossibility, given the system of equations. In the 1970s and 1980s, this neo-Walrasian approach spread from pure general equilibrium theory to macroeconomics with the ascent of the New Classical School, that adopted the 'equilibrium method' (new concept of equilibrium) and 'rational expectations' (new notion of rationality or hyper-rationality). Robert Lucas' new concepts drew closely from Nash's concept of equilibrium (which had already been incorporated to the general equilibrium analysis) (Lucas, 1987, pp. 15-16; Vercelli, 1991, Appendix 2B).

In the same period, it occurred a methodological and theoretical revolution in the Industrial Organization field. This more general theoretical background (the generalized pressure for neoclassical microfoundations) may shed some light on why there was such a rapid diffusion of the Cournotian conception of competition and the new concept of equilibrium, as well as the acceptance of the shortened temporal horizon of some analyses[167].

Yet, the New Industrial Organization would not have been as successful if it had not taken the offensive against its rival conception of competition, represented by the concepts of barriers to entry and limit pricing. The critique, however, was not directed to Joe Bain or to Paolo Sylos-Labini's original works, but to the "Sylos' Postulate" coined by Modigliani's review (1958). Also, it is often accepted the misleading representation of their contributions as a Cournot's model (interpretation originally proposed by Farrar, Phillips and Fisher – the "Bain-Sylos-Modigliani model" – in a debate that followed the publication of Modigliani's paper[168]).

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[166] Petri (2004, appendix 5A3) shows that constant returns to scale and capital mobility, which were necessary assumptions to the long-period general equilibrium, bring difficulties to the intertemporal version.

[167] In his manual, Vives (1999, p. xi) advised the reader that his "main concentration is on short-run supply theory".

[168] The tension between the Classical and Cournotian conceptions of competition is clearly perceptible in this debate. Although Modigliani (1958, 1959) eliminated some of the most "heterodox" Sylos-Labini's ideas (technological discontinuities, competitive asymmetries between producers and the search for an objectivist theory), he was plainly against this Cournotian misrepresentation (as discussed in 2.6.4.1).

While Nash's concept of equilibrium allowed the reinstatement of oligopoly theory, one of its refinements made it possible the contestation of the Sylos Postulate. Selten (1965) defined that a Nash equilibrium is subgame-perfect if the players' strategies constitute a Nash equilibrium in every subgame (Gibbons, 1992, p. 95). Any player who makes a threat knowing in advance that he will not be able or be interested in carrying it out if such circumstances become materialized cannot satisfy the rationality requirement of a subgame-perfect equilibrium. This happens because the rivals will realize that the threat is just a bluff and will follow the strategy that is advantageous to them (and disadvantageous to the incumbent who will not retaliate post-entry). The Subgame-Perfection was designed to confine players to credible strategies.

A vast literature developed the reasoning that the assumption which established that firms would keep constant their quantities after entry (*i.e.*, the Sylos' Postulate), leading to a price decrease and financial losses to incumbents and new entrants, cannot be credible. Despite the numerous contestations of the universal nature of the Sylos' Postulate, most papers have not eschewed it entirely, pondering the necessary conditions for its validity.

Spence (1977), Friedman (1979), Dixit (1979, 1980, 1982), for example, emphasized that incumbents' irreversible pre-entry investments (leading to sunk costs) can demonstrate commitment and signalize retaliation to potential entrants. Dixon (1986) developed a model in which the incumbent can choose between a putty-putty technology (smooth production function, with continuous factor substitution) and a putty-clay technology (Leontief production function, with fixed coefficients)[169]. Choosing the second option increases the firm's inflexibility[170], demonstrating greater commitment and discouraging entry.

On the other hand, Milgrom and Roberts (1982) argued that when information is not complete, the established and potential entrant are not able to fully identify each

[169] The emergence of Industrial Organization as an autonomous discipline, partially emancipated from conventional theory, was directly related to the search for a more realistic microeconomic theory. Sylos-Labini's refusal to assume a technology that presents an infinity of production methods for pure formal convenience reflects this concern. Following this perspective, an imaginary conjecture that posits a choice between a technology that exists and a technology that does not exist in the real world does not seem a sensible theoretical development.

[170] Dixon (1986, pp. 66-67) remarked, however, that the firm may prefer the more "flexible" technology (putty-putty) when there is uncertainty.

other's characteristics. In this situation, the pre-entry price may be a valid signal of incumbent's costs and thus inform post-entry price and profits. So, limit-pricing alone may discourage entry, reclaiming Bain's original argument[171].

Regardless of these disagreements, the intellectual influence of these entry deterrence models on the field's literature is undeniable[172]. Most of them contrasted the constructed, endogenous, behavioral or strategic barriers to entry from the New IO to the allegedly natural, exogenous, structural or 'innocent' (Salop, 1979b) barriers to entry from the Harvard/SCP approach (Davies and Lyons, 1989, pp. 31-32; Jacquemin, 1987, ch. 4).

This rhetoric was particularly powerful because the theoretical developments about markets/industries and firms (e.g., managerial, behavioral, resource-based) kept an appreciable distance during the SCP hegemony (the efforts to reduce this gap by better specifying the conduct dimension of the econometric regressions led to the already mentioned multicollinearity problems). The New Industrial Organization was, on the other hand, incredibly skillful in modelling interactions between conduct and structure (thus endogenizing the market structure) and between structure and performance[173], being able to incorporate important developments such as the new neoclassical theories of the firm (principal-agent, nexus of contracts, transaction costs, etc.) into more or less coherent theoretical market model(s).

The earlier contributions to Industrial Organization were frequently accused of excessive empiricism (misleading the readers to believe that a *different* theoretical framework is equivalent to the absence of a theory). From the old Industrial Economics, little has been preserved, one exception being the so-called "Sylos-Postulate", which is often used as a didactic example to illuminate the importance of using rigorous methods such as Game Theory and mathematics in order to preserve the logical consistency of

[171] Divergences with respect to the validity of limit-pricing is one of the reasons why the New IO literature have mismatched discourses concerning the existence of a rupture or a continuity (with the required adjustments and developments) with respect to the previous theoretical tradition. It is worth noticing that even Milgrom and Robert's paper that "confirms" limit-pricing represents Bain's entry-deterrence argument by a game-theoretical Cournot's model with incomplete information.

[172] This strand of the New Industrial Organization recognizes the role played by potential competition (Gilbert, 1989, p. 107). In other words, this literature attempts to conciliate two different conceptions of competition (Classical and Cournotian).

[173] Davies and Lyons (1989, p. 7) proposed a pedagogical illustration of the relations between structure, conduct and performance in the New Industrial Organization, contrasting it with the famous representation created by Frederic Scherer.

the theory (Arena, 2007, p. 41). As Shepherd (1990, p. 454) remarked, "the superiority of 'new IO theory'[174] has been asserted, and, with remarkable collective amnesia, much of the established content of the field has been forgotten or denied".

From the empirical point of view, the New Industrial Organization theory contributed for the renunciation to the cross-section regressions that filled the journals in the 1960's. Although the inconsistencies of these econometric studies were used to accuse the SCP tradition of developing a failed empiricist approach (with loose or inexistent theory and deficient empirical methods) and to praising their New IO approach, the critiques towards such regressions were not carried out exclusively nor pioneeringly by this school of thought. Be that as it may, it occurred a shift to more industry-specific analyses, producing a return to the Masonian origins of the discipline with new theoretical and empirical tools (Schmalensee, 1983, p. 254; Tirole, 1988, pp. 1-4; Bresnahan, 1988, p. 1012; Martin, 2010, p. 11)

With regard to public policy, the "liberal" enthusiasm began to wane and concerns with concentrated market structures and anticompetitive conducts reappeared in the mid-1990s. Policy recommendations started to lean once again towards the direction of the Harvard School/SCP tradition, moving away from the Chicago School and Contestability Theory extreme positions. In practice, "agencies and courts lie somewhere between the interventionism of the 60s and the laissez-faire of the 80s" (Motta, 2004, p. 9).

These developments that defended more interventionist policies were labelled as the Post-Chicago approach, in the sense that they intended to overcome Chicago's radical liberal position (Brodley, 1995; Sullivan, 1995; Cucinotta *et al*., 2002). From a methodological and theoretical point of view, the Post-Chicago[175] position was greatly influenced by the New Industrial Organization[176], widely employing game-theoretic

[174] To be fair, Shepherd (1990) proposed the label 'new IO theory' with a broader meaning than it is being used here, encompassing three of the anti-structuralist approaches that arose in the 1970's and 1980's – Chicago-UCLA School, the contestability school and the game theoretic Cournot-Nash duopoly modelling, respectively discussed on the sections 3.3, 3.4 and 3.5 of this chapter.

[175] Although this position refuses to follow Chicago's policy recommendation, there is not a complete rejection of the theoretical contributions of this tradition. The measurement of welfare in terms of total surplus (whose sole objective is efficiency, regardless of the distribution of this surplus between producers and consumers) and some pro-efficiency arguments proposed by authors of the Chicago School (and later developed by other approaches such as the New Institutional Economics and the Contestability theory) continued to be accepted by the Post-Chicago position.

oligopoly models, with a high level of formalization and sophistication, as well as advanced econometric techniques (Budsinski, 2007, pp. 301-302).

In sum, the New Industrial Organization school revolutionized the field in the 1980's, reclaiming the use of marginalist microeconomic tools (marginal and average cost curves, profit maximization, optimal production, demand curves, etc.), employing notions of game-theory and reviving the oligopoly (Cournot, Bertrand, Stackelberg) and monopolistic/imperfect competition models[177]. In the 1990s, new techniques (experimental economics, computer simulations) were also introduced. Industrial Organization ceased to be an "ugly Duckling" and became one of the most acclaimed fields of Economics, with a great number of researches having been graced by the Nobel prize (Spence, Stiglitz, Maskin, Tirole, Milgrom, Vickrey and many others) (Jacquemin, 1987, p. 5; Roncaglia, 2019, p. 142; Cinquetti, 2016, pp. 333-334).

The high level of formalization and the substantial proliferation of models has also had, however, its downsides, such as the reliance to substantive rationality, the indeterminacy associated with the frequent multiple equilibria results[178], the low level of correspondence between the models and reality (making testing difficult) and the absence of a unifying theoretical framework[179] (Schmalensee, 1988, pp. 675-677). For an iconoclastic critique of such theoretical approach, see Fisher (1991).

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[176] The fact that many models of strategic interaction confirmed structuralist prescriptions about the dangers of 'monopoly power' is another reason why some theorists identify a continuity between the SCP and New Industrial Organization traditions.

[177] As it was mentioned before, the other two original neoclassical oligopoly models (Bertrand and Stackelberg) followed Cournot's basic structure of a given number of profit maximizing firms. The monopolistic/imperfect competition (as well as the perfect competition) models included the concept of capital mobility, but the number of firms is still a needed assumption, so that they also have their roots – although less deep than the oligopoly models - in Cournot's conception of competition. So, in spite of the development of a constellation of models with a multitude of auxiliary hypotheses, Cournot's influence is much greater in the New Industrial Organization than in other approaches discussed in this section.

[178] "[…] most of the time in game theory, it is not hard to find a Nash equilibrium, the real challenge is finding only one (Serrano, 2010b, p. 409, own translation)

[179] "Most central questions in industrial organization have by now received considerable game-theoretic attention; *the problem is not too little theory but too many different theories* […] Advances have also been made on the empirical front, particularly in the analysis of individual industries. But, while the empirical research discussed in the preceding sections has uncovered a number of interesting regularities, it has not yet managed substantially to erase the impression that 'anything is possible' left by the theoretical literature" (Schmalensee, 1988, p. 676, emphasis added)

3.6. Neo-Austrian School

The Austrian school has its origin in the works of Carl Menger, being developed in the late nineteenth and early twentieth centuries by Friedrich von Wieser and Eugen von Böhm Bawerk[180]. These authors were at the center of two important theoretical controversies: Menger defended the deductive method of the marginalist theory against the criticisms from the German Historical School, while von Wieser and Böhm Bawerk – as well as other non-Austrian marginalist authors such as Wicksteed (1884) and Pareto (1893, 1902) – criticized Marx's theory of value (Rudolf Hilferding's response to Böhm-Bawerk gave rise to an intellectual duel) (Spann, 1930, pp. 240-247; Milford, 2012, p. 16; Sweezy, 1949).

In the twentieth century, Austrian economists participated actively on several controversies. The socialist planning (or economic calculation) debate is probably the most important among them and surely is the one with more implications for issues here discussed. Ludwig von Mises and Friedrich von Hayek diverged from Oskar Lange, Abba Lerner, Henry Dickinson, Fred Taylor, Evan Durbin and other authors about the possibility of creating an efficient socialist economy (Lavoie, 1985, p. 2).

It was Lerner's and Lange's interventions that led the discussion to a deeper theoretical level, as they argued that central planning could be carried out using General Equilibrium models, allowing socialism to be as efficient as free market capitalism. In doing so, the Austrian School, which had used in the past the deductive method to contradict the interventionist policies proposed by historical and institutionalist economists[181], was then obliged to negate the usefulness of axiomatic pure theory.

Both sides of the socialist planning debate believed in the validity of the General Equilibrium model as the main reference for the pure theory (even though the existence of such equilibrium had not been yet satisfactorily demonstrated). The dispute revolved around the ability of using such model in real world analyses, as it lacked a plausible

[180] De Jong (1986, p. 71) argued that the original Austrian tradition provided an important theoretical background for the development of Continental European Industrial Organization theory, as the historical school remained dominant until the early 1920s.

[181] Although the so-called battle of methods (*Methodenstreit*) happened in the late nineteenth century, in the first half of the twentieth century there were still influential historical and institutionalist economists. It was this tradition (rather than the followers of Walras or of Marshall) that was considered by Mises (1933) as the major opponent of Austrian economic theory. It is ironic, or even paradoxical, the radical turn of Austrian positioning with regard to the usefulness of historical and institutional in economic analyses (Kirzner, 1987, p. 150; 1988, pp. 9-10).

explanation about how the equilibrium was achieved. As it is well known, the Walrasian General Equilibrium model requires a fictional character (the auctioneer) to "shout" the prices of goods to buyers and sellers, which inform back the desired quantities for such prices. Prices are successively modified by the auctioneer until the plans of all agents converge (supply equals to demand for each good): only then, when the vector of equilibrium prices is found, transactions can occur.

The stability of General Equilibrium thus depended on this atemporal process of adjustment (*tâtonnement* – literally *"*groping" or "tentative proceedings") carried out by an agent which does not have any economic interest for participating in the markets' transactions. Also, when production is considered, the transformation of inputs into outputs depends on the coordination of entrepreneurs which, in equilibrium, are not remunerated (they earn zero absolute profits) (Arrow and Hahn, 1971, pp. 3-5; Screpanti and Zagmani, 2005, pp. 184-185; Ingrao and Israel, 1990, pp. 99-100).

The marginalist theory, which originally provided an harmonic explanation of the economic system operation (income distribution reflecting marginal products, tendency towards full-employment of factors and the derived optimistic welfare implications), was used to theoretically underpin the economic liberal doctrine and to repel the more "heretic" approaches, suffered from a basic contradiction[182]: it required the action of a fictional agent that operates from outside the markets to ensure its proper functioning. Given the high level of abstraction and a-historicity in which the theory was developed, the supporters of socialist planning concluded that such function could well be executed by a State agency.

The participation in the debate led Mises and Hayek, to change their discourse from an original position in the 1920s considerably adherent to mainstream economics to a position in the 1940s which stressed the theoretical fragilities of this approach and developed new elements (Kirzner, 1988, p. 1; Boettke and Leeson, 2003, p. 445). Some texts that reflect this new position were Mises' *Nationalökonomie* (1940) – later revised and published in English with the title of *Human Action* – and Hayek's *The Use of Knowledge in Society* (1945) and *The Meaning of Competition* (1946).

[182] Another important basic contradiction of neoclassical economics is the necessity of assuming pre-determined axiomatic behaviors in order to obtain "well-behaved" properties for the *system*. In doing so, it deprives individuals from any spontaneity, making unfeasible the development of a methodological individualism *de facto*. As G. L. S. Shackle (1979, 1983) - a common source for both Neo-Austrian and Post-Keynesian Schools - emphasized, if every agent makes a decision in the same exact deterministic way, it may be even difficult to calling it choice.

According to them, the real nature of competition was not adequately discussed by the General Equilibrium and the perfect competition partial equilibrium analyses, as they take as "basic data" features that should be viewed as the result of the operation of the competitive process (firm's knowledge about the cost structure and consumers' preferences, the diffusion of information, the elimination of abnormal gains) and assume away many conducts (advertising, product differentiation, undercutting, innovation) that, in the real world, are recognized as crucial to the achievement of competitive market outcomes.

Austrians think of competition as a dynamic process of discovery that operates and becomes visible during the disequilibrium. It is emphasized the unquiet nature of markets, the exploration of the unknown (search for new things or new ways of doing things better than they have been done before), rather than the static allocation of resources with complete information as in Robinson Crusoe's metaphor or Lionel Robbins' definition of Economics. The perpetual improvement of society's pool of knowledge is one of the greatest virtues of the competitive process (which justifies to a large extent the superiority of capitalism *vis-à-vis* socialism). Entrepreneurship occupies a central role in setting in motion endogenous changes to the economic system.

Hayek (1946) explicitly rejected the normative role of the perfect competition model, the use of comparative statics and the associated welfare implications. In the background of this discussion lied a concern in adjusting the liberal discourse in order to regain influence over society and economic policies, as the main theoretical representant of this political doctrine – the neoclassical theory – was increasingly used to justify State intervention not only in socialist economies (economic planning) but also in capitalist economies (macroeconomic and "microeconomic" policies).

Even though the 1940s can be regarded as a turning point for the development of the modern Austrian School, marking an emancipation from neoclassical economics, many of the original contributions from Hayek and Mises were still underdeveloped. Some refinements were given by the same authors in the following decades, but the greater advances were achieved by their followers (Israel Kirzner, Ludwig Lachmann, Duncan Reekie[183], Stephen Littlechild and others)[184].

[183] Reekie (1979), Reekie and Allen (1983), Reekie and Crook (1995) discussed the Industrial Organization theory about markets and firms from an Austrian perspective. Other textbooks such as Reid (1987, ch. 6), Ferguson and Ferguson (1994) and Lipczynski *et al.* (2005) dedicated a considerable part of their content to the exposition of ideas from the Austrian School.

In spite of the fact that Neo-Austrians emphasize radical (Knightian) uncertainty, ignorance, time, complexity, heterogenous agents, indeterminacy, creation and diffusion of knowledge, to discuss the processes of disequilibrium[185], they remain faithful in a large extent to the marginalist theories of value, distribution and output to explain the nature of the equilibrium. The ability of prices in communicating information of relative scarcities throughout the system, which Austrians praised in the calculation debate, ultimately rests on the validity of the Principle of Substitution[186]. So, although Neo-Austrians have been exploring subjects which are very dear to the heterodox tradition, defining it as a heterodox school of thought is still a controversial matter (Lavoie, 2014, pp. 29-30).

In Industrial Organization Theory, the development of an alternative welfare conception based on the coordination process led Neo-Austrians to emphasize the importance of institutions in the creation, obtention and diffusion of information, as well as the encouragement of entrepreneurial behavior and innovation. In this subject, the Neo-Austrian literature has merged considerably with the New Institutional Economics (Ronald Coase, Douglass North and Oliver Williamson) and Public Choice Theory (James Buchanan, Gordon Tullock), making its way into mainstream economics (Kirzner, 1973, ch. 6; O'Driscoll, 1977, ch. 6; Boettke and Leeson, 2003, p. 452).

Such incorporation of Austrian ideas spiced up the Industrial Organization theory, enabling more vivid discussions about the evolution of markets, business conducts and innovation and exploring the gap between the neoclassical static theory and real-world issues. The higher receptiveness towards Austrian ideas *vis-à-vis* other

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[184] Boettke and Leeson (2003, p. 445, p. 447) identified seven generations of Austrian economists, there including specialists in fields which are not discussed in this work, such as macroeconomics and monetary economics: 1st generation: Carl Menger; 2nd generation: Friedrich Von Wieser and Eugen von Böhm-Bawerk; 3rd generation: Ludwig von Mises and Hans Mayer; 4th generation: F. A. Hayek, Gottfried Haberler, Oskar Morgenstern, Fritz Machlup and Paul Rosenstein-Rodan; 5th generation: Murray Rothbard, Ludwig Lachmann and Israel Kirzner; 6th generation: Mario Rizzo, Don Lavoie, Roger Garrison, Lawrence White, Walter Block and Joseph Salerno; and 7th generation: Geroge Selgin, Peter Boettke, Steve Horwitz and David Prychitko.

[185] The relative weight given to disequilibrium and equilibrium analyses within Neo-Austrian theory is still an unsettled matter (Kirzner, 1988, p. 16; Boettke and Leeson, 2003, pp. 449-450).

[186] In a situation with reverse capital deepening, for instance, an excess of labor and a decrease in wages in a certain region could lead to the adoption of more capital intensive, mechanized or 'roundabout' techniques. In this case, the transmission of information of relative factor prices and the 'alertness' of entrepreneurs would produce nothing virtuous to the system. Additionally, this market response may well produce an inferior outcome in comparison with an alternative situation in which the State plans investments and population displacements.

"dynamic" approaches may be influenced by the fact that the enrichments proposed by them do not question or impair the analytical core of Marginalism (after all, Menger was one of the three revolutionaries) and because of their usual defense of laissez-faire policies[187], such as privatizations.

3.7. Concluding remarks

In the orthodox tradition, there were developed numerous models combining both conceptions of competition (perfect competition, imperfect competition, SCP framework). During the anti-structuralist revolution, however, a bifurcation arose, as the Contestability Theory recuperated the classical conception of competition and the New Industrial Organization reclaimed and developed the Cournotian conception of competition. The tension between the two conceptions of competition became more evident in this period, although the Industrial Organization literature has attempted to create new amalgamations since then.

Given the perspective adopted in this work, one might expect that this chapter, by discussing the neoclassical schools of Industrial Organization, would only narrate theoretical setbacks. At least one exception, however, can be identified to this line of reasoning. The theory of contestable markets not only emphasized the classical conception of competition, which was partially present in the SCP approach, but also advanced with regards to Sylos-Labini and Modigliani by rejecting the notion that economies of scale (defined as a large minimum efficient plant) alone can constitute a barrier to entry.

[187] The Schumpeterian and Misean/Hayekian views on competition present considerable similarities, such as the disruptive role attributed to the entrepreneur, the consideration of competition as a process (rather than a state or situation), the idea that capitalism possesses endogenous forces that continuously create novelties and the refusal to consider the perfect competitive model as an ideal type (McNulty, 1987, pp. 536-537). However, while Neo-Schumpeterians have moved away from the policy recommendations of their forerunner (which can also be regarded as belonging to the original Austrian tradition), most Neo-Austrians have remained staunch libertarians.

Chapter 4 – Barriers to entry and the classical theory of value

4.1. Introduction

This chapter is essentially constructive, attempting to integrate contributions from Industrial Organization theory to the Sraffian (or surplus) approach. In the previous chapters, the development of the conception of competition centered on capital mobility by authors such as Bain, Sylos-Labini, Andrews, Baumol, Willig and Panzar were presented from a history of economic thought perspective. Now, the theoretical elements that influenced and inspired the proposed interpretation of the classical approach to competition are presented in a more "pragmatic" way, having less concerns with the position of each author among the several schools of Industrial Organization thought.

The second section discusses a highly significant addition to the classical approach to competition: Josef Steindl's microeconomic analysis. Even though Steindl (1989, p. 98) himself acknowledged Kalecki's general influence on his intellectual trajectory, his microeconomic formulation is much closer to classical framework than to the theory of mark-up pricing. Building on Steindl's work, we suggest that barriers to entry can be interpreted as cost asymmetries that give rise to extraordinary profits or 'Ricardian' rents.

The remainder of the chapter discusses how restrictions on capital mobility can be addressed within the surplus approach, both schematically and algebraically. The third section proposes the incorporation of entry barriers into the representation of the gravitation process. It emphasizes that extraordinary earnings arise from persistent cost advantages rather than 'sticky prices'. The fourth section suggests integrating competitive asymmetries into the Sraffian framework, arguing that they can be addressed as various specific profit rates (including a range of extraordinary profits) or, preferably, as 'Ricardian' differential rents in addition to a minimum rate of profit.

4.2. Barriers to entry as cost-advantages

Even though the basic elements of the conception of competition as capital mobility were presented by Smith or even Turgot[188], the most relevant advances of this view occurred only with the rise of the Industrial Organization (or Industrial Economics) field. Yet, as the contributions to this viewpoint are originated from distinct affiliations, the selection of theoretical elements from this literature must be carried out in a careful and pragmatic way. This is crucial as the classical conception of competition is a necessary, but not sufficient condition for a coherent microeconomic framework. It is claimed a certain degree of interpretative freedom to incorporate compelling ideas while discarding the marginalist aspects of these analyses.

So far, we have discussed the contributions of Bain, Sylos-Labini, Andrews, Baumol, Willig, and Panzar to the development of the classical conception of competition. Another theoretical formulation of great significance for this approach – Steindl's microeconomic analysis - has not yet been discussed and will be now addressed.

4.2.1. Steindl's microeconomic analysis.

a) The search for alternative microfoundations

Like Andrews[189] and Sylos-Labini, Josef Steindl praised John Maynard Keynes's contribution to economic theory and attempted to develop a non-neoclassical microeconomic analysis that could contribute to the ongoing revolution in

[188] Gilbert (1989) provided an interesting assessment of the role of potential competition in Industrial Organization, there including the several limit-pricing models (from Bain to the entry deterrence models of the New Industrial Organization Theory), Chicago School and Contestability theory. Strangely, he identified J.B. Clark (1902) as a pioneer of this notion of competition, as if it (or the entire price theory) had started with the marginalist theory.

[189] Andrews (1949, p. 251) aimed to create a *General Theory of Business Activity* following the lines laid down by Keynes's *General Theory of Employment*. The similarity highlighted was to the fact that short-term changes in demand affect more employment, the quantity sold and investment decisions than the price of goods (although Keynes himself assumed flexible prices). This argument was also used by Sylos-Labini (1962, p. 62, p. 114). This assumption may be interpreted as a "stronger" version of separability between prices and quantities, while the "weaker" classical version concerns the investigation of long-period equilibrium and does not require any specific pattern of prices in disequilibrium. As it will be shown in the section 4.3, short-period price rigidity is not a necessary hypothesis for the validity of limit price theory.

Macroeconomics. In *Maturity and Stagnation in American Capitalism* (completed in 1949 but not published until 1952), Steindl provided the most interesting theoretical advances in this direction.

Steindl (1952, p. 2) propounded that the concept of uncertainty ("Knightian" or "Keynesian") should be taken in consideration in the discussions about price theory. In uncertain circumstances, the informational basis available for calculating the marginal revenue or price elasticity of demand are very precarious, making impossible for entrepreneurs to adopt an optimizing behavior.

Regarding the consumers' decisions, there would not only be informational, but also cognitive limitations for comparing prices and product characteristics, making the possibility of rational calculation unfeasible. Furthermore, the decision-making process would involve a "cost" for the consumer (the similarity with Herbert Simon's[190] later analysis is evident), so that consumers often avoid long deliberation processes for products whose individual value is not expressive (Steindl, 1952, pp. 58-60).

After rejecting the marginalist pricing behavior, he initially took in consideration the kinked demand curve[191], but soon discarded its usefulness and considered the threat of new competitors entering the market[192] as the primary reason why prices are not set at an excessively high level (Steindl, 1952, pp. 13-17, p. 67). This led him to the recognition of capital mobility as the main regulating mechanism of price:

> "It is quite likely, however, that even in the long run, in many cases, the elasticity of demand is too low to be relevant, in practice, for the determination of prices. What prevents oligopolistic industries from charging

[190] As Simon (1978, p. 12) suggests, the neoclassical theory assumes that everything is scarce, except the "computational" capacity of the human mind.

[191] The firm's demand curve, as shown by Kaldor (1935), cannot be precisely defined, since the consideration of the reactions of competing firms makes it subject to numerous "kinks", discontinuities and position shifts. If one tries to represent such a situation, it will be difficult to arrive at something that resembles a continuous and negatively inclined curve. As Reid emphatically remarked, the prominent role gained by such limited instrument can only be explained by the absence of a satisfactory theory of oligopoly: "… falsification has a lesser role than Popperians would have claimed. An important purpose of the study of Reid (1981) on the persistence of the kinked demand curve theory of oligopoly was to enquire into how a theory which had been refuted in the leading journals by eminent authorities could nevertheless continue to have a wide currency over forty years later. It is clear that on the one hand few tests indicating falsification are decisive, and on the other a theory is not readily abandoned if there is no suitable replacement for it. In the case of the kinked demand curve, tests of the theory which proved negative were not judged decisive by the economics profession, and furthermore economics desperately lacked (and lacks) *any* good theory of oligopoly" Reid (1987, p. 213, emphasis in original).

[192] To be fair, the disciplining effect of the possibility of entry had already been considered by Hall and Hitch (1939, p. 22).

> higher prices than they actually do is probably the fear of new entry into the industry, rather than any considerations of elasticity of demand.
>
> We are thus led to question altogether the usefulness of the concept of elasticity of demand for the explanation of prices. We shall in the following chapters attempt to discuss the various problems of price formation, and even the problem of selling cost, without making use of the elasticity of demand. We shall make use of another concept, however, namely that of cost differentials between firms, which have an important bearing on the intensity of competition, and therefore on the formation of prices" (Steindl, 1952, p. 17)

In addition to rejecting the relevance of demand elasticity[193] for price determination, Steindl (1952, p. 2) repudiated the "casuistic speculations" that characterized the oligopoly theory[194].

As we have discussed before, the elasticity of demand, derived from the indirect substitution mechanism, does not play any role in the classical theory of prices[195]: the adjustment process towards long-period positions takes place through variations of the quantity brought to the market and not by a movement along a demand curve. Steindl himself recognized "in the classical more precisely Ricardian, theory of prices the competitive effect of the new entry played a paramount role in the form of the 'law of equalization of the rate of profit'" (Steindl, 1952, p. 67).

b) Barriers to capital mobility and profitability differentials

Steindl criticized, however, the "law of equalization of the rate of profit" on two main grounds.

The first reason concerned the fact that capital, "once invested in a certain industry, can be freed only with great difficulty" (Steindl, 1952, p. 68). This situation is primarily associated with the acquisition of fixed assets (factories, warehouses, machinery, etc.) that can only be "freed" slowly (by depreciation or sold at a discount in

[193] Steindl's categorical rejection of the relevance of the concept of elasticity of demand led him to distantiate himself from Kalecki with regard to the theory of price (Steindl, 1952, p. 71). In this aspect, Steindl's formulation is considerably superior to the one from Sylos-Labini, who despite having rejected the theoretical elasticity of demand (Sylos-Labini, 1962, pp. 30-31), made unnecessary concessions to an "empirical" notion of elasticity of demand (Sylos-Labini, 1962, p. 37).

[194] Even though Sylos-Labini and Steindl proclaimed to be developing a "heterodox" oligopoly model, the more structural aspects of their analyses are related to barriers to entry. Hence, we have chosen to interpret them as followers of the classical tradition to competition.

[195] Also, "[…] there is no such thing as oligopoly in classical competition theory, where it is the degree of capital mobility and not the number of firms that is the relevant measure of the degree of competition" (Serrano, 2013, p. 218).

the secondary market, if it exists). Also, investments in stocks, which need to be liquidated slowly so as not to induce an abrupt drop in the price of the commodity, and the expenses related to building a clientele (for example, advertising), can rarely be recovered. Yet, Steindl (1952, p. 68) himself pointed out that this reasoning applies only to capital already invested and that the presence of new capital flows can limit existing profitability inequalities between different lines of production.

While this first cause of relative capital immobility can be characterized, in contemporary terms, as barriers to exit related to sunk costs, the second one can be defined as barriers to entry: "entering a new industry will involve the acquisition of an entirely new market and goodwill, new experiences and a new organization. All of this is more difficult than expanding their business in their own industry." (Steindl, 1952, p. 68).

Throughout the book Steindl discussed several sources of entry barriers that were later identified by Bain and Sylos-Labini, such as the presence of high capital requirements, product differentiation (advertising, product characteristics, distribution channels, etc.) and economies of large scale (productivity differentials between plants of distinct sizes). In doing so, he was able to show that beyond a certain cost-determined limit, actual or potential capital flows can no longer reduce the profitability inequalities between producers, so that the "average" profitability of some industries can remain above the "normal" level (Steindl, 1952, p. 8, pp. 55-60, pp. 67-68, p. 79).

In addition to having developed the notion (although not the terminology) of barriers to mobility (to entry and exit), Steindl suggested the idea of entry-preventing/limit and elimination prices:

> "The restriction of entry into an industry – apart from the case of legal restrictions such as patents – is a relative factor, depending largely on the rate of profit earned in the industry. If prices, and consequently profits, are sufficiently high, entry of new competitors into an industry becomes feasible even where capital requirements are great. The price in oligopolistic industries is therefore fixed on a level which just keeps potential competitors out; or, in other cases, it may be fixed at a level which is sufficient to squeeze out some existing competitors, whose markets the price leaders want to take" (Steindl, 1952, p. 17)

There are thus several elements that place Steindl as an important contributor to the classical approach to competition: the rejection of subjective elements and the consideration of objective, structural elements for price determination (and income distribution); the emphasis on the disciplining role of entry and the detailing of the

limits to this process, recuperating and developing the classical conception of competition; the consideration of a "normal" degree of capacity utilization (as discussed in 1.3.6); the suggestion of an entry-preventing price. An even more explicit influence of the classical economic thinking on Steindl's analysis was his treatment of competitive asymmetries, which we will discuss now.

c) Competitive asymmetries as cost-differentials

Steindl represented competition in terms of cost differentials between producers, proposing a modernized "Ricardian" differential rent theory, dissociated from the degeneration practiced by Marshall (Steindl, 1952, pp. 8-9, pp. 66-67). The origin of this argument, as we have discussed in chapter 1, can be traced back to Sraffa (1925, 1926). We now need to better understand why the author thought that the Ricardian theory needed to be "modernized".

Steindl criticized David Ricardo for his defense of the "law of equalization of the rate of profit" which, according to him, have overestimated the possibility of entry. According to Steindl (1952, pp. 37-38, p. 67), Ricardo restricted cost differentials to agriculture (due to the limited availability of better-quality soils), neglecting the competitive asymmetries arising from the scarcity of "big units of capital". The producers which possess such methods enjoy cost advantages resulting from economies of large-scale, that were discussed by the author in chapter 4 of "Maturity and Stagnation" and in his previous book *Small and Big Business* (1945).

Steindl's criticism of Ricardo can be evaluated in two parts. First, it should be noted that the distributive effects of competitive asymmetries can alternatively be expressed in terms of different profit rates or differential rent. While Smith opted for the first representation (including the situation of the exceptionally fertile soils of France), Ricardo preferred the second. However, these alternative forms of exposition do not greatly alter the general message of the authors, who share the merit of founding the classic notion of competition.

Second, it seems correct to say that Ricardo downplayed the extent of obstacles to capital mobility. This criticism ends up entering, however, into a discussion of historical and empirical nature about whether economies of large-scale (or even capital requirements, product differentiation, etc.) were sufficiently relevant in the early 19th century to be emphasized in his theoretical analysis. The fundamental issue is that, even

if Ricardo had considered all these barriers, this would not necessarily invalidate the "law of equalization the rate of profit" because the existence of a uniform rate of profit can be considered a hypothesis (or rather, a theoretical-methodological choice) of the author. In this sense, it is possible to follow Ricardo's formulation considering that all established capitals in the market obtain *at least* a "normal" rate of profit and that any competitive asymmetries between different capitals are treated in terms of differential rent (as, curiously, Steindl himself proceeded).

To develop an analysis in terms of differential rent, it is sufficient to consider that there are marginal producers in the industry analyzed:

> "In the classical theory of differential rent, as formulated by Ricardo, cost differences provide the explanation for a surplus (in the specific case, the rent on land). The crucial concept of the theory is the *marginal producer*, who satisfies two conditions: (1) he is the highest cost producer, (2) he has himself no surplus, *i.e.*, the price equals his cost. Under these conditions, all the surplus can be explained by the cost differentials." (Steindl, 1952, p. 37, emphasis in original)

Given the presence of economies of large-scale, marginal producers are associated with smaller plants (Steindl, 1952, p. 24, pp. 37-39). There is a great dispersion of profits earned by marginal producers, with some of them obtaining extraordinary profits, others covering only their costs and even those presenting losses. Steindl considered, however, that marginal producers earn, on average, zero economic profit (or only "normal profits")[196]. In this way, the industry's aggregate profits can be treated analytically as a sum of differential rents arising from the cost advantages of infra-marginal producers in relation to marginal producers (Steindl, 1952, p. 39, p. 67).

Producers with small plants tend to earn, as a group, "normal profits", and can be generally treated as the marginal producers of the industry. However, in cases where competitive pressure is very intense, producers with only small plants can be eliminated from the industry, so that medium or even large plants start to obtain only "normal profits" (Steindl, 1952, p, 39, p. 53). In this way, the intensification or relaxation of competition tends to modify the group of producers that make up the "margin of existence".

[196] The criticism from Pivetti (1991, p. 113) that Steindl considered that marginal producers obtained absolute zero profits seem misdirected. In *Small and Big Business*, Steindl (1945, pp. 3-4) is even more explicit in his position that the "small firms" usually obtain 'normal' profits.

Steindl was incredibly skillful not only in identifying the existence of cost differentials that generate a hierarchy of earnings in a given moment, but also in discussing how the industrial structure is dynamically transformed by strategies of innovative producers (which he called *progressive firms*). The main determinant of the competitive pressure is technical progress, which alters the producers' cost structure thus modifying the nature and the heights of the barriers to entry, thus making the differential rents variable in the long (or very long) period (Steindl, 1952, p. 38, p. 45).

4.2.2. Generalized cost-advantages

The notion of barriers to entry, like many central concepts in economic theory, is subject to controversies - a good exposition of the different views was given by Lyons (1989). As we have already suggested, George Stigler's definition serves us well here: "a barrier to entry may be defined as a cost of producing (at some or every rate of output) which must be borne by firms which seek to enter an industry but is not borne by firms already in the industry" (Stigler, 1968, p. 67). In the absence of barriers to entry (or, alternatively, in a situation of free entry or free competition), entrants suffer no cost differentials relative to existing producers (Stigler, 1968, p. 70).

We will discuss next how the main types of barriers to entry are manifest through cost differentials, allowing us to proceed with the conceptualization of barriers as generalized cost-advantages. It is argued that different types of entry barriers can be treated analogously to absolute cost advantages. Hence, we can proceed with the analysis of entry barriers in accordance with the classical separation between prices and quantities.

a) Absolute cost advantages

This type of entry barrier represents a straightforward case, accounting for the cost differentials between producers irrespective of their output levels.

As we discussed in Chapter 2, Bain considered that the limit price is situated above the competitive price. However, in the case of absolute cost advantages, this supra-competitive level of the limit price does not stem from the fact that entrants exercise control over the quantity produced. Bain associates the competitive price with

the cost of production of the superior technique (that is, the price that would prevail *if* such a technique became diffused) and the limit-price with the cost of production of the technique available to potential entrants, regardless of the level of production.

It is perfectly possible to think the other way around. The limit-price can be defined by the cost of production of the dominant technique, within which there is free mobility of capital, while holders of superior techniques enjoy extraordinary profits to the extent of their cost advantages.

b) Economies of large scale

We have argued that Sylos-Labini's contribution can be associated with two views on the source of extraordinary earnings: i) extraordinary profits connected to supra-competitive prices; ii) rents derived from cost advantages relative to the dominant technique. Regarding the barriers to entry stemming from economies of large scale, these alternative interpretations are related to: i) the proportion of the market that the entrant needs to supply to be efficient (minimum efficient scale/absolute market size) – referred to by Bain (1956, p. 157) as the 'percentage effect'– which inevitably leads us to the behavioral assumptions from Bain, Sylos-Labini, Modigliani, and culminates in the New Industrial Organization models of entry-deterrence; ii) the coexistence of plants of different sizes that present different productivities. This second formulation, which is of interest to us here, finds its most developed version in Steindl's work.

The methods of production are represented by fixed technical coefficients, each tied to a particular level of production. The premise is that methods that operate at higher levels of production exhibit lower average costs of production. Economies of large scale, from this standpoint, is a specific type of cost asymmetry linked to the level of production of each plant (operating at the normal degree of capacity utilization). By considering that methods of production, distributive variables, the market size, and producers' market shares are given, it is possible to determine the entire cost structure of the industry. It is thus possible to acknowledge the presence of economies of large-scale even in the absence of continual cost curves and simultaneous determination between prices and quantities.

The question that arises then is: why would most producers not be able to invest in larger plants? If such plants involve a technology that is not mastered by all producers, the ultimate cause of the barrier is technological. If the restriction lies in the

difficulties to raise sufficient funds for the construction of the plant – what Bain (1956, p. 157) called the 'absolute-capital-requirement effect' – the ultimate cause of this barrier is financial: “The market for investible funds may be such as to impose higher effective interest costs on entrants than on established firms, or alternatively to impose a more severe rationing of funds on potential entrants” (Bain, 1956, p. 145).

Steindl’s explanation of the scarcity of 'big units of capital' was influenced by Kalecki's Principle of Increasing Risk (Steindl, 1945, pp. 5-6, pp. 43-44; Steindl, 1952, p. 38, pp. 48-49). In the absence of enough internal accumulation of profits, the firm needs to resort to third-party resources. Therefore, the larger the amount invested, the higher the level of indebtedness and the greater the losses if expectations end up being disappointed (Kalecki, 1937, p. 442). There would thus exist a limit to investment financing through credit, imposed either by the firm itself (which would fear a situation of illiquidity) or by the creditor (who would raise the interest rate to cover increasing risk premiums or establish a quantitative control over the amount loaned).

In situations where substantial initial capital requirements are required for the construction of larger plants, established firms owning these plants enjoy absolute cost advantages over smaller plants of established producers and potential entrants who can only enter the market at diminished scales (Serrano, 1988, pp. 74-75).

c) Product differentiation

Stigler (1968, p. 70) considered that entry barriers resultant from product differentiation could also be contemplated by such definition, as long as the costs of differentiation (design, advertising, etc.) are higher for the potential entrants than for the existing producers[197]. In this matter, Stigler was greatly influenced by Bain (1956, ch. 4), who discussed in detail product differentiation advantages[198] (which he considered

[197] When product differentiation is considered, prices can vary considerably within the same industry. This does not necessarily invalidate the reasoning previously developed. A producer with a lesser-known/less-desired product needs to charge a lower price and/or incur additional selling costs. Therefore, producers of well-established products can enjoy a higher profit margin due to their cost advantage.

[198] “Thus a general tendency of buyers to prefer established new products may place potential entrants to a differentiated-product industry at a disadvantage as compared to firms already established in the industry. In general, this disadvantage may take the form of either lower price or higher selling cots. In order to secure a market, the entrant may have to accept lower net price than established firms, relative to the cost of production, either perpetually or for an appreciable interval of time during which he established ‘buyer acceptance’ for his product. Or he may have to incur appreciably higher selling costs per unit of sales volume, indefinitely or for a similar interval. Finally, he may have some combination of these two disadvantages. *His total disadvantage due to product differentiation at any time will be*

to be the most powerful source of entry barriers), derived from already established products, brands, reputations, distribution and dealer systems (Bain 1956, p. 16, p. 116, p. 204, p. 216). Other authors who contributed to the classical view of competition developed their reasonings in similar lines.

Phillip Andrews asserted that "potential competitors will be discouraged by the obvious lack of a ready-made market for the product" (Andrews, 1949, p. 175), so that they may need to incur in additional selling costs in order to by-pass this initial disadvantage. He also argued that, aside from advertising costs, which present a higher degree of autonomy, transport and other selling costs should be considered as "expenses of the actual operations of getting the commodity to the customer and selling it to him" (Andrews, 1949, p. 185). These activities are so intertwined in modern business activities practices that allocation expenses solely to production or to selling becomes challenging, as can be illustrated by the example of packaging (Andrews, 1949, p. 186).

Influenced by Sraffa (1926) and Andrews (1949, ch. 5, n. 5), Sylos-Labini (1962, pp. 53-54) also identified that selling costs are involved in acquiring an adequate circle of customers, producing obstacles to competition both internally and externally to the industry. Even though Steindl's *Maturity and Stagnation* was not directly influenced by Andrews' *Manufacturing Business,* he also argued that the conditions of cost should be better specified to take into account not only costs of production but also distribution and selling costs, which are considerably important when the product is differentiated (Steindl, 1952, p. 55). Having proceeded with such modifications, Steindl maintained that competitive asymmetries could still be expressed in terms of cost differentials.

In the second section of chapter 1, we have discussed Sraffa's early attempt to conciliate elements of real-world competition (obstacles to capital mobility, financial factors, innovation) with the marginalist framework. He soon encountered insurmountable difficulties, giving up pursuing this path. Sraffa's objections to the incorporation of marketing expenses must be considered, however, in these circumstances of development of the imperfect competition model.

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effectively the sum (conveniently stated in per-unit-of-output terms) of his price and his selling-cost disadvantage. Not only the initial size of the disadvantage, but also its duration will of course be important. Additionally important may be an increment to absolute capital requirements, representing money which the entrant must 'invest in losses' over a period of years during which he is striving to establish his product" (Bain, 1956, p. 116, emphasis added).

Thus, the problem does not seem to be marketing costs *per se*, but the attempt to introduce it to the neoclassical value theory, particularly to the version that tried to build an individual firm's demand curve. We argue that the incorporation of product differentiation to the classical theory of price as a source of barrier to mobility[199] allows the preservation of an objectivist approach to competition, as subjective factors can be ultimately reduced to a common monetary unit to be measured and compared. Rather than inserting utility into costs (which, according to Dardi, 2001, pp. 133-134, was Sraffa's concern), it is the case of treating demand as (differential) costs.

d) Economies of scope

Panzar and Willig (1975, 1981) coined the concept "economies of scope" to describe cost savings associated with joint-production *vis-à-vis* the combination of single methods of production: $C(y_1, \ldots, y_n) < \sum_{i=1}^{k} C(y_i)$, for $k > 1$. In the simplest case of two products, $C(y_1, y_2) < C(y_1) + C(y_2)$. These economies stem mainly from shared inputs, indivisibilities and other cost complementarities, and are deemed as an essential condition for the expansion of multi-product firms in contestable markets (Baumol, Willig and Panzar, 1982, p. 71-72, p. 177, p. 285)

Considering that the contestability theory is part of the neoclassical research program, it presents methodological and theoretical foundations (simultaneous determination between price and quantity, production functions, continuous cost curves, profit maximization, etc.) that are incompatible with the Sraffian approach. It is believed, however, that the general concept of economies of scope (as well as that of contestability) can be incorporated into the classical approach to competition here developed.

4.3. Barriers to entry, limit pricing and extraordinary earnings

As discussed in the chapter 1, the dominant techniques (the methods of production used in a widespread way) define the quantities of inputs necessary for the

[199] Selling expenses give rise not only to barriers to entry, but also barriers to exit. As Lyons (1989, p. 48) has put "who wants to buy a second-hand, failed advertising campaign?".

production of each commodity in the economic system. These technical requirements can be visualized in each "line" of Sraffa's system of equations.

If it exists only one method of production, then all the producers present the same technical coefficients and obtain the normal profit rate. When there exists more than one method, however, it is necessary to introduce an analysis about alternative methods of production. In this work, it will not be discussed the very frequent issue in the Sraffian literature (especially in the capital debates) about the choice of the most profitable method of production as income distribution changes. Instead, we will opt to analyze the case of coexistence of methods that maintain a constant cost differential for every observed point of the real wage-profit rate frontier[200].

It was argued in the previous section that barriers to entry from different sources (absolute cost advantages, product differentiation, economies of scale and scope) can be ultimately represented by generalized cost advantages of incumbents *vis-à-vis* newcomers. Having that in mind, let us assume that one producer possesses a superior, more efficient method (with lower cost) protected by a patent, while all the other producers have access to the dominant technique (using Steindl's terminology, we can call them "marginal producers"[201]). In this situation, the "innovative" producer will earn an extraordinary profit in a similar way that the owner of the most fertile land earns a differential rent[202]. In that way, it is possible to say that cost advantages over marginal producers generates a "Ricardian" differential rent (Schefold, 1989, p. 203).

This reasoning is represented in Figure 6 in the following way: the dominant method is represented by a thicker black bar at the natural price level and the patented method is represented by a thinner black bar below the natural price level. The distance between the two bars indicates the (unitary) cost differential between both methods. Multiplying this value by the quantity produced by the owner of the method with lower cost (q), we obtain the differential rent (represented by the grey area) accrued by such a

[200] Dosi (1984, p. 291) proceeded in a similar way, arguing that "the general case, we suggest, is that there are univocally superior and inferior techniques irrespective of income distribution".

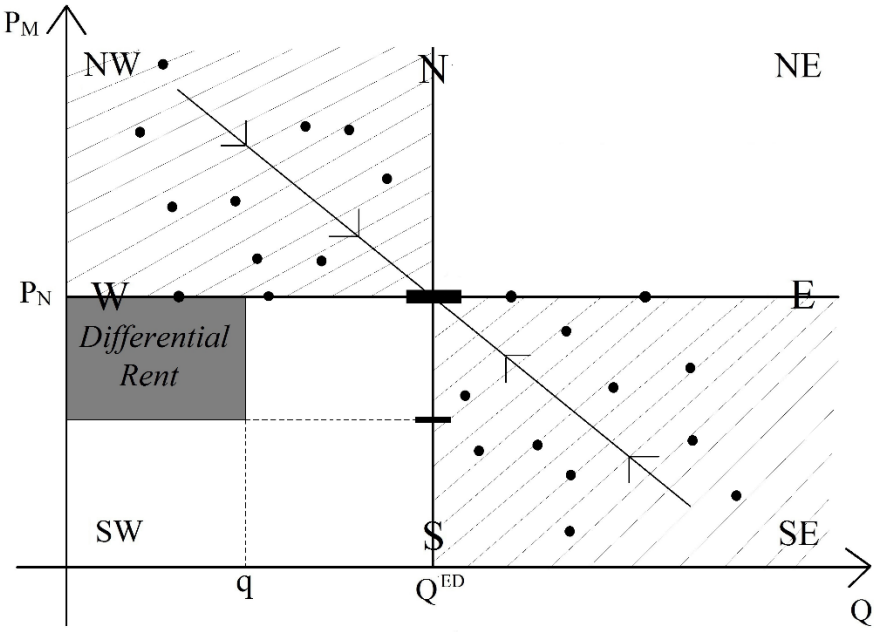
[201] In the situations described by Ricardo and Steindl, the dominant method presents the highest cost, so that there can be superior methods, but not inferior ones (Shaikh, 2016, pp. 266-267).

[202] The case of technical progress allows the innovator to earn extraordinary profits or rent, while Ricardo described a symmetrical case in which the existence of a physical limitation of a non-reproducible element of production leads to a reduction of overall agricultural productivity (technical regress) (which illustrates well that the effect of demand over price can be long-lasting only if it affects the choice of the dominant technique). In the former situation, the owners of the "new technique" obtain extraordinary earnings while in the latter situation the producers who have access to the "old technique" are benefited.

producer. The ability of most efficient producer to gain differential rent (or extraordinary profits) relies on his cost advantage and the market share ($\frac{q}{Q^{ED}}$) possessed by him[203].

It is important to note that there is an additional difference between the situation originally discussed by Ricardo and the stylized classical model proposed here. In the Ricardian case, the market share of each producer is determined by supply factors, specifically the distribution of ownership of different qualities of land. In the proposed model of technological asymmetries, on the other hand, market shares are considered exogenous[204].

Figure 6 – Limit price and differential rent



Source: Own elaboration based on Garegnani (1983)

[203] Steindl and Sylos-Labini's discussion about the competitive fringe implies a decision that involves a specific interaction between price and quantity: how much of his price/margin the most efficient producer is willing to give up in order to eliminate marginal producers and to increase his market share. Choices of this sort are exclusive to lower cost producers, as marginal producers cannot decide much while struggling for survival (in Steindl's words, they operate at the 'margin of existence') (Steindl, 1952, p. 52). As it will be discussed in chapter 6, Dosi (1984) initially discussed limit pricing in a 'static' context and then introduced 'dynamic' elements. He represented, for example, how process innovations can decrease costs and allow the producer to obtain a higher margin and/or charge lower prices in order to capture a larger market share (Dosi, 1984, p. 96, p. 134). The interactions between technical progress, costs and "quantities" are diverse and may vary from case to case, but business strategies ultimately aim to expand their "grey rectangle" of Figure 6.

[204] An explanation regarding the determinants of market shares would require delving into the theories of the firm, which is beyond the scope of this work.

It is possible to establish an equivalence between limit (or entry preventing) price of the old industrial organization literature (most notably, Bain and Sylos-Labini's contributions) and the natural price inherited from classical political economy (Serrano and Freitas, 2015, p. 261; 2016, p. 72). If the price is set on the level of the natural or limit price, there are no incentives to entering the market. This happens because any increase in the quantity brought to the market will lead market price to a position below natural price, in such a way that it does not fulfill the system's minimum profitability requirement. In this approach, the existence of differential rent is not associated with the degree of price "rigidity"[205], but with barriers to entry. The producer which presents persistent cost advantages in relation to marginal producers and potential entrants can maintain the price above its *own* costs and enjoy extra earnings without fearing entrance of new competitors.

The degree of price "rigidity" or "flexibility" can be interpreted as specific distribution patterns of market prices inside Northwest and Southeast areas. In one extreme, differences between the quantity brought to the market and effectual demand produce more pronounced price variations. These "flexible" prices tend to be localized further from the West-East axis. On the other extreme, differences between the quantity brought to the market and effectual demand affect only the quantity sold (through inventory adjustments and/or product backlog alterations). These "pre-set", "fix" or "administered" prices are positioned along West-East axis. Surely, several intermediate cases are possible[206].

Following this approach, it is possible to claim that price "rigidity" depends mostly on market's technical and institutional aspects, rather than by firms' "monopoly power". A high market share, unless combined barriers to entry, does not concede any especial advantage to the producer. In the classical perspective, actual or even potential

[205] After all, any neighborhood grocery store defines its own price tags, while iron ore and oil producers have their products quoted on international stock markets. It would be very strange to consider that the former is more likely to earn differential rents than the latter.

[206] It is important to stress that neither case (not even the "fully flexible" one) possess a market clearing property. In fact, the very necessity of price and/or quantity adjustments derives from the fact that disequilibrium is irreversible. What producers can do is to revise future production (and investment) plans in order to try to equalize the quantity brought to the market to effectual demand and/or to re-establish inventory's desired level.

entry restrains the capability of producers that do not possess cost advantages to make extraordinary profits.

4.4. Cost asymmetries and extraordinary earnings in a Sraffian framework

Pivetti (1991, p. 64) interpreted the profit rate (r) from Sraffa's system as a minimum or "pure" return on capital. As activities present different degrees of *risk and trouble*, profit rates must be adjusted in such a way as to make it indifferent for capitalists to invest in a more or less risky activity (otherwise, there would be a complete migration of capital from activities riskier to less risky activities). The specification of the "pure" component of the rate of profit (r) and the component associated with risk and trouble (k_1, k_2, ..., k_n) can be integrated into Sraffa's system of price equations as follows:

$$(a_{11}.p_1 + a_{21}.p_2 + ... + a_{n1}.p_n).(1 + r_1) + w.l_1 = p_1$$
$$(a_{12}.p_1 + a_{22}.p_2 + ... + a_{n2}.p_n).(1 + r_2) + w.l_2 = p_2$$
$$.....$$
$$(a_{1n}.p_1 + a_{2n}.p_2 + ... + a_{nn}.p_n).(1 + r_n) + w.l_n = p_n$$

$$r_1 = (1 + k_1).r$$
$$r_2 = (1 + k_2).r$$
$$.....$$
$$r_n = (1 + k_n).r$$

With the introduction of n additional equations and 2n variables - (r_1, ..., r_n) and (k_1, ..., k_n) -, the system would be underdetermined. However, if we consider that the risk differentials, captured by k_1, ..., k_n are exogenous, the system can be solved again.

Alesandro Roncaglia suggested a system of this nature, replacing the hypothesis of a uniform profit rate with a variety of profit rates, with each activity or branch of production (each "line" of the system of equations) may earn a different rate of profit. The author's justification for such range of profit rates is the existence of structural characteristics associated with legal and technical entry barriers or high starting-up costs. He pointed out that Sraffa's theoretical scheme is incompatible with the neoclassical theory of the firm, based on the interaction between marginal costs and marginal revenues, but it is perfectly compatible with the "classically derived theories

of oligopoly" (notably those of Bain and Sylos-Labini), based on the existence of entry barriers to new producers (Roncaglia, 1978, p. 29, p. 35; 2009, p. 54).

Sylos-Labini himself (1971, pp. 269-272; 1984, pp. 154-156) had already proposed the incorporation of differentiated profit rates into Sraffa's system. The author argued that the empirically verified disparities between profit rates could not arise solely from risk differentials between activities, but would actually express the height of technological, commercial and financial barriers to entry at work in each branch of production (Sylos-Labini, 1971, pp. 245-246, p. 257).

In this way, the uniform rate of profit would constitute a mere preliminary hypothesis for the construction of a "general microeconomic analysis" (Sylos-Labini, 1971, pp. 269-270). Considering the enormous challenges faced by Sraffa in "Production of Commodities", the hypothesis of uniformity of the rate of profit proved to be a functional simplification to the construction of the main arguments of the book. However, despite having constituted an important theoretical "scaffolding", such a premise can be replaced once the Sraffian "building" has been erected and solidified. Having achieved this goal, it is possible to modify Sraffa's original system in order to make it more suitable for dealing with real markets (Sylos-Labini, 1971, pp. 271-272).

As discussed before, the representation of profitability differentials resulting from competitive asymmetries can alternatively be performed by means of differentiated profit rates or by "Ricardian" differential rents. Curiously, Roncaglia and Sylos-Labini, authors of Sraffian inspiration, opted for the first representation, while Steindl, a Kaleckian, claimed to be following Ricardian lines.

The exposition in terms of differential rent makes it possible to preserve the hypothesis of a uniform rate of profit, interpreting it as a minimum remuneration that any established capital must obtain and treating deviations from this norm as competitive advantages associated with non-disseminated methods of production. Under these conditions, the system of equations can once again be represented by:

$$(a_{11}.p_1 + a_{21}.p_2 + ... + a_{n1}.p_n).(1 + r) + w.l_1 = p_1$$
$$(a_{12}.p_1 + a_{22}.p_2 + ... + a_{n2}.p_n).(1 + r) + w.l_2 = p_2$$
$$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$
$$(a_{1n}.p_1 + a_{2n}.p_2 + ... + a_{nn}.p_n).(1 + r) + w.l_n = p_n$$

$$A_1^w.\, p_1 + A_2^w.\, p_2 + ... + A_n^w.\, p_n = w$$

Following what was discussed in the previous section, we can assume that a producer of the commodity 1 has a more efficient method of production than the dominant one and it protected by a patent. This situation could be represented by:

$$(a_{11} .p_1 + a_{21}.p_2 + ... + a_{n1}.p_n).(1 + r) + w.l_1 = p_1$$

$$(a_{11}^* .p_1 + a_{21}^*.p_2 + ... + a_{n1}^*.p_n).(1 + r) + w.l_1^* + DR = p_1$$

Considering that the technical coefficients of the dominant methods of production (a_{11}, ..., a_{n1}, l_1) and the most efficient method of production (a_{11}^*, ... , a_{n1}^*, l_1^*) are given exogenously, it is possible to calculate the differential rent (DR) by subtracting $p_1 – (a_{11}^*.p_1 + a_{21}^*.p_2 + ... + a_{n1}^*.p_n).(1 + r) – w.l_1^*$.

As long as the technical coefficients of the patented method are known, it is possible to find the value of the differential rent, since one equation and one new variable are added to the system of equations. The most efficient method does not, however, play any role in determining the prices and distributive variables, whose values need to be extracted from the original system.

The first of the two equations above determines (together with the n – 1 other price equations of the original system) the price of commodity 1, and can be interpreted as representative of Steindl's "marginal producers" (or the Ricardo's marginal producer who does not pays rent). The second equation, in turn, can be associated with Steindl's "progressive firm", which has a more efficient production method and is able to appropriate the difference between the prevailing price and its own cost.

Let us consider now a case of two non-basic commodities (so that the rate of profit can be taken as given), which are produced by single-product dominant techniques in the following way:

Single-Production of Commodity I: $(a_{11}.p_1 + a_{21}.p_2).(1 + \bar{r}) + w.l_1 = p_1$

Single-Production of Commodity II: $(a_{12}.p_1 + a_{22}.p_2).(1 + \bar{r}) + w.l_2 = p_2$

If we assume that only one producer has access to a more efficient technique composed by two methods of production in which the inputs of commodities 2 and 1 are not fully depleted in the productive process, we obtain:

$$\begin{cases}(a'_{11}.p_1 + a'_{21}.p_2)(1 + \bar{r}) + \mathrm{w}.l_1 = p_1 + \mathrm{b}_{21}.p_2 \\ (a'_{12}.p_1 + a'_{22}.p_2)(1 + \bar{r}) + \mathrm{w}.l_2 = \mathrm{b}_{12}.p_1 + p_2\end{cases}$$

Rearranging both equations, we arrive at:

$$\begin{cases}(a'_{11}.p_1).(1 + \bar{r}) + [a'_{21}.(1 + \bar{r}) - \mathrm{b}_{21}].p_2 + \mathrm{w}.l_1 = p_1 \\ [a'_{12}.(1 + \bar{r}) - \mathrm{b}_{12}].p_1 + (a'_{22}.p_2)(1 + \bar{r}) + \mathrm{w}.l_2 = p_2\end{cases}$$

As the prices of commodities 1 and 2 and the profit rate are uniform, the owner of the non-diffused joint production technique obtains a differential rent associated with the cost advantage (due to "economies of scope") over the dominant single-product techniques[207].

These simple examples serve to illustrate that generalized cost advantages of non-diffused methods of production with respect to the dominant method of production allow the appropriation of pure profits or differential rents by their owners. As the most efficient method of production spills over (through imitation, patent expiration, industrial espionage, among other reasons), the innovator's differential rent tends to dissipate. At the limit, this method can be so widespread that it becomes the new dominant method, replacing the previous coefficients in the "original" system of equations and yielding only normal profits.

We have argued that barriers to entry are associated with cost differentials between more efficient methods of production and the dominant methods of production, which allows the holder of the former to appropriate a profitability differential (expressed in terms of extraordinary profits or economic rents). As the entry barrier is a relative concept, it cannot explain the level of the natural or limit price, which depends on the technological and distributive data of the system (Dosi, 1984, p. 133; Serrano, 1988, p. 71).

[207] In this particular situation, economies of scope give rise to extraordinary earnings. However, when joint production methods are widespread, such cost conditions become the market norm, and producers earn only normal profits.

4.5. Additional comments on the cost structure

In Chapter XI of *Production of Commodities*, Sraffa revisits the classical theory of rent. Discussing the choice of techniques in the production of corn, the author argues that the extensive occupation of land cannot be ordered in terms of natural fertility of the soil independently of income distribution (Sraffa, 1960, p. 75). This contradicts Ricardo's original reasoning. As we have taken the Ricardian theory of differential rent as an inspiration to incorporate competitive asymmetries into the Sraffian system, certain considerations about these results are required.

We have assumed so far that the income distribution was given or, alternatively, that the cost differential between different methods of production was independent of income distribution. Upon closer examination, however, the latter reasoning will probably not hold. For instance, if the superior technique uses more iron per unit of output than the dominant and inferior techniques, and the relative price of iron increases, then the cost advantage of the owner of the superior technique will be negatively affected.

The cost differentials are therefore not entirely fixed, they can vary slightly along with distribution. However, it is highly improbable that these changes will bring about a switch between methods of production, as the productivity discrepancies tend to be significant. If this was not the case, we would not be able to classify such techniques as univocally superior or inferior.

We assert that these theoretical considerations can be effectively addressed within the proposed analytical framework, resulting in only minor modifications to its results, while other approaches are completely unable to take into account such repercussions. The most common alternative proposal from Sraffian authors, which considers a given structure of particular profit rates – by adding spreads over the minimum profit rate – fails to capture any endogenous effects of changes of normal distributive variables on the relative profitability of sectors (as it is exogenously determined).

Regarding the conventional Industrial Organization literature, it becomes clearer that constructing a functional relationship between cost and quantity produced depends not only on the already mentioned restrictive hypotheses (such as continuity, reversibility, etc.) but also on limitations inherent to the scope of 'partial equilibrium'

analysis. The tools of the discipline cannot adequately deal with sectoral interdependencies and their consequential effects on relative prices and profitabilities.
Finally, it is worth remarking that these remarks are not an intellectual exercise of pure theory without implications for Industrial Organization subjects. The Neo-Schumpeterian approach, which we will discuss later, has made significant progress in identifying factors causing differentiation among producers which lead to the dispersion of profit rates. However, most of its proponents believe that such an endeavor can be carried out with a complete independence from any theory of value and distribution. Our recognition that the relative structure of profitability cannot be entirely independent from the normal rate of profit, however, reinforces the need for a preliminary analysis of the tendential forces that drive the system toward long-period equilibrium

4.6. Concluding remarks

It is claimed that the incorporation of contributions from the Industrial Organization literature discussing barriers to capital mobility (Bain, Sylos-Labini, Stigler, Steindl, Baumol, Panzar and Willig) can advance and enrich the Sraffian approach. Conversely, it is argued that the Sraffian framework is able to express industrial interdependencies and to determine prices and distributive variables in a logically consistent way, providing a non-neoclassical alternative for explaining the orderly outcomes achieved by the market processes.

Also, it is important to underscore the great flexibility of this formulation, capable of encompassing a wide array of market of situations (according to the extent and pervasiveness of cost asymmetries). Consequently, there is no necessity to develop a variety of specific models of competition, as it occurs in neoclassical microeconomics.

The difficulties that arise in constructing this theoretical framework stem largely from the treatment of systemic relationships that are simply omitted in competing approaches.

Chapter 5 – Sraffian and Marxian approaches to competition

5.1. Introduction

This chapter analyzes some of the most well-known Sraffian and Marxian interpretations of competition. It is argued that there are important convergences between the approach developed in this dissertation and Anwar Shaikh's real competition analysis, and that both approaches are in direct opposition to Monopoly Capital School's interpretation that it has occurred a demise of capitalist competition, invalidating the law of value developed by the classical economists and Marx.

The next section emphasizes that the classical approach, differently from the marginalist one, does not need to postulate any specific firm behavior. It is proposed, however, a methodological connection between Sraffa's initial search for a representative firm in the 1920's and the technological assumptions from the *Production of Commodities by Means of Commodities* (1960).

The third section critically evaluates Clifton's influential articles that contributed to the diffusion of the misleading idea that the Sraffian framework is incapable of addressing situations of limited capital mobility.

The fourth section briefly discusses the Monopoly Capital School's thesis that transformations occurred since the second half of the nineteenth century in markets' configurations undermined the analyses of the classical economists and Marx regarding the determination of prices and profits. It is suggested that this reasoning has some of its roots in a debate between Rudolf Hilferding and Eugen von Böhm-Bawerk, in which the Marxist author refrained from defending Marx's theory of value from an analytical point of view.

The fifth section traces the theoretical origins of the interpretation presented in this work. It is underlined that Sraffa's book sparked a renewed interest in the works of the classical political economists and Marx. We suggest that that the reevaluation of conception of competition of the classical economists and Marx was a consequence of the efforts to reinterpret the history of economic thought and to formulate the theory of value in a more consistent, analytical, and formalized manner.

The sixth section posits a theoretical convergence between the Sraffian concept of dominant technique and Shaikh's concept of regulating capitals, asserting that it is

possible to stablish the validity of long-period equilibrium prices while accounting for persistent intra-industry, inter-industry and inter-firm profitability differentials.

The seventh section distinguishes between institutional and endogenous barriers to capital mobility. It is argued that the former are exogenously created by the State and connected to monopoly prices, while the latter are created and regulated by capitalist competition and connected to natural or limit-prices. Finally, it is remarked that extraordinary profits are affected by socio-political factors, such as microeconomic policies.

5.2. Sraffa and the theory of the firm

In the neoclassical or marginalist approach, the firm plays a central role: it is defined as the locus of transformation of inputs into outputs under technological (production function) and economic (profit maximization) constraints. Following this notion, it is possible to create a functional relation between price and quantity produced for the individual firm (the firm's supply curve). By aggregating all firms supply curves, we arrive at the industry's supply curve, which determines, together with the demand curve, the equilibrium price and quantity. As Penrose (1959, pp. 9-10) has perfectly put it, the neoclassical theory of the firm "[…] was constructed for the purpose of assisting in the theoretical investigation of one of the central problems of economic analysis - the way in which prices and the allocation of resources among different uses are determined. It is but part of the wider theory of value, indeed one of its supporting pillars […]".

On the other hand, the concept[208] of the firm is completely absent from the classical theory of prices. For this reason, it was avoided along this dissertation the use of the word "firm" while presenting the classical perspective. The participants of the competitive process were characterized as "producers" or "competitors". It was argued that the costs of production of each producer depended on the technique in use, while the determination of the long-period equilibrium price depended on the costs of production associated with the dominant technique.

[208] Adam Smith, for example, emphasized the effects of the division of labor (which is not necessarily restricted to the interior of the firm, but frequently includes it) over productivity. Karl Marx, for his part, wrote extensively about the working conditions in the factories and the industrial transformations that occurred in the 19th century. They did not define, however, the firm as a specific object of study.

As it is well known, Alfred Marshall examined the firm in two main dimensions: i) an abstract one, associated with the representative firm, aiming at the construction of partial equilibrium on purely logical grounds; ii) a more realistic one, discussing the evolution of firms and combining theory with historical and institutional knowledge[209]. In the 1926 article, Sraffa pursued a Marshallian approach not only theoretically but also methodologically, discussing in the first part of the text the necessary conditions for guaranteeing the logical consistency of partial equilibrium, while reserving the second part to address the more realistic aspects of competition. However, as discussed before, he gave up pursuing this path and took a radical theoretical turn that culminated in the *Production of Commodities.*

Even though Sraffa did not really discuss the concept of the firm after his intervention in the Symposium *Increasing Returns and the Representative Firm* in March 1930, we can make an effort to interpret some aspects of this particular subject from a Sraffian standpoint: the notion of a dominant technique can be considered, from a methodological point of view, as the outcome of the author's search for a representative firm in the 1920s. Both concepts are conceptual tools to determine, at the sphere of pure theory**,** long-period normal profits and prices (even though, as we have repeatedly stressed, the analytical structure of both analyses are radically distinct).

While discussing Sylos-Labini's contribution, we have associated units of production with different methods of production techniques (inferior, dominant and superior). Following this simplified[210] reasoning, a firm[211] that operates several plants

[209] Those two approaches to the theory of the firm influenced different lines of research: i) Pigou (1927, 1928) and Viner (1931) developed the argument that all firms are in equilibrium and operate at the lowest point of the U-shaped average cost curve. These authors sought to eliminate the inconsistencies and contradictions underlying Marshall's analysis by simply ignoring many of the more realistic aspects of it, resorting to the axiomatic method. Unfortunately, almost all microeconomics textbooks begin their exposition from where Pigou and Viner left off; ii) The evolutionary theories of the firm (Post-Marshallian, Penrosian/Resource-based view, Neo-Schumpeterian, Institutionalist) that find some shelter in the fields of Industrial Organization, History of Economic Thought and Methodology.

[210] It is a simplification because the entire chain of a commodity (which is what a method represents) may not be restricted to a single plant, particularly when distribution and selling activities are included.

[211] As Glick and Ochoa (1988, pp. 1-2, pp. 25-27) pointed out, many empirical studies that criticized the tendency towards profit rate equalization present evidences at the firm level, misunderstanding what the classical (or even the original neoclassical) propositions actually were. In the classical political economy, there is a long-period tendency towards uniform profit rates between *industries*, but not between firms. The empirical literature (from both the orthodoxy and heterodoxy) is dominated by the notion of perfect competition as the benchmark of competition (Shaikh, 2016, p. 367).

(multi-plant) and/or produces different commodities (multi-product), receives a series of income streams arising from the markets it operates.

Companies make decisions to preserve or to capture a larger market share, to enter in new markets (diversification) or even to create a novel one through radical product innovation. Additionally, the acquisition or development of better methods of production reduces costs and increases the premium between the price associated with the dominant technique and the producer's cost. All these business practices, however, operate in disequilibrium, which is the appropriate logical domain for a realistic theory of the firm.

5.3. Clifton's competition analysis

In his famous article, Clifton (1977) defended that the alternative proposed by Piero Sraffa to the model of perfect competition was not in the second part of the article from 1926 but in the *Production of Commodities by Means of Commodities*. He also argued that Sraffa's system of equations, which assumed a uniform rate of profit, represented a situation of free capital mobility (Clifton, 1977, p. 138).

Clifton explained clearly that the classical conception of competition was structured around the idea of capital mobility. He contrasted the situation of free capital mobility conceived by the classical political economists with the neoclassical model of perfect competition, which requires the additional hypothesis of atomism. Clifton also rejected the models of oligopoly, imperfect competition and 'degree of monopoly', which he associated with the neoclassical price theory (Clifton, 1977, p. 137, pp. 142-143). All these remarks deeply influenced this dissertation.

There is, however, a more controversial aspect of such article, which reappeared in a later article from 1983, that concerns the thesis that historically "[…] the adjustment mechanism tending to produce a uniform rate of profit throughout the economy becomes stronger, not weaker, with capitalist development" (Clifton, 1977, p. 145). The author particularly emphasized the technological transformations in communications and the means of transportation that were taking place in the 1970s – which now we identify as part of the Third Industrial Revolution – and their effects on the organization of markets and firms (Clifton, 1977, p. 144).

These advances enabled the big corporations (multi-plant, multi-product and multinational companies) to rearrange their internal structure and to adjust production their more rapidly. They also channeled the flow of internal funds towards the best investment opportunities, reducing their dependency on the banking system. In this way, competition has become increasingly characterized by the confrontation of large financial conglomerates, increasing the control of finance over production (Clifton, 1977, pp. 144-147; 1983, p. 36).

According to Clifton (1977, p. 147), the industrial and geographical diversification of Big Business have made capital "less" fixed, as the companies operating in multiple markets could quickly reorient production and revise their investment plans, speeding quantity responses. In essence, Clifton thought that the abovementioned process exacerbated global capital mobility, in such a way that the hypothesis of free capital mobility would be the best approximation to the real world. Consequently, the competitive adjustments underlying Sraffa's price system would be currently operated by the diversified multinational firms (Clifton, 1977, p. 138, pp. 146-147, pp. 149-150).

5.4. The alleged obsolescence of the law of value

The proposition that the assumptions and results of the classical theory of value are confirmed by the capitalist mode of production becoming more competitive with capitalist development (Clifton, 1977, p. 138; 1983, p. 29) is diametrically opposed to the main thesis of the Monopoly Capital School[212]. According to this Marxian strand, the technological, organizational and institutional changes occurred in the second half of the nineteenth century produced a shift from the competitive to the monopolist phase or stage of capitalism, undermining the central aspects from the analyses of the classical economists and Marx regarding the determination of prices and profits.

[212] Authors such as Shaikh (1978, 1980, 1982), Semmler (1981), Weeks (1981, ch. 6) and Possas (1989) tried to revitalize Marx's original conception of competition, being critical to the monopoly capitalism school and the notion of competition associated with it.

5.4.1. Monopoly capital and Industrial Organization theory

Karl Marx was deeply interested in the organization of industry, having studied and written at length about organizational and technological innovations (Rosenberg, 1976). He also discussed the growing size of industrial plants and the increasing market share in the hands of few producers (Marx called these processes as concentration of capital and centralization of capital, respectively).

Some neo-Marxian authors considered, however, that Marx's original analysis of competition was unable to explain the transformations that took place in the most advanced capitalist countries, such as the appearance of cartels and the association between industrial and banking capitals (most notably in Germany and later in Japan), the association of capitals through mergers, trusts and collusive practices, the ascent of modern corporation and the role played by the stock market in financing investment (as it was the case of the US).

The first author to discuss these issues was Rudolf Hilferding with his famous book "Finance Capital" (*Das Finanzkapital*), published in German in 1910. Lenin (1917) and Bukharin (1917) attempted to integrate the processes of internationalization of capital and the higher market concentration into their theories of imperialism. Other authors influenced by the Marxist tradition, such as Maurice Dobb, Michal Kalecki, Josef Steindl[213], Oskar Lange and John Bellamy Foster, were also concerned with the effects of the industrial transformations over competition, income distribution and economic growth.

It was the book M*onopoly Capital: An Essay on the American Economic and Social Order* (1966), written by Paul Baran and Paul Sweezy, by that time already respected scholars and frequent writers of the socialist independent magazine Monthly Review, that probably had the stronger influence on heterodox and left-wing circles. In a nutshell, Baran and Sweezy argued that the monopoly capitalism constituted a new phase or stage of this mode of production, so that two of the laws identified by Marx in the nineteenth century – the uniformity of the rate of profit (an important piece of his law of value) and the tendency of the rate of profit to fall – did no longer hold. They argued, instead, that the continuous introduction of innovations and the prevalence of

[213] Even though we have made an effort to reinterpret Steindl's microeconomic contributions from a classical perspective in 4.2.1, we acknowledge that there are also elements in his work that are compatible with this neo-Marxian view.

monopoly had produced a rising (rather than a declining) surplus and the generalization of extraordinary profits.

With regards to the theory of value, Baran and Sweezy argued that the increased concentration and appearance of giant corporations eliminated the connection between prices and costs. Furthermore, the source of monopoly profits was the restriction of output by such companies:

> *[…] with commodities being priced not according to their cost of production but to yield maximum possible profit*, the principle of *quid pro quo* turns into the opposite of a promoter of rational economic organization and instead becomes a formula for *maintaining scarcity* in the midst of potential plenty." (Baran and Sweezy, 1966, p. 337, emphasis added)

The generalization of monopoly[214] would have made the classical [sic] and neoclassical theory of monopoly more appropriate to analyze this new phase or stage of capitalism:

> "[…] it means that the appropriate general price theory for an economy dominated by such corporations is the traditional monopoly price theory of classical and neo-classical economics. What economists have hithertho treated as a special case turns out to be, under conditions of monopoly capitalism, the general case" (Baran and Sweezy, 1966, p. 59)

Baran and Sweezy's book covered a wide range of social and economic subjects, combined micro and macroeconomic theories and blended contributions from several heterodox giants such as Marx, Veblen, Schumpeter, Keynes, Kalecki and Steindl with the marginalist theory. In this way, their exposition was different from what was expected from a regular work in Industrial Economics. Keith Cowling (1982) attempted to fill this gap with a more careful detailing of the theoretical and empirical aspects of the Monopoly Capitalism thesis, as well with responses to some criticisms.

Davies and Lyons (1989, pp. 16-19) produced one of the few textbooks that included the Monopoly Capital School[215] as one of the approaches to industrial

[214] It should be remarked, however, that the meaning attributed by Baran and Sweezy to the concept of 'monopoly' is closely related to the traditional concept of "oligopoly": "Throughout this book, except where the context clearly indicates otherwise, we use the term 'monopoly' to include not only the case of a single seller of a commodity for which there are no substitutes, but also the much more common case of 'oligopoly', i.e., a few sellers dominating the markets for products which are more or less satisfactory substitutes for one another" (Baran and Sweezy, 1966, p. 6). In chapter 3, the authors reinforced that the typical corporation was not monopolist in the traditional sense but "one of several corporations producing commodities which are more or less adequate substitutes for each other" (Baran and Sweezy, 1966, pp. 57-58). Thus, from the microeconomic point of view, their theoretical approach could well be considered as a marxo-marginalist one.

organization, even though they characterized it as radical[216]. The reason for this adjective was not because of the authors' recrimination of industrial concentration, which was a common concern to the mainstream of Industrial Organization theory (SCP paradigm) and the policy makers at that time, but probably because of the method of analysis and exposition chosen by the authors (and also maybe their ideological orientation).

5.4.2. The debate between Hilferding and Böhm-Bawerk

To understand the dominancy of this view of competition and the role attributed to the law of value in Neo-Marxian approaches, it is worth revisiting an old debate between Eugen von Böhm-Bawerk and Rudolf Hilferding.

The critiques from Böhm-Bawerk (*Capital and Interest*, 1884; *Karl Marx and the Close of His System*, 1896) to Marx's *Capital* specially targeted the labor theory of value not only because the Austrian author despised its "heretical" nature but also because he identified analytical fragilities in it (such as the fact that the determination of aggregate surplus could not suppose that wage goods were sold at their "values" instead of their "prices of production") (Garegnani, 2018, pp. 12-14).

Böhm-Bawerk imagined that, if the labor theory of value was refuted, Marx's whole formulation would then fall apart. In his reply, Hilferding (*Böhm-Bawerk's Criticism of Marx*, 1904) unfortunately "took Böhm-Bawerk's bait", not only accepting but also emphasizing the centrality of the labor theory of value in Marx's work. The main problem was that Hilferding was not capable of convincingly defend Marx's labor theory of value on its true ground, that is, the determination of the rate of profit and of relative prices. Instead, Hilferding attributed ulterior meanings to Marx's "values". He stablished necessary connections between the measurement of the value in terms of embodied labor and the characterization of commodities as "social things" – in opposition to bourgeois economists who considered it as "natural things" – as well as

[215] For a critique of the neo-Marxian Monopoly Capitalism School's view on competition, see Shaikh (2016, pp. 353-356).

[216] This characterization does not imply any demerit, as the Monopoly Capital school or Monthly Review school is often categorized as "Radical" as an abbreviation of "radical political economy" (Jo, Chester and D'Ippoliti, 2017, p. 5; Pietrykowski, 2003, p. 80).

with the understanding of the laws of motion of society (Hilferding, 1904, p. 130, pp. 132-133; Garegnani, 2018, pp. 14-17).

Hilferding's reply was very influential within the working-class movement[217]. Among the possible reasons for such a good reception, we can cite that his text was originally written in German – the language of the most important Marxist party at that time, the greater familiarity of intellectuals sympathetic to this movement with sociological and/or philosophical arguments than with strict economic theory and the fact that Hilferding became a renowned Marxist author after the publication of *Das Finanzkapital* (Garegnani and Petri, 1989, pp. 442-443; Garegnani, 2018, p. 3).

From then on, the labor theory of value unfortunately "took on a life of its own" along the Marxist tradition, being associated with subjects quite different from the ones discussed by Smith, Ricardo and even Marx. The authors which, on the other hand, perceived the theory of value as an analytical tool to determine the rate of profit and relative prices and faced the problem of transformation – such as Bortkiewicz and Dmitriev –, had very little influence on dominant Marxism (Garegnani, 2018, p. 3; Semmler, 1984a, p. 4).

5.5. The rehabilitation of the theory of the classical economists and Marx

It would not be entirely fair, however, to blame Hilferding for the transfiguration of Marx's economic analysis. At that time, the link between the classical economists and Marx was totally blurred. David Ricardo's theoretical effort was not truly recognized and understood. The edited version of Marx's *Theories of Surplus Value* – a book that indicated a line of continuity between the classical economists and Marx – was not published by Kautsky until 1905-1910. Marginalism was already hegemonic in academic circles, reducing opportunities for those wishing to study different approaches (Garegnani, 2018, p. 14; Garegnani and Petri, 1989, pp. 442-443). These aspects provide us some clues why Hilferding chose to emphasize the new elements contained in Marx's formulation of the labor theory of value instead of looking for analytical resemblances with precedent authors.

[217] Hilferding's approach of the labor theory of value contributed to temporarily preserve Marxist hegemony inside the working-class movement. However, his refusal to dispute on the strict economic theory ground "[…] left the field open to a hegemony of the marginalist theories outside the working-class movement, and thus to a long-run influence of these theories also within that movement" (Garegnani, 2018, p. 15).

Be that as it may, the authors who did not believe in the obsolescence of Marx's theoretical framework and tried to solve the transformation of values into production prices, like Dmitriev (1898), Bortkiewicz (1907)[218], Shibata (1933), Winternitz (1948) and Seton (1957), were far less known in academic circles and even within the Marxist tradition. It was only after Sraffa's *Production of Commodities by Means of Commodities* was published, stimulating debates in prestigious economic journals, that these Marxian works started to attract more intellectual interest (Semmler, 1984a, pp. 4-5; Daou Lucas, 2017, p. 650).

Sraffa's efforts to reclaim the scientific status of classical political economy produced a renewed interest in developing Marx's propositions in a more analytic and formalized way, particularly as a defensive mechanism to the "crisis" regarding the validity of the theories of labor value and exploitation. Several authors[219], such as Brody (1970), Abraham-Frois and Berrebi (1976), Fujimori (1981) and Shaikh (1977, 1978) made efforts to rehabilitate Marx's value theory (Garegnani and Petri, 1989, pp. 436-437, p. 453; Semmler, 1984a, p. 5, p. 9).

We have previously discussed that the contributions to the classical conception of competition in the Industrial Organization literature are scattered through different periods and streams of thought. In the more recent literature about Political Economy, however, the recovery of the classical conception of competition was more concentrated in time, being stimulated by four main non-exclusive concerns:

i) The attempt to reclaim the conception of competition underlying the classical theories of value and distribution, contributing to the broader project of reinterpretation of the history of economic thought initiated by Sraffa (1951, 1960). It is part of an effort to construct a logical coherent alternative body of theory, purging the marginalist theoretical elements (there including their treatment of competition) (Clifton, 1977; Roncaglia, 1978; Arena, 1979; Eatwell, 1982);

ii) The methodological change that the marginalist theory underwent with the transition from the long period to the temporary and intertemporal general equilibrium

[218] Paradoxically, Paul Sweezy both contributed to the divulgation of Bortkiewicz's work in *The Theory of Capitalist Development* (1942) and to the Monopoly Capital approach with his book written in co-authorship with Paul Baran, *Monopoly Capital: An Essay on the American Economic and Social Order* (1966).

[219] For a critical review of the new contributions to the transformation problem, see Daou Lucas and Serrano (2018).

models (Garegnani, 1976[220]; Milgate, 1979; Petri, 2004). In this theoretical movement, the notion of equilibrium and the associated conception of competition were intellectual mutants at the service of marginalist pure theory (Eatwell, 1982);

iii) The role played by the conception of competition in the theories of value and distribution developed by the classical economists and Marx. In particular, the opposition to the monopoly capitalism school's view of the competitive process (Clifton, 1977; Shaikh, 1978, 1980; Semmler, 1981; Weeks, 1981).

iv) At last, it is worth stressing that the recovery of the conception of competition of the classical economists and Marx was originated not only from a purely history of economic thought's curiosity. It was also a by-product of the attempts from both Sraffians and Marxians to model the gravitation of market prices around long-period prices (*e.g*. Steedman, 1984; Garegnani, 1990a; Semmler, 1984b; Duménil and Lévy, 1987).

5.6. Mobility of capital and gravitation

As we have discussed in the chapter 1, long-period relative prices are determined by a particular subset of techniques (the dominant techniques of *basic goods*) plus an exogenous distributive variable and the convergence of market prices towards equilibrium positions depends on the process of gravitation. Our approach bears close resemblances to Anwar Shaikh's[221] classical-Marxian theory of real competition, which considers that:

[220] It is worth acknowledging that Pierangelo Garegnani is an essential theoretical reference for this dissertation. In chapter 3, it was attempted to show that the shift in the notions of equilibrium and competition from general equilibrium analysis originally identified by Garegnani (1976) spilled over to Industrial Organization theory. In chapter 1, it was presented the representation of the process of gravitation introduced by Garegnani (1983) and, in chapter 4, it was proposed the incorporation of the notion of barriers to entry into this framework. In the next chapter, we will draw on Garegnani's (1984) analytical schematization between dependent and independent variables and his definition of the 'core' of the classical framework.

[221] The initial discussion of competition by Shaikh (1978, 1980a, 1982) seems to have two main objectives: i) reclaiming Marx's conception of competition, moving away from the interpretation of the Marxian school of Monopoly Capitalism, which was closely related to neoclassical economics; ii) arguing that mechanization was the dominant form of technical progress in the capitalist system. Shaikh draws on this capital-intensive bias of technical change to defend the tendency for the rate of profit to fall. The joint treatment of these two complex themes have generated misunderstandings within the literature - as Shaikh (1980a, p. 83) himself once acknowledged.

> "[…] at any moment of time within any given industry, there are a set of capitals representing the *best generally reproducible condition of production* in that industry […] Reproducibility is important because new investment must be able to replicate the conditions of these particular capitals. The profit rates of these *regulating capitals* will be the focus of new investment. When these profit rates are higher than those of regulating capitals in other industries, new investment into the industry will accelerate, and when their profit rates are lower, new investment will decelerate." (Shaikh, 2016, p. 265, emphasis in original)

Gravitation is thus a long-period tendential process that is operated mainly by new capital flows, as already materialized capital goods have a low degree of mobility (Ciccone, 1986, 2011; Garegnani, 1990a, 1992). It is considered that capital accumulation occurs predominantly in the best generally reproducible conditions of production or dominant techniques. Inferior techniques will hardly[222] attract investments, as they generate sub-normal profit rates, but can still coexist with more efficient techniques - following Joan Robinson (1962, p. 50) we could call them "fossils". Superior techniques are actively searched by innovative producers. Once obtained, they reward extraordinary earnings to their owners (contributing to the disequalization of profit rates), who tend to use all the means at their reach to prevent the diffusion of such methods[223].

Shaikh's interpretation of the Sraffian view on competition seems more influenced by the latter objective, as he associates it with the Okishio Theorem. According to the author, the assumptions of price-taking behavior, uniform profitability and absence of fixed capital underlying the Okishio Theorem's leads to mistaken conclusions about the effect of technical change on the rate of profit. For a critical evaluation of Shaikh's analysis of the choice of techniques, see Roos (2019, ch. 1).

[222] Some investments in inferior techniques can be expected from financially constrained producers that cannot purchase the means of production associated with the dominant technique. These actions can be advantageous as long as the rate of profit is sufficiently above the rate of return of standard low-risk financial assets (government bonds, for example).

[223] Letferis Tsoulfidis and Persefoni Tsaliki, followers of Shaikh's theory of real competition, exposed this reasoning in a crystal-clear way: "… new capitals are expected to enter into an industry with the method of production or technology of the marginal or regulating capital, which can be easily emulated, and, at the same time, the anticipated rate of profit is high enough. In fact, the regulating capital of each industry is a concept similar to what business people and also input-output economists call 'the best-practice method of production', which is not necessarily the top method or the worst but rather the one that makes the returns on investment worth taking. More specifically, new competitors, by and large, aim at the most up-to-date available production conditions (or plants) in the industry and not the outdated or those of top efficiency. The outdated production methods, other things equal, display profitability lower than the average, whereas the most profitable methods of production may not be easily duplicated, or their reproduction may entail a certain degree of risk, thereby discouraging potential new entrants." (Tsoulfidis and Tsaliki, 2019, p. 232).

This approach to competition rejects the standard view that extraordinary profits stem from the producers' ability of collectively withhold output, creating an "artificial" scarcity or shortage. From a classical perspective, it is perfectly possible to explain the existence of extraordinary, supernormal or "pure" profits in a market where effective demand is fully met by producers (the market is not continuously undersupplied). In this case, the price does not differ from the situation in which all the producers have access to the same method of production (a possible representation of "free competition"). The main difference between these two situations is the way the economic surplus is distributed among the different capitals. In a complete absence of competitive asymmetries, the profits are divided in an equative way. In the presence of such asymmetries, producers with persistent cost advantages (disadvantages) will earn profit rates higher (lower) than the general profit rate associated with the dominant technique. Extraordinary earnings are thus explained by the coexistence of techniques rather than by the existence of producers with market or monopoly power.

It is true that the price *could* be lower if the superior technique was disseminated by means licensing, imitation, industrial espionage and/or other business actions, eventually becoming the new dominant technique. Nevertheless, in a given moment, it is the presence of competitive asymmetries - and not the fact that firms (with access to the *same* production function) hold significant market shares and restrain output - that explains the existence of most extraordinary earnings in capitalist economies.

Considering the pervasive existence of cost asymmetries among producers, there is a tendency towards a dispersion of profit rates both within each industry and across industries (as there is no reason for the asymmetries to be averaged out). Also, as firms can operate distinct methods of production in a single or in multiple markets, there is no reason to believe in a process of equalization of profit rates among them.

We can now return to reevaluate Clifton's (1977) main thesis. This author appropriately described the rearrangement of global industrial production brought by the internationalization of companies. It is true that this process certainly contributed to an increase in the *geographical* mobility of capital. Nevertheless, we cannot deduce from this that capital has become more mobile in an economic sense, because the mobility of capital refers not only to the possibility of capital migrating from one place to another but also the degree to which methods of production can be replicated by competitors.

In fact, the foreign direct investment made by the multinational corporations in some peripheral countries did not eliminate the technological gap in the world economy,

let alone the extraordinary earnings obtained by them. This can be explained by the fact that there are still many competitive weapons available to firms – industrial secrets, tacit knowledge, intellectual property rights, among others – which hinder the diffusion of superior techniques and enable the preservation of their competitive advantages.

In the Introduction of this work, we have reproduced a quote from David Ricardo in which the author acknowledges that the owner of improved machinery obtains extraordinary profits as long as its technical superiority persists. Ricardo considered that such abnormal profits tended to dissipate reasonably rapidly, unlike the rents of landlords, which stemmed from a non-reproducible natural resource. Nevertheless, over the past two centuries, a series of legal, institutional, and organizational mechanisms have been created (through initiatives of States and/or companies) to protect superior methods from imitation.

The prolonged duration of these extraordinary earnings does not alter, however, the validity of the reasoning developed by Ricardo, whose general logic remains relevant. It is worth stressing once again that, as long as there exists sufficient capital mobility within the dominant technique, the prices of production will remain as the center of gravity of the economic system. Thus, there is no intrinsic contradiction between the processes of centralization and concentration of capital described by Marx and the validity of the law of value (Shaikh, 2016, pp. 353-355).

In the first place, in a world of multiproduct firms, the absolute size and the share of a firm in a specific market cannot be taken as synonyms. Secondly, large plant sizes (due to the presence economies of scale) and high market concentration do not necessarily lead to supernormal profits. Thirdly, even if a greater amount of extraordinary earnings can indeed be verified, it does not necessary follow from this that prices have surpassed the limit level, as the most competitive producers can have cost advantages. Unfortunately, a great part of the literature about market or monopoly power does not adequately address one or more of these issues, leading to an almost tautological explanation of the firm's size and profitability (it is profitable because it is big and vice-versa).

It is worth making a distinction between *monopoly power* and *corporate power* (Semmler, 1984a, p. 8, pp. 191-193). Monopoly power has to do with a considerable control of the "relevant market" of a specific product. Corporate power, on the other hand, is not related to particular markets, but as power over production processes and relations, bargaining power in labor negotiations, lobbying to influence public policy,

mass media, the level of compliance to labor, environmental and tax legislations, among other things. Even though these elements are very important to understand the economic and political reality[224], they act under very different, specific and complex "transmission channels". In this way, the attempts to address several of these dimensions while referring to 'monopoly power' (a concept that has a very restrict meaning in neoclassical microeconomics) confounds more than explains.

Many concerns of the Monopoly Capitalism school, such as wealth and income inequality, anti-labor practices, increasing financial and political power of corporations, are thus worthy of consideration in contemporary capitalism (probably even more now, after many neoliberal reforms, than in the Golden Age period that the original *Monthly Review* authors wrote). The problem, however, lies in a certain nostalgia and yearning for an alleged competitive phase of capitalism that not only is unlikely to have historically existed but also that is theoretically dependent on the neoclassical notion of market perfection. In sum, despite the prophetic nature of such descriptions, the theoretical foundations of these authors' criticisms are fragile.

5.7. Monopoly prices, microeconomic policies and income distribution

From a classical view on competition, barriers to capital mobility can be of two general types: institutional (arising from government interventions) or endogenously created by capitalist competition (arising from business practices).

In the first case, a monopoly price is exogenously established[225]. Producers benefiting from institutional barriers do not have "monopoly power", but political

[224] Even though heterodox authors reject the harmonious view of capitalism portrayed by the orthodoxy, there is far from a consensus on what the main "transmission channels" of the social conflicts are. Sraffians, for example, emphasize the conflict regarding the distribution of the surplus among social classes. Neo-Kaleckians examine whether employment and output patterns of growth are harmoniously or disharmoniously aligned with income distribution (wage-led or profit-led). Marxists usually underscore the system's instability and susceptibility to crises (which seems to be also the case for many Keynesians) and the exploitation of labor by the property-owned class and/or of dependent countries by imperialist countries: the Monopoly Capitalism School occupies a peculiar stance, identifying the conflict at the sphere of circulation, considering an "exploitation of the consumer" or "competition as class struggle" (Salvadori and Signorino, 2010, p. 10).

[225] "A monopoly granted either to an individual or to a trading company has the same effect as a secret in trade or manufactures. The monopolists, by keeping the market constantly under-stocked, by never fully supplying the effectual demand, sell their commodities much above the natural price, and raise their emoluments, whether they consist in wages or profit, greatly above their natural rate. The price of monopoly is upon every occasion the highest which can be got" (Smith, 1776, p. 78)

power to influence the public policy that erects such barriers and maintain them as suppliers of such good or service.

Regulatory policies, for instance, exogenously define prices or rates of return of particular industries, in many cases above the competitive level. Public utilities (which are associated with essential basic commodities) are often sources of extraordinary earnings for enterprises - in many cases, formerly state-owned ones. Sir James Steuart (1767, ch. VIII) identified two sources of aggregate profits: transfer of wealth and appropriation of the social surplus. Privatization frequently involve both: a transfer of undervalued assets to the private sector and the entitlement to future extraordinary income streams.

Smith's opposition to mercantilist policies stemmed largely from his perception that super-normal profits reflected the connections of certain individuals or groups to power, rather than with virtuous economic practices. In this sense, we could say that many neoliberal policies, which grant concessions to markets with blockaded entry to private enterprises under a weak regulation of captured agencies, are much closer to mercantilism than to classical liberalism.

In the second type of entry barriers, the natural or limit-price, associated with the dominant technique, prevails. It determines the normal (or "competitive") level of profits, while extraordinary profits are associated with competitive advantages. It is important to recognize, however, that even extraordinary earnings created by private enterprises are affected by public policies. The laws of intellectual property rights, for example, affect the pace of technological diffusion. A superior technique that could otherwise be readily imitated can be safeguarded by a patent, thus shielding its extraordinary earnings for many years.

Antitrust policy consists of an even more direct intervention on the distribution of extraordinary earnings. A merger or acquisition between two more efficient (infra-marginal) firms can have important social and economic effects, even if the dominant conditions of production (and thus, prices) remain unaffected.

The notion that the absence of a potential price increase after a merger or acquisition takes place is sufficient to justify its approval is largely based on the view that the primary concern of antitrust policy should be limiting 'monopoly power'. After the deal is closed, there are usually lay-offs associated to the downsizing of overlapping/duplicated organizational structures, so that "efficiency" gains (cost

reductions/increases in extraordinary earnings) are achieved at the expense of employees.

So, unless there is a way to guarantee that the price will *decrease* after the deal is closed, the approval from the antitrust agency can lead not only to higher unemployment but also income inequality, even though it can be justified by industrial policy reasons (balance of payments effects, preservation of national sovereignty, etc.). These conflictive dimensions of antitrust policy, however, are usually kept away from the main body of antitrust economics (Viscusi *et al*., 2000; Motta, 2004).

The Sraffian literature about exhaustible resources (oil, iron, etc.) have long stressed the socio-political nature of economic rents (Parrinello, 2004; Ravagnani, 2006; Kurz and Salvadori, 2009; Fratini, 2009, 2013; Serrano, 2013; Fioritti, 2016; Roos, 2019). In this dissertation, we proposed a generalization of this classical treatment of competitive advantages for other industries, drawing on the suggestions from Serrano (1988, p. 71) and Schefold (1989, p. 203). We hold that the main the problem here is how extraordinary earnings are created (by active business practices and/or induced by policies) and distributed among the different social groups (social classes, at the most aggregated level). The State plays an essential role in administering such structures.

In mainstream economics, the Industrial Organization thought is dominated by the New Industrial Organization, but the Neo-Institutionalist, Public Choice and Austrian schools exert considerable influence. In the heterodox field, Neo-Marxians, Post-Keynesians and Kaleckians argue that the technological, organizational and institutional changes occurred since the late nineteenth century enlargement of plant sizes, increasing market concentration and firm sizes have weakened the forces of competition. These approaches owe much to neoclassical economics and, explicitly or implicitly, accept perfect competition as their touchstone (see Shaikh, 2016, pp. 328-329, 353-356).

The Sraffian approach, on the other hand, recognizes the existence of obstacles to capital mobility and the political nature of distributive variables and of some commodities, but at the same time emphasizes the role of the process of competition in disciplining prices and producing orderly market outcomes. It is believed that this theoretical perspective has much yet to contribute to the discussion about 'microeconomic' policies, whose derivations can be obtained in a rather straightforward way from Sraffa's original contribution.

In the modern classical theory, that long-period price determination depends on the existence of sufficient capital mobility within the dominant techniques or regulating capitals (Shaikh, 2016, p. 265), while market concentration is practically irrelevant. The rationale shifts significantly with regards to the aggregate distribution of income.

Sraffa's framework defines the normal rate of profit associated with the dominant technique, but the average rate of profit also depends on the composition of techniques (inferior, dominant and superior) - incorporated in capital goods of different vintages (Salter, 1966), that is, from distinct types of technologies and ages (Roncaglia, 1978, pp. 27-28; Eatwell, 1987, p. 599; Schefold, 1997, pp. 159-160). Thus, the pace of technological diffusion of superior techniques can have a substantial impact on inequality over time. Also, even assuming a particular distribution of techniques (given cost asymmetries), changes in market shares of producers can alter the amount of extraordinary earnings.

As the behavior of firms can affect both parameters, it seems that the attainment of a realistic theory of the firm (and not only a "representative" one) is crucial to explain the evolution of aggregate income distribution, a theme which is very dear to the Sraffian tradition.

5.8. Concluding remarks

The modern classical economics argues for the tendency towards the formation of a uniform profit rate and the validity of the classical theory of production prices while at the same time acknowledging the existence of persistent dispersion of profit rates between industries, within industries and among firms. The reason behind this apparent paradox lies in the fact that the uniformization of the profit rate occurs within a subset of production techniques: the dominant method or regulating capitals. It is contended that the existence of enough capital mobility within dominant methods is essential for the validity of the process of gravitation.

There are, however, commodities which are not regulated by competition. These are the cases of monopoly prices, which are strictly politically determined. These prices do not correspond to the marginalist model of monopoly (single producer profit maximization), given that there are no supply and demand curves. But there is also no classical process of gravitation, as the price is determined exogenously.

At last, it is emphasized that microeconomic interventions, such as regulatory and antitrust policies, as well as direct involvement in public utilities and other essential basic commodities through state-owned companies (electricity generation and distribution, oil and its derivatives, transportation, water distribution, etc.) can affect prices and income distribution.

Chapter 6 – 'Dynamic' aspects of competition and the classical theory

6.1. Introduction

The classical (or surplus) approach carried out by Sraffa and his followers has two main contributions to economic theory: i) it questions the internal logic of the marginalist apparatus, providing strong arguments in favor of a complete abandonment of this research program; ii) it provides an alternative inter-sectorial theoretical framework for determining systemic prices and normal distributive variables, explaining the orderly (although not necessarily efficient or "optimal") outcomes achieved by market processes.

Even though the scope of Sraffa's original analysis was relatively narrow, the research program that followed him made use of different tools of analysis and levels of abstraction to deal with other issues, while preserving a certain degree of integration and coherence. In this chapter, we explore the convergence between the classical theory of value and distribution and other heterodox contributions, especially the neo-Schumpeterian/Kaldorian views of technological progress and productivity growth.

The next section presents the concept proposed by Pierangelo Garegnani of the 'core', regarding the relationships between independent and dependent variables of the surplus approach. It is also discussed Sraffa's methodological approach, which considers equilibrium analysis as an important preliminary step toward the construction of a coherent and logically sound theoretical framework. At last, it is argued that now that the Sraffian theoretical building has been erected and solidified, the classical framework can serve as a microeconomic baseline for analyses outside of the 'core'.

The third section provides a critical evaluates the dichotomy between statics versus dynamics (or equilibrium versus disequilibrium) as the sole criterion to assess the different treatments of competition. It is argued that this wide-ranging methodological demarcation is unable to identify: i) the dissimilar nature of classical and marginalist notions of equilibrium; ii) the changes in the notion of equilibrium within the orthodox tradition, and how these notions of equilibrium are intertwined with certain conceptions of competition; iii) the differences between the textbook microeconomic theory and the frontier of Industrial Organization theory, which has incorporated some dynamic aspects of competition and exerts considerable influence on

the discussions about “microeconomic” policies; iv) the theoretical differences between the alleged ‘dynamic’ approaches.

The fourth section introduces the Neo-Schumpeterian approach, which rejects the most basic theoretical and methodological foundations of the neoclassical microeconomics and seeks to build an alternative framework by drawing upon a diverse array of influences. It is believed that this approach has produced the most compelling theoretical development in recent Industrial Organization literature.

The fifth section holds that the conception of competition as capital mobility is flexible enough to encompass both static and dynamic dimensions of competition, so that some theoretical elements from the Industrial Organization literature can enhance the classical understanding of markets and contribute to the development of a more coherent microeconomic framework.

The sixth section explores some possible analyses outside the ‘core’. It is argued that one of the most robust empirical regularities in the economic science - the Engel's Law - is convergent with the classical conception of demand. The assumption of a given state of technology is dropped and the intra-firm, intra-industry, inter-industry and systemic dimensions of technological progress pointed out by the Neo-Schumpeterian approach are emphasized. Additionally, the Kaldorian explanation of productivity growth, which combines a demand-led macroeconomic theory with a sophisticated view of supply, is presented.

The seventh section maintains that the theoretical contributions defended in this chapter are compatible with the classical framework, explaining changes in the independent variables, as well as feedbacks between dependent and independent variables and interactions among independent variables. It is claimed that the separation of the analysis into distinct logical stages provides a greater flexibility for developing complementary deductive and inductive investigations, while maintaining a coherence with the larger body of theory.

6.2. Going beyond the ‘core’

As we have discussed in chapter 1, the classical theories of value and distribution take as given (Garegnani, 1960, Part I, ch. 1; Eatwell, 1977, p. 62):

i) the techniques of production;

ii) a distributive variable;

iii) the level of the social product;

iv) the composition of the social product.

Garegnani (1984, pp. 292-294) proposed that the 'core' of the surplus approach consists of determining the dependent variables (*i.e.*, relative prices and the residual distributive variable) taking i-iv as data, while discussions involving changes in these independent variables, feedbacks between dependent and independent variables and interactions among independent variables are left to be explained by analyses outside the 'core'.

Even though Sraffa's followers often refer to their approach as *classical*, they do not wish to reclaim the whole theoretical structure of this tradition of thought, but rather a particular aspect of it: the theories *of value and distribution.* Garegnani's (1984, pp. 292-294) distinction between analyses inside and outside the 'core' reflects this reduced scope of the reinterpretation of the classicals (Kurz and Salvadori, 2008, pp. 1-2; Petri, 2021, pp. 71-73).

Considering the enormous challenges faced by Sraffa in his more than three decades journey towards the *Production of Commodities by Means of Commodities* (1960)[226], many simplifying assumptions were required for the exposure of his main arguments. He adopted a similar position to Keynes (1936), who drew on assumptions he probably did not believe in (such as exogenous money supply and competitive markets) simply to ensure that the *General Theory* would be read by his orthodox peers and that the results obtained would not be attributed to 'frictions' (which, ironically, ended up happening anyway). In this sense, assuming the constancy of technology and the absence of competitive asymmetries constituted an expository strategy to demonstrate the complex and irregular relationships between income distribution and

[226] Among the theoretical contributions of Sraffa's *Production of Commodities by Means of Commodities* (1960), we can mention: i) The proposed solution to the "problem of value"; ii) The demonstration of an inverse relationship between the real wage and normal rate of profit (for given dominant methods operating at the normal degree of utilization and at a given level of social product); ii) The elucidation of the complex relationship between distributive variables and relative prices, arguing that while the classical theory remains practically unharmed, the marginalist theory is considerably impaired by it; iii) The construction of an invariable measure of value (standard commodity); iv) The discussion of joint production, fixed capital, and rent from natural resources within the classical framework; v) A reinterpretation of the history of economic thought in light of the notion of social surplus.

relative prices[227] and their effects on the choice between alternative methods of production.

Sraffa believed that a 'static' analysis constituted an essential preliminary step for the development of a consistent theory, rejecting the intellectual attitude of attempting to escape from unresolved problems by hastily heading towards dynamics:

> "It is 'a fatal mistake' of some economists that they believe that, by introducing complicated dynamic assumptions, they get nearer to the true reality […] the assumptions being too complicated it becomes impossible for the mind to grasp and dominate them - and thus it fails to realize the absurdity of the conclusions." (Sraffa, 1927, D3/12/11: 33)

If he had not pursued this project, many aspects of the classical theory would probably have remained obscured and submerged, just as the demand-side problems of neoclassical capital theory might have never been brought to light.

Furthermore, the subject matter delineated by Sraffa (1960) did not encompass, for instance, monetary or financial elements, well-known for their destabilizing effects, even within the neoclassical tradition (Wicksell, Schumpeter). The variables that most commonly exhibit unstable trajectories, both at the macro level (price levels, economic growth) and at the micro level (firms' profitabilities), do not have a direct connection to Sraffa's primary focus, namely *relative* prices[228] and income distribution, which are known to be empirically more stable[229].

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[227] Even though this aspect, as well as the process of market prices gravitating towards natural prices, can also be identified as 'turbulent' aspects of capitalism (Shaikh, 2016, p. 5), should one choose to follow the rhetoric of the theoretical superiority of 'dynamics' over 'statics'.

[228] The two main problems that can arise are: i) the absence of enough degree of persistence of independent variables; ii) path-dependent trajectories hindering the convergence towards equilibrium (see Crespo, 2008, pp. 127-138). It is worth noting that the phenomenon of path-dependency mentioned here has a fairly narrow analytical scope (gravitation towards the points of normal price-effective demand)Its subject matter differs, therefore, from much of the evolutionary literature (neo-Schumpeterian and institutionalist) regarding path-dependency, which typically deals with trajectories of technology and firms, which are, to a large extent, consistent with the classical view. Pierangelo Garegnani highlighted that the existence of normal positions requires persistence – but not constancy – of the determining forces (Garegnani, 1976, p. 28; Garegnani, 2002, p. 390). Also, "This […] has nothing to do with denying the possibility of sharp 'one-off' changes in those determinants (for example, an important invention), or with overlooking the long-term effects of the gradual changes […] the method of the normal positions has the precise purpose of studying the effects of such changes by comparisons of the position before and after the change" (Garegnani, 2002, p. 395).

[229] As Paul Samuelson pointed out, attributing a "dynamic" status to your own theory is a common exercise of rhetoric in Economics: "We damn another man's theory by terming it static, and advertise our own by calling it dynamic." (Samuelson, 1947, p. 311)

It is also important to emphasize that the classical economists considered that real economies were never actually in equilibrium. They believed in the existence of long-period trends, reflecting persistent determinants, that generated the observed regularities. Moreover, the *nature* of classical equilibrium was fundamentally different from the marginalist equilibrium. It did not aim to determine equilibrium quantities simultaneously with prices, it did not impose precise functional relationships on consumption and technology, it did not assume that companies reached an optimum size (equilibrium of the firm), and it did not imply full employment of labor (Garegnani, 1976, 1978; Serrano, 2003). It is the *nature* of the marginalist equilibrium (even more after the introduction of intertemporal method, but not only because of it) that makes so difficult for the orthodoxy to pursue realistic explanations of the economic system without renouncing to its 'core' (*i.e.*, deserting the research program).

Also, several orthodox and heterodox approaches are capable of constructing 'dynamic' analyses, investigating the trajectories of variables over time based on the introduction of certain changes (in parameters, independent variables, etc.). Thus, the choice between competing perspectives depends on theoretical aspects rather than purely methodological ones.

It is believed that now that the Sraffian theoretical building has been erected and solidified, certain "scaffolds" used in its construction can be removed. In this way, it is possible to go further and explore other important economic phenomena:

> "As far as Sraffa's model is concerned, the view has hithertho prevailed that it was necessary to develop first of all the implications of the pure model, deliberately avoiding other analytical developments – like the one concerning technical progress and growth – that would create dangers of confusion. As far as I was able to understand, Sraffa himself had an attitude of this type. I think that such an attitude, fully justified twenty or even ten years ago, now-a-days needs to be reconsidered; the conclusion will probably be reached that there is room for both kinds of analytical works […]" (Sylos-Labini, 1985, p. 66)

Assuming that the techniques of production, a distributive variable, the level and composition of the social product are exogenous variables does not imply that they are not susceptible to analytical investigation. It simply means that they do not possess mathematical properties with sufficient generality to be expressed in exact quantitative relationships, like those captured by the system of equations representing the 'core' (Garegnani, 1984, pp. 298-299; Mongiovi, 1996, p. 219).

Such logical separation follows a theoretical and methodological choice that some variables are better studied in isolation, to be subsequently integrated to the analysis. Only then, the main interrelationships between them are examined (Garegnani, 1984, pp. 296-297; Roncaglia, 1988, p. 160; Serrano, 1988, p. 25; Mongiovi, 1996, pp. 219-223). This goes beyond the separation between prices and quantities, including considerations about causality hierarchies and relative paces of change of economic variables so as to define which are deemed exogenous and which are determined endogenously (a problem that, in certain a way, every theory has to go through).

Precisely because this modern classical approach is less ambitious than the marginalist one, it has a higher degree of flexibility to incorporate other theoretical elements to explain changes in the independent variables. The Sraffian research program has thus advanced into subjects unexplored by the seminal *Production of Commodities* (1960), such as international trade, money and finance, economic growth and structural change, while preserving a considerable degree of coherence with its core. A comprehensive survey of the developments occurred within this tradition was provided by Aspromourgos (2004).

6.3. Equilibrium and disequilibrium analyses

It was suggested along this dissertation that there is an ever-present tension between the Classical and the Cournotian conceptions of competition and that the pendulum has swung a couple of times between these two views throughout the history of economic thought. Also, it was attempted to identify the classical and marginalist elements underlying Industrial Organization Theory, particularly with regard to the most known models of competition, and to situate this discussion in a more general picture of competing theories of value.

This interpretation follows a theoretical criterion rather than the usual methodological contrast between deduction and induction, theory and history or statics and dynamics (or equilibrium and disequilibrium). Schumpeter's distinction between the circular flow and the economic development triggered by creative destruction is probably the most iconic example of the latter contraposition.

This criterion is commonly found both in the heterodox literature – such as Marxian (Shaikh, 1982; Semmler, 1984a; Tsoulfidis and Tsaliki, 2019), Neo-

Schumpeterian (Possas, 2013), Neo-Austrian (Machovec, 1995; Blaug, 1997[230]; Mosca, 2005) and even Sraffian (Salvadori and Signorino, 2010) – and in the orthodox one – Machlup[231] (1959) provided a survey about the usages of these two concepts, there including important authors from the neoclassical tradition and, more recently, Vickers (1995, p. 3) compared[232] competition as states/situations to competition in the behavioral sense. Samuelson, however, has warned about the rhetoric use of such opposition, as the 'static' dimension is frequently employed in a pejorative manner:

> "Often in the writings of economists the words 'dynamic' and 'static' are used as nothing more than synonyms for good and bad, realistic and unrealistic, simple and complex. We damn another man's theory by terming it static, and advertise our own by calling it dynamic." (Samuelson, 1947, p. 311)

Even though there is nothing essentially wrong with this methodological demarcation, we believe that it is insufficient for reasons that will be elaborated henceforth.

6.3.1. The dissimilar nature of classical and marginalist notions of long-period equilibria

Both classical and marginalist theories initially approached their investigations of determining equilibrium prices at the systemic level. The explanation of prices at the level of partial equilibrium only emerged after Marshall formulated certain sets of restrictive assumptions. In the surplus approach, the discussion about particular

[230] Blaug (1997, pp. 79-80) rightfully dismisses the model of perfect competition, the theory of general equilibrium and the New Welfare Economics, but argues subsequently that the alternative is "the content of every chapter textbook on imperfect or monopolistic competition, on oligopoly, duopoly and monopoly" without assessing any of its fragilities. Blaug even ignored the critique developed by the tradition of thought which he follows that the models of imperfect or monopolistic competition preserve certain unrealistic assumptions of 'perfection', "particularly the assumptions that *at all times* a uniform price must rule for a given commodity throughout the market and that sellers know the shape of the demand curve" (Hayek, 1946, p. 362, emphasis in original). It also seems contradictory that the same Blaug that recognizes Cournot (1838) as the founder of the end-state conception of competition, defends the use of models that are ultimately derived from Cournot's work.

[231] Even though Fritz Machlup himself can be situated in a frontier between neoclassical and austrian economics.

[232] Although he later argued that both approaches were contemplated by the current industrial organization theory (Vickers, 1995, p. 18).

commodities appeared only when Sraffa (1960) addressed the cases of non-basic goods, whose prices depended exclusively on their costs of production.

Considering the complexity of their objects of study, considering a given state of technology and demand ('static' conditions) constituted a preliminary step towards the construction of their multi-market equilibrium analytical schemes. However, even though the classical and the marginalist theories of value and distribution were both conceived under static conditions, their conceptions of their independent variables (the meanings and descriptions attributed to technology and demand) were radically distinct, which affected the nature of their respective market equilibrium (Serrano, 2003).

It is the *nature* of the marginalist equilibrium, and not the equilibrium *per se*, that constitutes the main obstacle towards pursuing a more realistic economic theory. As the classical theory does not attempt to determine the equilibrium quantities simultaneously to prices, does not impose such restrictive characteristics to consumption and technology, does not postulate an equilibrium of the firm and does not derive so favorable conclusions about resources allocation - full employment - and social welfare, it has a higher degree of openness and flexibility to investigate the actual workings of firms and markets.

This remark holds significance as many criticisms of equilibria analyses assume, either explicitly or implicitly, that static theory is synonymous to neoclassical economics. In doing so, they reject together with the general equilibrium theory any possibility of constructing an explanation about relative prices. We assert that the problem is not to build (at least initially) a theory under static conditions, but in considering the orthodox theory as the most adequate manner to take this initial step. The transition from a classical equilibrium analysis to an exploration of structural changes and economic policies can be accomplished more seamlessly, although certain challenges may still persist.

6.3.2. The changes in the notion of equilibrium within the orthodox tradition

The original marginalist tradition followed the long-period method, considering that real economies were never actually in equilibrium[233], but that there were long-term

233 As it can be apprehended from a famous quote of the founder of General Equilibrium Theory "[…] the market is like a lake agitated by the wind, where the water is incessantly seeking its level without ever reaching it." (Walras, 1926, p. 380)

trends that caused variables to conform to normal levels. Thus, various marginalist authors investigated both macroeconomic aspects (business cycles, monetary factors) and microeconomic aspects (bargaining, product differentiation, innovation)[234] as phenomena of disequilibrium.

This started to change in the 1930s with the transition from Marshallian to axiomatic partial equilibrium analysis – and the new conception of the representative firm associated with it – and the beginning of a movement away from the long-period general equilibrium – initiated by the temporary general equilibrium models (Hayek, 1928; Lindahl, 1929; Hicks, 1939a) and completed by Arrow and Debreu's intertemporal general equilibrium models in the 1950's. The axiomatization of this period led to the reconfiguration of microeconomics textbooks, removing the particularities of theoretical expositions and institutional descriptions of each neoclassical school of thought in favor of the construction of a unified and standardized theory.

Only in the 1970s and 1980s, with the rise of the New Classical and the Real Business Cycles Schools, did this new conception of equilibrium spilled over to macroeconomics. With this new definitional concept of equilibrium, behaviors associated with disequilibria started to be regarded as a logical impossibility. Consequently, many processes that were previously considered as trajectories outside of equilibrium, such as business cycles, came to be characterized as processes of moving equilibria.

6.3.3. The differences between the textbook microeconomic theory and the frontier of Industrial Organization theory

Around the same period, there was a tremendous development of models representing situations of equilibrium (redefined by Nash and other refinements from Game Theory) or of disequilibrium in the New Industrial Organization theory. Modernized neoclassical oligopoly and imperfect competition models, along with new neoclassical theories of the firm, new institutional economics and Public Choice theory[235], as well as advanced econometric methods, experimental economics and

[234] See, for example, Mosca (2005).

[235] In macroeconomics, the rise of new schools of thought (Monetarist and New-Classical) led to a shift from full employment to contractionary economic policies. Regarding particular markets, the new schools

computer simulations, have enriched the toolbox of microeconomists. As the core of the neoclassical research program was taken over by the imperative of axiomatic microfoundations, the rules of correspondence with reality were pursued by the widening of the protective belt.

The common heterodox critique that the neoclassical competition models are 'static' (focused on finding equilibrium solutions) rather 'dynamic' (explaining market processes) thus have become somewhat anachronist: even though the textbook microeconomics remains static, the frontier of applied microeconomics/Industrial Organization considerably 'changed its face' (Colander *et al*., 2004), addressing many dynamic aspects of competition (sequential interactions between agents, incomplete information and contracts, product differentiation, innovation, etc.). This shift has exerted considerable influence on discussions surrounding 'microeconomic' policies (regulatory, antitrust, industrial, commercial, etc.) (Vickers, 1995, p. 18; Possas, 1997, pp. 15-17).

In this way, associating neoclassical treatment of competition with the perfect competition model, for example, can be considered by the orthodoxy as a 'straw man' argument and/or as evidence of heterodox economists' ignorance of the advances made in recent decades (demonstrating that their economics training is not sufficiently rigorous and up-to-date). It would be a herculean task for an individual scientist to keep up with the orthodox frontier while simultaneously advancing in heterodox microeconomic theory. We consider, however, that the evaluation of contemporary Industrial Organization theory is indeed a necessary task as a collective project of heterodoxy. This is important not only to conduct rigorous critiques but also as a way of avoiding uncritical incorporations of 'fashions' from this literature.

We think, however, that a part of such heterodox critique remains valid as long as the traditional neoclassical models continue to be taught and to guide the way of thinking of the economics profession[236]. Also, the analyses carried out in the protective

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of thought in Industrial Organization (Chicago School, Contestability Theory, New Institutional Economics and Public Choice theory) contributed to the wave of liberalizations, deregulations, and privatizations. As with regards to firms, the principal-agent theory focused on creating incentive mechanisms to ensure that managers always seek to maximize shareholder value (avoiding any form of cooperation between workers and managers or drives for production and growth, which would have been the behavior of Big Business during the Golden Age according to the managerial theories of the firm). In many developed countries, the 1980s marked the beginning of increasing inequality, both functional (reduction of the wage share) and of wages (increase in the wage range).

[236] In the specific case of perfect competition, although most orthodox economists acknowledge that the model does not represent real market situations (it lacks a positive character), its normative character

belt of the neoclassical research program cannot be fully independent of the core (otherwise it would lead to abandonment of that research program), so that specific analyses from different research programs (*i.e.*, based on different cores) may continue to be necessary.

6.3.4. The differences between approaches are not only methodological, but also theoretical

As we have discussed, there are important theoretical differences between the conceptions of competition, which ultimately stem from the distinct analytical structures of the classical and the marginalist theories of value and distribution. To only criticize the static nature of the neoclassical theory – as many neo-Marxian, post-Marshallian, neo-Austrian and neo-Schumpeterian authors do while advocating for more 'dynamic' approaches to competition – often presuppose, implicitly or explicitly, that under 'static' conditions the marginalist theory could be valid.

"Dynamic" elements can also be treated quite differently by competing theoretical perspectives. Neo-Schumpeterians, for example, argue that a realistic representation of innovation cannot be achieved without a complete methodological disruption with neoclassical economics (maximization, equilibrium, stylized markets, inadequate treatment of technology, etc.). Also, with the departure from the 'law' of diminishing returns, capitalist production can no longer be considered fundamentally constrained by supply, thus relying on the size of the market. The expansion of profitable (or effective) demand then becomes essential for growth, introducing Keynesian/Kaleckian elements into microeconomics (Sraffa, 1926, pp. 542-546; Kalecki, 1954, p. 91; Steindl, 1952, ch. 5; Guimarães, 1982, p. 12, p. 62; Dosi, 1984, p. 130).

Many of the "dynamic" contributions from post-Marshallian, neo-Austrian, and even neo-Schumpeterian authors are confined to the workings of firms and markets, not only being unable to account for inter-sectoral relationships[237], but also ignoring or even

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continues to be accepted, especially for its implications in terms of welfare analysis (through the twin theorems of Pareto). Criticisms of the normative content of perfect competition can be found in the Contestability, Neo-Schumpeterian, and Neo-Austrian theories.

[237] The inter-industrial dimension requires a systemic theoretical representation, as is the case with the classical framework (and the input-output model, derived from it) (Kurz and Salvadori, 2000, 2003, 2006).

rejecting heterodox macroeconomic determinants. Therefore, in order to encompass such distinct schools of economic thought, the characterization of "dynamics" needs to be so broadened that it ends up losing economic meaning.

Instead of a diluted methodological demarcation, we propose identifying some theoretical convergence points. Acknowledging the presence of pluralism within Industrial Organization, the intention is not to construct a unified theory but rather to seek common theoretical elements that are necessary (though not sufficient) for building an alternative microeconomic framework.

6.4. The Neo-Schumpeterian approach

Despite being contemporary with neoclassical schools of Industrial Organization and having contributed to the anti-structuralist revolution, the Neo-Schumpeterian approach was not discussed in the chapter 3. The reason for this is simple: instead of contributing to the development of the neoclassical research program, this school of thought criticizes its theoretical and methodological assumptions outright and seeks to reconstruct the microeconomic on different bases. In this section, we will outline the general characteristics of this theoretical perspective.

The Neo-Schumpeterian approach was initially developed by two non-rival groups. The first one, originated from Yale University (USA), had Richard Nelson and Sidney Winter as its main proponents. Their book *An evolutionary theory of economic change* (1982) was groundbreaking. The other intellectual source of Neo-Schumpeterian ideas is more difficult to be characterized as a homogeneous stream. Nevertheless, it can be traced back mainly to the Science Policy Research Unit (SPRU) of the University of Sussex (UK) and to the scholars such as Christopher Freeman, Carlota Perez, Keith Pavitt, Luc Soete and Giovanni Dosi (Possas, 1988, pp. 158-159).

The theoretical developments of this approach were possible only because the Neo-Schumpeterian authors benefited from many important contributions, such as Joseph Schumpeter’s notion of competition centered on innovation, Herbert Simon’s concept of procedural rationality, Nathan Rosenberg’s contributions on the history of technology, Alfred Chandler on business history, Edith Penrose’s conception of the firm as a collection of intangible assets and Karl Polanyi’s concept of tacit knowledge. Also,

Thorstein Veblen and Alfred Marshall's[238] evolutionary metaphors were reclaimed and developed by Nelson, Winter, Hodgson and others. In addition to biology, developments from other two natural sciences (chemistry and physics) about complex systems and non-equilibrium trajectories influenced the Neo-Schumpeterian theorizing and modelling techniques (Nelson and Winter, 1982, pp. 33-43; Metcalfe and Saviotti, 1991, pp. 1-10)

We will now outline some of the theoretical and methodological characteristics of this approach and briefly contrast it with the neoclassical "textbook" microeconomics and the traditional Industrial Organization theory.

The economic system is conceived as a complex environment, subjected to fundamental, "Knightian" or "Keynesian" uncertainty (non-reducible to probability). The economic units are considered to possess procedural rationality and to adopt heterogenous behaviors. It is rejected the assumption of optimizing behavior underlying the conventional microeconomic theory, which requires substantive rationality, perfect information and unlimited time for the decision making. Without such restrictive assumptions, economic agents can act differently under similar situations without being considered irrationals (Nelson and Winter, 1982, pp. 35-40).

The innovation is considered to be the driving force of the system, setting in place a perpetual motion and an ever-present change. Although the market process of selection eliminates the least desired goods/competitive producers[239], diversity rarely ceases to exist because the incessant introduction of innovations guarantees the renovation of such economic plurality. The existence of heterogeneities is not considered as an anomaly or a 'market failure' (a departure from the perfect competitive benchmark), but as an essential feature of evolving economic systems.

The firm is conceived as an organization that manages a collection of assets, with particular importance given to the intangible ones (knowledge, competences). The

[238] The marginalist controversy (which contraposed mostly Hall, Hitch, Lester to Stigler, Machlup, Alchian, Friedman) was particularly important for the development of the Neo-Schumpeterian approach. It influenced not only Nelson and Winter's critiques of the neoclassical assumptions of profit maximization and substantive rationality but also the incorporation of Simon's notion of procedural or bounded rationality and the theories of the firm and organizations (Simon, Cyert, March, Teece, Williamson) developed from it. A curious influence came, however, from the opposite side of the debate, as Armen Alchian (1950) developed the evolutionary metaphor (Mongin, 1997; Nelson and Winter, 1982, pp. 34-36, 41-43; Metcalfe and Saviotti, 1991, pp. 2-3).

[239] To use the proposed evolutionary metaphor, innovations (mutations) differentiate the firm (individual/organism) from its competitors (other individuals/organisms from the same population) in the market (environment of selection), leading to the survival of the fittest.

singularity of such resources explains why firms differ so much in the real-world – they can have different sizes, market shares, methods of production, number of plants and lines of product, present different conducts (routines, business practices and innovative strategies) and obtain different performances (sales, profitability) – and why there are so many unique, non-generalizable and non-reproducible cases in business history.

In a sense, this approach takes methodological individualism much more seriously than the neoclassical tradition[240], as economic agents are valued by their diversity, idiosyncrasies and spontaneity, rather than by their compliance to pre-determined axiomatic assumptions. Neo-Schumpeterians reject the notion of representative agents, as the use of such theoretical tool suppresses from the main body of the theory a central attribute of market processes – the existence of competitive asymmetries –, leading to scientific impoverishment and misleading conclusions (Dosi, 1988, p. 1150).

Although the concept of innovation proposed by Schumpeter (1943, p. 68) has a wide meaning – new methods of production, new commodities, new forms of organization, new sources of supply, new trade routes and markets – the Neo-Schumpeterian school gave special attention to the technological aspect of capitalism. Technology is considered to present several elements of permanence, but it can also be subjected to initiatives that rupture the tendency of inertia. The study of the regularities that produce these tendencies of stability and change[241] gives room to a substantially new understanding of the subject. Technology is considered to be much more than physical assets, as competences, knowledge and learning are placed at the center of the discussion, and the technological aspects are viewed as intrinsically connected to the social dimension of production and the institutional background.

The virtuosity of competition depends on innovation. Innovativeness, in its turn, is closely related to the vigor and amplitude of technological progress (they are more

[240] "… note the paradox involved in the prevailing methodological individualism: while it appears to be very fond of some liberal idea of individual free choice it sets up the problem of choice itself in such a way that there is only a one-exit solution. In other words, there is generally a univocal 'right' choice which you do not choose only if you are mistaken or if you are crazy (i.e. irrational) […] Note that the neoclassical approach produces an apparent solution to the dilemma [between structures and freedom] by making change impossible and thus choice irrelevant" (Dosi, 1984, p. 200). It is a way of saying that the neoclassical theory is much more structuralist than it is usually recognized.

[241] Some remarkable insights had already been given by Nathan Rosenberg's use of concepts of "inducement mechanisms" and "focusing devices" (the former borrowed from Hirschman, 1958) in the discussion about the direction of technological change (Rosenberg, 1976, ch. 6).

concerned with production than consumption, although they eventually discuss aspects related to the latter, as many "needs" are created by product innovation and publicity). The stronger the disruptive effect of the introduction and diffusion of innovations, the more likely that the current technological paradigm (Dosi, 1982) will be challenged and eventually supplanted by a new one.

This approach thus rejects the methodological and theoretical project to determine equilibrium prices under certain given conditions (conditions which could differ from theory to theory) that is conducted ever since the birth of Political Economy, to the detriment of explaining the transformation of industrial structures and competitive asymmetries over time (a subject which, to be fair to the Classicals, was also present in Adam Smith's *Wealth of Nations*).

Differently from the traditional SCP literature, Neo-Schumpeterians do not think market structure is stable enough to be considered as an 'independent variable'. It is attributed to the firm an active role, as the unceasing introduction of innovations and their subsequent diffusion have the ability to bring about changes in market conditions, that is, the structure becomes (at least partially) endogenous[242]. Hence, the focus of analysis shifts from the market structure to innovation strategies (Pavitt, 1984; Bell and Pavitt, 1993).

The market process is thus modeled as a dynamic, complex, structurally unstable, evolutionary environment, that present non-predictable, non-ergodic and non-stationary trajectories. The search for an equilibrium is substituted for the creation of simulated trajectories, providing an interesting framework to deal with the passage of time (and the associated property of irreversibility), cumulativeness[243] and to develop history-friendly models, which often show path-dependency. In this way, Neo-Schumpeterians advanced in the development of a heterodox micro-dynamics.

[242] Although this approach can be considered as a critic of SCP just as the other four schools discussed in the chapter 3, there are considerable particularities which puts it in opposition to neoclassical microeconomic theory, orthodox Industrial Organization schools and even to other heterodox approaches.

[243] The firm tends to search in the vicinity of the *limited* technological alternatives available at a given moment, as well as the market conditions in which it is used to supply - Penrose (1959) called such opportunities "production/technological base" and "market area", respectively. Business decisions are not isolated in time and are usually irreversible, so that the innovation efforts (R&D, learning) tend to follow a trajectory which is contingent and cumulative (sometimes loosely characterized as "increasing returns").

6.5. Some theoretical elements for an alternative microeconomic framework

We will now discuss some points of convergence between the classical approach to competition, value and distribution and theoretical elements from the Industrial Organization literature, with particular interest on the neo-Schumpeterian theory.

6.5.1. Rejection of the neoclassical theory of production and the development of an alternative understanding of technology

The Neo-Schumpeterians did not have the pretension to build a general theory about technology and innovation, but they managed to advance in the identification of regularities, patterns about such subjects. These developments were part of a larger theoretical effort to build a realistic microeconomics, contrasting it with neoclassical economics that decrees the irrelevance of the actual nature of technology by postulating a smooth, twice differentiable production function (Dosi, 1984, p. 90, p. 105, p. 108; Teece, 1988, p. 266).

Many theoretical, empirical and historical studies had shown that most of the best-practice methods of production assumed by neoclassical theory are not 'there' to be chosen from in the real world. Even if they exist, firms do not have free access to them (there are industrial secrets and patents). The information and the cognitive efforts required to take into consideration the alternative methods make the deliberation process a costly and time-consuming task. If it is considered that technology embraces not only the characteristics of the machinery, the labor force and the proportion to which they must be combined, but also includes organizational elements (many of them take form of tacit knowledge), it gets much more difficult to attest *ex-ante* the costs and efficiency associated with each alternative method. Also, if a great part of the organizational knowledge depends on its usage (learning by doing), it ceases to exist a clear-cut distinction between the given technological data and the choice of technique that maximizes profit[244] (Rosenberg, 1976; Dosi 1988, p. 1145; Pavitt, 1984, p. 348;

[244] Yet, Dosi acknowledged that "... it is not for us to deny that firms utilise maximising procedures *whenever it is possible:* for example, the choice between two well-defined techniques of production for a given wage rate and for given desired quantities of output will involve a straightforward maximisation of the profit rate" (Dosi, 1984, p. 110, emphasis in original).

Metcalfe and Saviotti, 1991, p. 9; Silverberg, Dosi and Orsenigo, 1988, p. 1036; Possas, 1988, p. 160).

The neoclassical theory of production was also subjected to severe attacks during the Cambridge Capital Controversy. Such critique was built on a different theoretical level, as it concerned the internal logic of the neoclassical theory, rather than its unrealism. The general line of the argument is that, in an economy with heterogenous capital goods, the methods of production cannot be ranked in terms of relative factor intensity independently of relative prices and income distribution (Sraffa, 1960, §7, §48, ch. 12; Pasinetti, 1966; Garegnani, 1966, 1970; Harcourt, 1972).

An important conclusion of such debate is that "well-behaved" (continuous, monotonic, downward sloping) factor demand functions cannot be derived in a system with produced means of production. The basic mechanism that explains how markets work from a marginalist perspective – the Principle of Substitution – is thus undermined (Garegnani, 1990b; Petri, 2004, ch. 6; Serrano, 2005; Lazzarini, 2011). The capital critique has a destructive impact on Marginalism as it affects its most basic theoretical tools (production function, factor demand function, cost function, equilibrium between supply and demand, prices as indexes of scarcity, etc.) *even in a situation of perfect competition.*

Internal and external critiques of the neoclassical theory of production can thus be combined to justify that even in situations when there is more than one best-practice technique, there is no guarantee that the choice of technique will follow the interfactoral substitution and factor-saving biases to technological innovations (adoption or creation of methods of production more intensive in the factor relatively cheaper)[245] (Dosi, 1988, p. 1145; David, 1975, p. 2). As the main pillars of the neoclassical economics are shown to be fragile, it is opened room for the development of an alternative theoretical edifice. The firms' assets can perfectly be regarded as a collection of heterogeneous capital (as well as human and organizational resources), as homogenous capital is no longer a requirement for the logical consistency of the theory.

[245] Vromen (1995, p. 70, p. 225) argued that Nelson and Winter's evolutionary model vindicated rather than demolished the proposition that exists an inverse relationship between the factor price and its quantity demanded, as they obtained the same neoclassical results with more 'realistic' assumptions. Dosi, Pavitt and Soete (1990, p. 24, pp. 37-38), on the other hand, explicitly rejected the principle of factor substitution (elsewhere, Dosi, 1984, p. 9, p. 73; 2000, pp. 3-4, 6-7, recognized the influence of the capital debates on his intellectual trajectory). So, even though there is no unanimity, important authors from the Neo-Schumpeterian tradition proposed a more complete, radical rupture with neoclassical microeconomics.

Leaving behind the imaginary world of production sets and isoquants, the research on technology cease to be empirical or historical curiosities and become important inputs for the identification of the inner properties that influence the economic trajectories of firms, industries and countries (Dosi, Pavitt and Soete, 1990). The emergence of the Economics of Technology[246] as a particular scientific domain provided a certain autonomy[247] for leaving aside some of the neoclassical methodological and theoretical straitjackets and searching for the real determinants behind the choice of technique and the technical progress (*i.e.*, to look beyond the principle of substitution). It is believed that the incorporation of some of these insights[248] can enrich the classical view of production and technology.

6.5.2. Rejection of "Cournotism" and emphasis on the central role of potential competition

In the famous chapter 7 of *Capitalism, Socialism and Democracy* about the process of creative destruction, Joseph Schumpeter stated the following about the notion of competition which he was developing:

> "It is hardly necessary to point out that competition of the kind we now have in mind acts not only when in being but also when it is merely an ever-present threat. It disciplines before it attacks. The businessman feels himself to be in a competitive situation even if he is alone in his field or if, though not alone, he holds a position such that investigating government experts fail to see any effective competition between him and any other firms in the same or a neighboring field and in consequence conclude that his talk, under examination, about his competitive sorrows is all make-believe. In many

[246] In the US, the expansion of studies in the 1950s and 1960s about the relationship between science, technology and innovation was stimulated by efforts during the Cold War to lead the technological race (more particularly, the space race). In this field, differently from neoclassical economics, simply imagining an infinite array of technologies (rather than investigating the actual existing possibilities) would not take them very far.

[247] In a similar way to what has happened in the post-war period with other fields such as Macroeconomics, Industrial Organization, Development Economics and Economic History, until they were contested by their lack of neoclassical microfoundations. In this dissertation, it was chosen to follow a theoretical (rather than a thematical) exposition precisely because the extent of the neoclassical influence over the Industrial Organization theory is not sufficiently recognized in the literature and, consequently, many approaches do not rupture enough with orthodoxy.

[248] With regard to a possible convergence between the classical and the neo-Schumpeterian approaches, the excessive emphasis given by some neo-Schumpeterian authors on the diversity of technologies (which are redefined to include capabilities, knowledge, etc.) may suggest an excessive plasticity, malleability of the technology that collides with the structural view of the classicals on how the economic system works.

> cases, though not in all, this will in the long run enforce behavior very similar to the perfectly competitive pattern." (Schumpeter, 1943, p. 85)

The kind of competition which consists of an ever-present threat and disciplines the competitors' behaviors is clearly potential competition. So, although it is true that Schumpeterian view investigates 'dynamic' elements of competition, it also includes the notion of competition proposed by the Classical Political Economy[249] and later developed by industrial economists from different school's affiliations (such as Bain, Sylos-Labini, Andrews, Steindl, Baumol, Willig and Panzar[250]).

From this excerpt, it is also noticeable that Schumpeter rejects the Cournotian reasoning and he even suggests that, as long as there exists considerable potential competition, markets with few producers can present a performance very similar to what would be expected from a perfect competition situation (thus anticipating the idea of a perfectly contestable market[251]).

Surely, a classical approach to competition was – and still is – far from complete. However, there is nothing essentially missing in the general analytical framework of this approach to competition: the central aspect is the *degree* of capital mobility. There is a wide spectrum of possible situations depending, for example, on the extension and distribution of cost asymmetries between producers and the institutional arrangements established in the markets. Nonetheless, if it is necessary to define two

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[249] Giovanni Dosi is even more explicit: "[…] this image of the competitive process underpins the Schumpeterian theory of innovation and growth. That same image, however, is not very distant from the 'microfoundations' implicit in the dynamic theory of some classical economists (Smith and Ricardo) and explicit in Marx. Even if it is not possible to analyse here with any satisfactory depth the conceptions of competitive markets held through the history of economic thought, it is worth noticing that the permanent existence of inter-firm technological differences is compatible, in the tradition of classical economists, with the existence of market conditions which are defined as 'free competition'." (Dosi, 1984, p. 99)

[250] Although the contestability theory can be regarded as a part of the neoclassical research program, it discussed and advanced in two subjects which are dear to the surplus approach: the classical conception of competition and the joint production analysis (which is crucial to the explain why that large, diversified firms can obtain extraordinary profits as a result of their cost advantages - economies of scale and scope -, rather than by their exercise of market or monopoly power).

[251] In an interesting article, Araújo Jr. (1984) proposed that the convergence of ideas from two seminal books: *Contestable Markets and the Theory of Industry Structure* by William Baumol, John Panzar and Robert Willig and *An Evolutionary Theory of Economic Change* by Richard Nelson and Sidney Winter, both published in 1982. According to him, the central features of these contributions concerned the study of the evolution of industrial structures marked by the presence of large diversified companies and heterogeneous rhythms of technical progress (Araújo Jr., 1984, p. 1). Here, we stress other common characteristics: the recognition of the role played by the potential competition and the refusal to take in consideration any "Cournotism" and the consequent defense of the endogeneity of the market structure.

poles, there would be a situation of free competition (absence of barriers to capital mobility) in one side and a market with blockaded entry (institutionalized barriers to entry and exit) on the other. In both situations, there is no necessary relation between the intensity of competition and the number of producers: there can exist free competition with one or few producers and blockaded entry with more than one producer.

The absence of specific competition models in the classical economic thought that discussed the manyness or fewness of competitors is not an evidence of primitivism of this economic theory, but the result of a different view on competition that does not consider this aspect as particularly relevant to explain markets' performance. The creation of specific models depending on the number of firms in the market – the conception of competition derived from Cournot – is connected with the marginalist theory of value, that needs to aggregate a given number of firms' supply curves in order to build the industry's supply curve.

As it was already shown, the existence of barriers to capital mobility does not invalidate the classical conception of competition, but rather enable the detailing and qualification of the limits of such competitive process, indicating paths for more specific analyses. One important theoretical contribution in this direction was given by Richard Caves and Michael Porter.

In a seminal article, Caves and Porter (1977) suggested that barriers to entry and to exit could be integrated into a more general view on mobility barriers. They also defended the necessity of better describing the characteristics, conjectures and actions of economic participants. More particularly, it was criticized the simplistic representation of the problem of entry by identical incumbents (except in size) that face an orderly queue of potential entrants which consist of new legal entities (start from zero output).

The authors argued that the chief entries are carried out by firms already established in other industries, as they are more able to overcome existing entry barriers due to the possession of goodwill assets (reducing the need of sale expenses), excess capacity of capital and management (enabling economies of scale derived from joint production), solid financial position (the possession of liquid funds or the possibility of borrowing at a reasonable interest rate), the existence of already structured distribution channels, the possibility of expanding through vertical integration, etc.. Entry in new markets can also occur by mergers and acquisitions of already established firms.

Caves and Porter also stressed that the degree of entry barriers can greatly differ among incumbents, so that it is possible to envision capital migration not only inter-industries, but also between different groups of the same industry (inter-group or intra-industry capital mobility). Although the idea of well defined "groups" is debatable, the general message there are asymmetries not only between incumbents and potential entrants but also among incumbents, remains valid. Another insight that echoed profoundly in the Industrial Organization literature was the proposition that barriers to mobility are partially endogenous, as they often result from the firms' efforts. Incumbents' active search for new ways to differentiate themselves and to protect their market position are not gratuitous, but require barrier-raising investments.

This article was thus incredibly competent in showing that that permanent (inter and intra-industry) rivalry is an integral part of the conception of competition as capital mobility. It also managed to outline some interactions between the structural and the behavioral dimensions, a theme that became ubiquitous in the subsequent decade.

The existence of effective (or even potential) capital mobility restrains the ability of producers to raise prices, keeping them close to the costs of production and profits accordant to normal levels. The system surely does not "stop" waiting for a full adjustment to happen. Successful producers act to protect or create new barriers and their opponents take action to destroy or surpass the existing barriers. While the investigation of effects of (given) entry barriers on prices and profits were usually captured by the "theories of markets", the structural transformations (*i.e.*, the evolution of barriers) brought about by business actions (or by State interventions) were left to be explained by the "theories of the firm"[252] (and/or the discussions regarding public policy).

Although the theories of markets and firms are conceived at very different levels of analysis, they can be both compatible with the general conception of competition as capital mobility. It can thus be argued that 'static' and 'dynamic' dimensions can coexist in the same theoretical conception of competition, escaping from the usually suggested methodological dichotomy.

[252] There is, obviously, a logical and temporal lag between the business conducts and their effects on industrial structure (reinforcing or diluting the original structural barriers or creating new ones). The absence of such warning may confuse the reader, as it usually happens when students are introduced to Scherer's famous representation (Figure 5) where product differentiation and vertical integration are listed among the structure (rather than the conduct) dimension.

6.5.3. Rejection of the equilibrium of the firm

In the neoclassical or marginalist approach, the firm plays a central role: it is the locus of transformation of inputs into outputs under technological (production function) and economic (profit maximization) constraints. Following this notion, it is possible to create a functional relation between price and quantity produced for the individual firm (the firm's supply curve). By aggregating all firms' supply curves, we arrive at the industry's supply curve, which determines, together with the demand curve, the equilibrium price and quantity. As Penrose (1959, pp. 9-10) had perfectly put it, the neoclassical theory of the firm "[…] was constructed for the purpose of assisting in the theoretical investigation of one of the central problems of economic analysis - the way in which prices and the allocation of resources among different uses are determined. It is but part of the wider theory of value, indeed one of its supporting pillars […]".

The classical approach, on the other hand, does not require any specific firm behavior because the concept of the firm is absent from its theory of value and distribution. In this theoretical framework, the dominant techniques, one distributive variable, the level and the composition of output are considered as data of the system, while relative prices and the other distributive variable are endogenously determined. The dominant or "socially necessary" techniques consist of the methods of production used in a widespread way, so that there is enough *capital mobility* to guarantee that production responds to profitability differentials and prices converge in the long-period towards normal costs (Roncaglia, 1978, p. 27; Vianello, 1989b, p. 165; Schefold, 1997, pp. 159-160; Ciccone, 2011, p. 1; Eatwell and Milgate, 2011, pp. 348-349).

This theoretical framework is built on the conception that the determinants of prices are better studied separately from the factors that affect quantities (separation between prices and quantities). This does not mean that prices and quantities are completely independent of each other, but that there is no necessary and quantitatively exact functional relationship between the two variables. Eventual relationships between prices and quantities are evaluated by specific analyses of an iterated (rather than a simultaneous) nature (Garegnani, 1976, p. 29; Eatwell, 1982, p. 219; Crespo, 2008, pp. 6-7, pp. 17-18).

So, the classical theory of prices does require any specific pattern of returns because variations at the margin are rule out by assumption. There are no supply and demand functions (price-quantities curves) because quantities are considered as given

(they are "points"). This means that not only constant returns to scale, but also increasing and diminishing marginal returns are not assumed (Sraffa, 1960, p. v; Eatwell, 1977; Garegnani, 1990c, pp. 128-132). In that way, it is not possible to draw the U-shaped average cost curve and to determine the optimal firm size. The equilibrium of the firm is simply not a logical requirement for the development of the classical theory.

As Glick and Ochoa[253] (1988, pp. 1-2, pp. 25-27) pointed out, many empirical studies that criticized the tendency towards profit rate equalization presented evidences at the firm level, misunderstanding what the classical (or even the original neoclassical) propositions actually were. In the classical theory, there is a long-period tendency for uniform profit rate between *industries*, but not between firms. As it was discussed before, such process does not depend on the number of the firms, let alone if they are in equilibrium. As firms can grow at different rates, differences in absolute sizes and/or market shares are a logical consequence. Also, as firms can possess different methods of productions and costs of production, disparities between their performances are expected.

The confusion between those two different conceptions of market equilibria is a reflection of the great influence of the neoclassical elements (particularly the axiomatic ones developed from 1920's onwards) - which consider that not only markets but also firms are in equilibrium - on the Industrial Organization Theory.

The classical notion of competition centered on capital mobility enables the determination of price regardless of the number and the market share of producers. In doing so, it frees the theory of the firm from requirement of atomism (an important pillar from the neoclassical theory of value) and gives room to the incorporation of alternative, more realistic theory (or a combination of theories) of the firm[254] capable of handling with naturality the existence of economies of scale and scope, learning by doing, financial strength and other characteristics related and non-related to size.

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[253] Empirical controversies often present important theoretical discordances in the background, which unfortunately are rarely discussed. So, following Glick and Ochoa's proposal, it was attempted in this dissertation to identify some of the classical and neoclassical elements in Industrial Organization Theory.

[254] In this dissertation, the history of industrial organization thought was narrated more from the perspective of how markets work than how firms behave. For concise and relatively comprehensive (pluralist) expositions of the different theories of the firm, see Lipczynski *et al*. (2005, ch. 3), Bertrand (2016), Archibald (1987), Teece *et al*. (1994, p. 12), Barthwal (1984, ch. 21).

6.5.4. Recognition of the endogeneity of market structure

The traditional competition models (monopoly, oligopoly, imperfect competition, perfect competition) which are taught on microeconomics textbooks are defined mainly by their market structure[255]. Little is explained, however, about how to associate real markets to each category and still less is said if and how it could occur a transition from one competitive situation to another. Textbook competition analyses are usually confined to the comparison and evaluation of the different models by means of comparative statics and Paretian welfare criteria.

The SCP approach, in turn, was able to create a simple model which contemplated all the spectrums associated with the neoclassical competition models, but included additional gradations (different concentration ratios and heights of entry barriers), making it more adequate for policy. The consideration of the market structure as an "independent variable" consisted of the central feature of this framework.

As it was discussed in the chapter 3, several schools of Industrial Organization thought made opposition to the SCP tradition in the 1970s and 1980s. It was argued that the market structure should be considered, in some degree, endogenous to the market process. Considering that these approaches have considerable theoretical and methodological differences – with regard to the definitions of rationality, the assumed behavior of economic actors, the adherence to the concept of equilibrium, the treatment given to technology and so on – it may be a little difficult to precisely define this "common" characteristic. It is possible, however, to assert that these approaches recognize that the number of producers and the market distribution between them are at least partially endogenous to the market process, although the degree to which technology is also "endogenized" by firms' innovation efforts[256] can vary substantially between the schools of industrial organization thought (and maybe even within each of them).

[255] Salvadori and Signorino (2010), for example, narrated the history of competition in economic theory using the following subdivision: competition as rivalry in a race (Classical and early marginalist authors, most notably Marshall), competition as a specific market structure (neoclassical oligopoly, imperfect and perfect competition models), competition as a discovery procedure (neo-Austrians and Evolutionary) and competition as class struggle (neo-Marxians).

[256] With regard to a possible convergence between the classical and the neo-Schumpeterian approaches, the excessive emphasis given by some neo-Schumpeterian authors on the diversity of technologies (which are redefined to include capabilities, knowledge, etc.) may suggest an excessive plasticity, malleability of the technology that collides with the structural (though not structuralist) view of the classicals on how the economic system works.

Regardless of such definitional complications, it is considered that the endogeneity of market structure in Industrial Organization theory is an important issue to be highlighted because the neoclassical competition models continue to be hegemonic in economics teaching and the structuralist tradition still exerts its influence in antitrust policy, so that people non-familiarized with the specialized IO literature (laymen and even economists) often think about competition as a specific market structure.

6.6. Structural change

Capital mobility reflects the most basic competitive factors at work in the capitalist economy (Harris, 1988, p. 139), in the sense that it is a process that takes place even in the absence of structural change[257]. This assertion must not be interpreted as a diminishment of the importance of these transformations in real economies. On the contrary, it is precisely because of its crucial role it deserves an independent, more detailed analysis, taking into account knowledge from distinct branches of Economics[258].

The 'uncertain', 'unstable', 'dynamic', 'turbulent' aspects of capitalism are sometimes used to justify that the previous traditions of economic thought (classical and neoclassical) are outdated, thus requiring the development of a totally new microeconomic theory. It will be suggested, instead, that there is no intrinsic theoretical incompatibility between many of the subjects associated with these aspects and the classical approach to competition.

[257] In this sense, the notion of classical competition is considered here as 'static'. This interpretation differs, for instance, from that of Duménil and Lévy (1987), who associate a dynamic dimension with the classical competition because the classical price theory (unlike Walrasian *tâtonnement*) provides an explanation for the stability of multi-market equilibrium.

[258] Such a degree of independence is not possible in the orthodox approach, as the acceptance of the general equilibrium analysis (even as notional reference) makes it difficult to deal with real processes of structural change. Heterodox approaches have surely more freedom for such developments, but the array of possible paths hinders the emergence of a more unifying framework.

6.6.1. Changes in the composition of demand

The consideration of a given composition of the social product requires a certain pattern of consumption. Despite being perhaps the most underdeveloped aspect of the Sraffian research program[259], the assumption about consumers' behavior aligns well with modern socioeconomic theories of consumption. The distinction between necessary and luxury goods, for example, is consistent with the hierarchy of needs. Consumers may have heterogenous tastes and behaviors, as "representative agents" are not a logical requirement for the classical theory. It is also possible to identify regularities related to economic and sociological common characteristics of each group of consumers, as well as the influence of socially shared habits and conventions (Schefold, 1997, pp. 157-159).

Despite all the individualistic rhetoric, the neoclassical economics showed, for a long time, little concern for the real *content* of consumer preferences, opting instead to postulate the *formal properties* to obtain an equilibrium (preferably a stable, full employment one) (Garegnani, 1983, p. 311). That is, the marginalist theory needs to assume that individuals behave in a certain way in order to obtain the desired results for the *system*. For this reason, it needs to consider that consumer preferences, despite being innate and prior to the market process, have the exact mathematical characteristics to ensure its proper functioning (Schefold, 1989, p. 22).

The main contrast between classical and marginalist approaches consists of the fact that the former does not rely on the mechanisms of substitution (neither direct, nor indirect) to explain long-period equilibrium prices, so that it has more freedom to search for more realistic descriptions of technology and consumption[260].

With regard to very long period changes in demand patterns, the Engels' law remains one of the most robust empirical regularities. According to it, the commodities

[259] It is believed that developments in this direction are important to complete the argument that the Sraffian approach is not a particular case of general equilibrium, but rather a competing analytical framework that enables the incorporation of more realistic descriptions of technology, competition and demand without impairing the explanation of the system's most basic operating forces.

[260] Rarely does a person hesitate between psychology and engineering when choosing a college major, as it is common knowledge that these are radically different fields. However, when we open a microeconomics textbook, we come across a curious fact: the indifference curves from the chapter about consumption have very similar mathematical properties (e.g., convexity) to the isoquants from the chapter about production. Obviously, these shapes did not appear by chance (let alone by observation/empirical evidence), but were rather created through 'backward induction' to obtain certain desired market outcomes.

with lower income elasticity of demand (originally, agricultural products) decrease their share in the consumption baskets and the social product, while commodities with higher income elasticity of demand increase their share (Houthakker, 1987; Shaikh, 2016, p. 92; Dosi, 1984, pp. 128-129, p. 206; Schefold, 1989, p. 201). Furthermore, changes in the habits of consumption and income distribution can affect the composition of demand (just consider that capitalists and workers have different consumption baskets and propensities to consume).

Sectors whose effective demands grow relative to others can expand their productive capacities investing within the dominant method. Therefore, alterations in demand patterns can bring about structural changes even in the absence of technological progress.

6.6.2. Endogenous transformations of industrial structures

In his influential book, Giovanni Dosi (1984) asserted that the neoclassical approach could be criticized on three main levels:

> "[…] (a) the general theory of prices as determined by supply and demand functions; (b) the difficulties of defining demand functions as determined by utility functions and the same feasibility of a 'utility' concept[261]; and (c) the logical and practical difficulties in interpreting the innovative process through this approach.
>
> The first question is undoubtedly the biggest one because it could undermine the entire theory on which this approach is based. This is not the place though to deal with that issue […] For our purpose it is enough to mention that if we assume, at any point in time, fixed coefficient of production and constant return to scale, variations in the quantities do not effect relative prices. Therefore we are bound to lose an important part of the 'signalling' mechanism. On the other hand, a demand/supply theory of prices might be

[261] Dosi's treatment of demand is also classically inspired "Our hypothesis, which corresponds quite closely to an implicit assumption of classical economic thought, is that the composition of the basket final consumption is jointly determined by the interplay between some basic anthropological needs and the evolution of social organizations, modes of consumption, patterns of use of leisure time, together with income levels and income distribution. The hypothesis will probably be understood more easily by the non-economist reader, for one can find an immediate reference in common sense: for example, no matter what is the relative price between food and a pocket calculator, the former has a strict priority in consumption; no matter what is the price of food itself, demand for it will reach saturation above a certain level, etc. The argument leads to a 'ranking of commodities in consumption' as Pasinetti (1981) does - according to 'anthropological' and social criteria. Moreover, if one considers the patterns of demand of a certain commodity in relation to income, one will generally observe a kind of Engel's curve, whereby per capita consumption after a certain point will increase at decreasing rates until it will become asymptotic to a saturation value […] Note that this idea is quite familiar to business economists who are more directly concerned with an operational concept of demand and do not find much use in playing with vague and obscure concepts such as 'utility functions'." (Dosi, 1984, pp. 128-129, p. 206)

> abandoned for the unavoidable difficulties of its theory of factor prices and distribution. For an account of the famous 'Cambridge Debate' on capital theory[262], see Harcourt (1972)." (Dosi, 1984, p. 9, p. 73)

Dosi (1984) also recognized that Sraffa's system could be used to represent the industrial interdependencies[263] (input-output relations and inter-sectorial capital mobility) and to explain the determination of relative prices and the general rate of profit (pp. 100-101, p. 199). He also acknowledged that the image of the competitive process portrayed by the Schumpeterian theory was not very distant from the one Smith, Ricardo and Marx had in mind (p. 99).

Nevertheless, this author associated Sraffa's system of equations with the situation of a 'weak oligopoly', in which inter-firm asymmetries are generally compensated so that the industry's average rate of profit tends to the 'normal' level (pp. 100-101, p. 294, p. 303). He argued that the attempts to substitute the assumption of a uniform profit rate by a vector of profit rates[264] lead to the loss of some of the system's original properties (p. 199). As it was advocated along this dissertation, the first argument is questionable, as it is possible to acknowledge the existence of inter-industry profitability differentials within Sraffa's framework. The second argument is more compelling, which is connected with our predilection to discuss competitive asymmetries in terms of cost-advantages and economic rents.

Dosi focuses his attention on the point (c) quoted above. He builds on the 'mark-up' pricing procedure suggested by Andrews (1949) and the notion of entry barriers proposed by Bain (1959), Sylos-Labini (1962) (which he called the 'structural approach') to discuss the determination of the profit margin[265] in an initial 'static' situation and then introduces elements such as product innovations, process innovations, imitation lags and learning by doing, to represent how business conducts can dynamically change industrial structures.

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[262] Elsewhere, Dosi (2000, pp. 3-4, 6-7), recognized the influence of the capital debates on his intellectual trajectory.

[263] Unfortunately, this general picture has gotten lost as neo-Schumpeterian theory became increasingly specialized in discussing Innovation Economics. Also, most authors from this intellectual tradition are more influenced by business economics than by classical political economy.

[264] See, for example, Sylos-Labini (1971, pp. 269-272; 1984, pp. 154-156; 1985, p. 65), Roncaglia (1978, p. 29, p. 35), Steedman (1979, p. 11) and Bharadwaj (1984, p. 9).

[265] Assuming unchanged capital/output ratios, there is a monotonic relationship between profit margins and profit rates (Dosi, 1984, p. 205).

The ‘static’ model assumes the existence of cost-based asymmetries[266] among incumbents and between incumbents and potential entrants. These asymmetries are associated to economies of scale arising from technologies discontinuities, inspired by Sylos-Labini’s (1962, ch. 2) example of firms with three different sizes[267]. Considering that demand is relatively stable in the short-run, prices are expected to converge to the limit-price level (Dosi, 1984, p. 101, p. 114, p. 117, p. 121).

Surely, there are situations in which the price can be set by a producer[268] below the limit level with the intention of gaining market share. This competitive strategy involves a specific interacting between cost-advantages, price and the dispute over the repartition of industry’s demand (an issue which was key to Sylos-Labini and Steindl’s discussions about the competitive ‘fringe’). Be that as it may, these competitive strategies seldom persist for long, as the possibility of retaliation and price wars can spoil the market’s profitability, and the temporary losses may not be sufficiently compensated in the future.

In this way, limit pricing can still be considered as the ‘center of gravity’ to which prices tend to gravitate around. This approach follows a structural view of the economic system, in which prices follow the costs of production of potential entrants, while most efficient producers earn extraordinary profits in proportion to their cost advantages (Dosi, 1984, p. 117, p. 141).

In this way, it is possible to envisage market equilibrium positions and a Schumpeterian (and Classical) diversity of producers with regard to costs, profit margins, absolute and relative sizes, strategies, etc.. Also, we can acknowledge that economic actors are able to influence their environment and their future, but also recognize that industrial structures define the boundaries of these degrees of behavioral freedom (Dosi, 1984, p. 110, p. 147).

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[266] Dosi (1984, p. 132) initially assumes that market shares are related to producers' cost advantages, which is a simplifying hypothesis (market shares can also depend on other factors such as customer base, previous pricing policies, etc.).

[267] It was argued in the chapters 2 and 4 that Sylo-Labini’s example is just a particular case (size related) to a more general notion of entry barrier based on cost-advantages.

[268] This producer does not need to be necessarily the industry’s most efficient (lowest cost) competitor. It may well be a producer that belongs to a more powerful business group (which inserts a financial dimension to the real-world competitive process, which cannot be entirely reducible to technological characteristics).

The ‘dynamic’ models explore “the opposing forces that affect both inter-firm technological asymmetries and costs structures, and the related competitive process” (Dosi, 1984, p. 146). Product innovations and high degrees of appropriability, ‘static’ economies of scale and technical progress based on ‘learning-by-doing’ produce advantages to the first mover, while the technological diffusion, the aging of the capital stock of established producers and the entry of new producers, frequently with technical progress incorporated in the newest ‘vintage’ of capital goods (Salter, 1966) provide some “backwardness advantages” (Gerschenkron, 1962). The relative pace of these asymmetry-creating factors and diffusive factors allows us to explain the dynamics of the erection and the destruction of mobility barriers[269] and its effects on costs, margins, market shares and so on.

Despite employing the concept of oligopoly, Dosi (1984) rejects the original and the modernized game-theoretical versions of the Cournot model, which he associated with indeterminateness and the ‘individualist’ methodology (p. 95, pp. 103-104, p. 147). He also refuses to connect ‘oligopolistic’ power with market concentration or collusive behaviors (p. 142). His distinction between ‘weak’ and ‘strong’ oligopolistic conditions ultimately rests on the height of mobility barriers and its effect on the industry’s average rate of profit. In this sense, his reasoning could have been even more convincing if he had abandoned completely the concept of oligopoly and had followed directly the concept of capital mobility.

Regardless of these terminological differences, Giovanni Dosi (unarguably a notable neo-Schumpeterian author) provided, however, an explicit defense of the importance of equilibrium analysis to stress the structural nature of entry barriers (pp. 115-116, p. 147, pp. 293-294). The innovation efforts put in place disequilibrium processes that lead to the evolution of the industrial structures over time, which in turn shape the future constraints to the behavioral freedom of each economic agent (p. 110, p. 135):

> “It should be clear that technical progress is one of the main dynamic factors. At the same time, we want to know also what are the forces at work for a *given* and *unchanged* state of the technology. In the real world, forces of

[269] It is irresistible to reproduce the famous assertion that “[…] the problem that is usually being visualized is how capitalism administers existing structures, whereas the relevant problem is how it creates and destroys them.” (Schumpeter, 1943, p. 84). Following the metaphor about the bombardment of a door proposed by Schumpeter (1943, pp. 84-85), innovation can destroy barriers (to entry).

> change and transformation, on the one hand, and force of adjustment and equilibrium, on the other hand, operate together; this is why we are able to observe relatively ordinated configurations of the economic system, at each point in time, and relatively regular patterns of change, over time." (Dosi, 1984, pp. 293-294, emphasis in original)

6.6.3. Policy-induced technological progress

For Schumpeter (1911, 1943), innovation - new methods of production, new commodities, new forms of organization, new sources of supply, new trade routes and markets - was the driving force of the system, setting in place a perpetual motion and an ever-present change. It is the main source of economic diversity, which is considered a central feature of evolving economic systems. Competitive asymmetries are deemed to be endogenously created by deliberate efforts from economic actors (mostly, firms) and destroyed by competitors' reactions, market selection and government interventions.

Influenced by Edith Penrose, the neo-Schumpeterian theory conveys the firm as an organization that manages a collection of assets, with particular importance given to the intangible ones (knowledge, competences). The singularity of such resources explains why firms differ so much in the real-world – they can have different sizes, market shares, methods of production, number of plants and lines of product, different conducts (routines, business practices and innovative strategies) and achieve different performances (sales, profitability) – and why there are so many unique, non-generalizable and non-reproducible cases in business history (Nelson, 1991).

Initially, the neo-Schumpeterian theory gave an extremely prominent role to the firm in shaping the market, largely as a counterpoint to the structuralist determinism and the shortcomings of the theory of firm (Nelson and Winter, 1982). However, as this approach progressed, some limitations to the exercise of disruptive behaviors started to be identified, even though the general view that firms present idiosyncratic and heterogenous behaviors was preserved.

Dosi's (1984, pp. 87-89) concepts of technological opportunity, cumulativeness, and appropriability have proven to be extremely useful in identifying sectoral patterns of innovation. Technological opportunity in electronics, for instance, is much higher than in clothing, so that innovativeness cannot be reduced to the willingness to innovate.

Since then, several attempts have been made to create sectoral taxonomies of innovation (for example, Pavitt 1984; Pavitt and Bell, 1993; Malerba and Orsenigo, 1993).

The initiatives of individual firms or associations of firms, however, may span more than one industry. Also, there are technological flows between different sectors, such as when a product innovation in the capital goods sector has effects on the process of production of the users of this means of production. Thus, the process of innovation and technological diffusion has dimensions not only within sectors but also across sectors (Scherer, 1982; Rosenberg, 1982, ch. 3; Pavitt, 1984).

The neo-Schumpeterian approach managed to demonstrate that innovation is influenced by many actors and factors. The development of the concept of National Systems of Innovation (Lundvall, 1992; Nelson, 1992, 1993; Freeman, 1995), which emphasizes the systemic nature of competitiveness, was crucial for the recognition of the collective, institutional and policy-induced nature of innovation (even though the outcome of this process is mostly privately appropriated).

Structuring a National Innovation System involves different types of interventions and institutions, encompassing not only instruments more traditionally associated with industrial policy - investments in infrastructure, mechanisms of public financing and subsidies, investments in Science and Technology (S&T), and support for Research and Development (R&D) - but also the interaction with microeconomic (regulatory, antitrust, commercial), macroeconomic (fiscal, monetary, and exchange rate) and social (education, regulation of labor relations) policies. Other authors also proposed the concepts of Regional (Cooke *et al.*, 1997), Sectoral (Malerba, 2004) and Local (Cimoli and Della Giusta, 1998; Cassiolato and Lastres, 2000) Systems of Innovation, inserting geographical elements to the process of innovation, frequently associated to the phenomenon of networks, filières or clusters ('Marshallian industrial districts').

While Keynesians have argued that aggregate output is not guided by “natural forces” regardless of macroeconomic policy and Sraffians have demonstrated the socio-political nature of income distribution, Neo-Schumpeterians have shown that innovativeness and competitiveness are extremely dependent on industrial policies, broadly defined. Even though the neo-Schumpeterian school has made considerable progress in building a microeconomic apparatus to deal with complex issues such as

technical change and innovation, their framework remains, to a large extent, supply-side oriented[270].

6.6.4. Kaldor-Verdoorn's laws

An interesting heterodox proposal of integration between microeconomics[271] and macroeconomics is provided by the Kaldorian literature. If the *level* of aggregate investment is considered to be induced by aggregate demand, more particularly by autonomous expenditures through a Supermultiplier model as Thirwall and McCombie (1994) proceed, then macroeconomic stimulus can positively affect not only aggregate output and the level of employment, but also the general productivity.

Following the Kaldor-Verdoorn laws, the productivity growth (g_b) can be considered to be *partially* endogenous to economic growth (g) – formally, $g_b = \alpha + \beta.g$, where $\alpha, \beta > 0$ – due to: i) the technical progress incorporated in new capital goods, as "gross investment is the vehicle of new techniques" (Salter, 1966, p. 65); ii) the adoption of more efficient methods and dynamic 'learning effects' associated with increased volumes of output - increasing returns à la Allyn Young (1928)[272]; iii) the increasing 'weight' of more productive or fastest-growing sectors on total output ('structural bonus'). When a considerable portion of the workforce is under 'disguised unemployment', overall productivity can increase even at an unaltered state of techniques (under a given technological paradigm, to use a neo-Schumpeterian jargon),

[270] Some noteworthy exceptions are Possas and Dweck (2005), Dosi *et al*. (2010, 2013, 2015) and Mazzucato and Deleidi (2019, 2020).

[271] One of our few disagreements regarding this matter concerns the use of Marshallian reasoning that 'diminishing returns' are found in agriculture, while industry presents 'increasing returns'. This procedure inserts misleading elements, some of which have already been mentioned in 1.2.1, to complex discussions of structural change (e.g., deindustrialization processes).

[272] "The important thing, of course, is that with the division of labour a group of complex processes is transformed into a succession of simpler processes, some of which, at least, lend themselves to the use of machinery. In the use of machinery and the adoption of indirect processes there is a further division of labour, the economies of which are again limited by the extent of the market. It would be wasteful to make a hammer to drive a single nail; it would be better to use whatever awkward implement lies conveniently at hand. It would be wasteful to furnish a factory with an elaborate equipment of specially constructed jigs, gauges, lathes, drills, presses and conveyors to build a hundred automobiles; it would be better to rely mostly upon tools and machines of standard types, so as to make a relatively larger use of directly-applied and a relatively smaller use of indirectly-applied labour. Mr. Ford's methods would be absurdly uneconomical if his output were very small, and would be unprofitable even if his output were what many other manufacturers of automobiles would call large." (Young, 1928, p. 530)

simply by shifting workers from inferior techniques to dominant techniques, both between sectors and within sectors.

Technological progress and productivity growth are thus influenced by demand (although not solely determined by it), so that the tools and levels of analysis need to go beyond those employed by researchers in the 'normal science' of innovation economics. It is not only about having 'fiscal space' to fund industrial policies or 'public procurement' to mitigate the uncertainty associated with innovative activities. The influence of economic policy on overall demand (especially on expenditures that do not create capacity) affects aggregate investment decisions, which are key to industrial modernizing[273]. As a result, fiscal policy exerts significant influence on the industrial structure, especially when the domestic market serves as the primary source of industrial demand, and ought to be explicitly incorporated into the analysis.

Even though there are sound theoretical explanations supporting it, the Kaldor-Verdoorn's laws are essentially empirical (a 'stylized fact'), valid only within certain limits of growth. Such laws, therefore, do not deny the existence of a potential output: the main message behind it is that the relevant supply constraints are not homogeneous and substitutable factors of production, but rather systemic conditions of infrastructure (energy, transportation, communication), technological capabilities (knowledge, human resources), and specific inputs (natural resources, capital goods[274]). When productive structure is unable to supply the domestic market, demand ends up being directed abroad, leading to a deterioration of the balance of payments. For this reason, Kaldorian literature emphasizes the external constraint[275] as the main obstacle to the economic growth process, especially for peripheral countries.

As currency crises are often a result of technological backwardness, the adoption of contractionary macroeconomic policies may mitigate inflationary problems in the

[273] Although increases in productivity may occur in situations of low or even negative growth, such as those resulting from the bankruptcy of less efficient firms and cost reduction strategies (downsizing, outsourcing), there including layoffs - what Fajnzylber (1990) referred to as 'spurious productivity'.

[274] An important contribution from the Latin American structuralist tradition to this matter was provided by Tavares (1979), who emphasized the need for the construction of a complex and integrated capital goods sector to ensure a long-run growth trajectory.

[275] Although external constraints impose a maximum rate for demand-led growth, there is no guarantee that the growth trajectory will follow this equilibrium condition: i) A country cannot incur balance of payments deficits indefinitely, but a situation of persistent surplus is surely possible; ii) Political restraints can limit the rate of output growth to a lower level than what is associated with the external constraint (Bhering, Serrano and Freitas, 2019).

short term, but they do not offer a comprehensive solution for long-term economic growth and development. This role is attributed to industrial policy, which intervenes on relative profitabilities[276] (prices, taxes/subsidies, interests or directly on margins) and/or quantities (quotas, public procurement, direct production), aiming to influence mainly the *composition* of investment (*i.e*., to induce changes in the industrial structure). Even though industrial policy is subject to considerable divergence regarding definitions and ways of structuring it (vertical, horizontal, "mission oriented"), there exists several heterodox contributions emphasizing the importance of productive densification[277], specialization in commodities with higher income elasticity of demand and the importance of building an endogenous core of technical progress.

In essence, productivity growth should neither be considered entirely exogenous, as in the Solow model, nor totally endogenous due to the heroic actions of entrepreneurs, as in the Austrian/Schumpeter mark I perspectives, or in a mechanistic way as in the endogenous growth models. Drawing from Kaldor-Verdoorn's laws, there is an endogenous component related to the level of economic activity ($\beta.g$) and an exogenous component (α), which reflects the Systems of Innovation and autonomous efforts of companies that, despite having their degrees of freedom modulated by policies, can always adopt spontaneous and proactive behaviors.

6.7. Core, non-core and feedback analyses

Given the specific focus and intent of Sraffa's (1960) book, it would be unfair to expect from the author something he did not intend to do. On the other hand, certain central questions about capitalism cannot remain unanswered. The 'solution' found by the Sraffian research program consisted of incorporating appealing developments from outside the 'core', while maintaining a certain degree of coherence with the classical theories of value and distribution.

In this chapter, we have examined several possible explanations for variations in the independent variables. The state of the techniques of production (i) were considered

[276] Economic development policies also face important political restrictions, often even greater than proactive macroeconomic policies, as they not only require interventions of greater scope and intensity but also because they tend to alter the hierarchy of power, wealth, and status within the property-owning class.

[277] Hirshman (1958, 1973) was a pioneer in this matter, stressing the role of backward and forward linkages.

to change due to technological progress, while the composition of the social product (iv) is believed to be adapted to alterations in the habits of consumption. Interactions between variables have also been suggested, such as the effect of income distribution changes on the composition of the social product (ii and iv) and a relationship between the level and the composition of the social product (iii and iv – the Engel's law), as well as on the state of technology (iii and i – the Kaldor-Verdoorn's laws).

Surely, the number of possibilities of interactions and feedbacks is endless. The Sraffian approach follows, however, Marshall's (1920, App. C, p. 638) method of successive approximations, considering that many short chains are preferable than few long chains of deductive reasoning. Mongiovi (1996, pp. 219-223) provides an interesting exposition of the nature of this methodological proposal and concludes with a thought that underlies this entire dissertation:

> "The deficiencies which characterize much heterodox analysis stem largely from the absence of a coherent, general and well-defined theoretical foundation. Sraffa's reconstruction of the classical theory provides such a foundation - without precluding discussion of historical processes, accumulation, disequilibrium dynamics or induced technical progress." (Mongiovi, 1996, p. 223)

6.8. Concluding remarks

The scope of Sraffa's "Production of Commodities" was very specific: to develop a logically consistent theory of value and distribution inspired by the classical economists (and Marx) and to show that the neoclassical theory of capital was deprived of analytical soundness. Following his reasoning, the classical theoretical framework can be considered as an alternative to the general equilibrium theory[278] for representing the inter-industrial relationships and identifying systemic properties of capitalism.

[278] Once again, we stress the convergence between our analysis and the one proposed by Giovanni Dosi: "[…] the view of technology presented here is a radical alternative to the assumption of 'production possibility sets', a concept essential to the neoclassical theory of income distribution introduced without the slightest reference to the empirical evidence on technology and technical change. Technological trajectories, on the supply side, and slowly evolving Engel-like baskets of consumption, on the demand side, define an economic system whose threads, *at any given point in time*, are consistent with an input-output description (including nearly fixed coefficients of production) and fundamentally different from the world of timeless *tatonnements* of general equilibrium: for once, the burden should rest upon those who are so fond of the traditional theory of relative prices and income distribution to demonstrate either that production and consumption possibility sets do empirically exist or, conversely, that the properties of their models resist the exposure to technological asymmetries, time and irreversibility." (Dosi, 1984, pp. 291-292, emphasis in original)

It was argued that precisely because Sraffa's interpretation of classical theory is less ambitious than the marginalist one (which determines prices, distribution *and outputs* simultaneously), it has a higher degree of flexibility to explain changes in the independent variables by complementary deductive or inductive (historical, institutional, empirical) analyses.

It is assertedthat a central feature of capitalist competition is how barriers to mobility are created and destroyed by the actions of companies and/or the State, and how the associated income is distributed among economic actors (at a more aggregated level, social classes).

As there is no magic formula for creating novelties, no general theory of technical progress and innovation can be attained. In spite of such these difficulties, the neo-Schumpeterian has achieved important advances in highlighting the complex, intricate and interactive nature of innovation, as well as identifying their intra-firm, intra-industry, inter-industry and systemic dimensions. It is also emphasized the Kaldorian explanation of productivity growth, combining a demand-led macroeconomic theory with a sophisticated view of supply.

In sum, it is proposed an integration between the Classical-Marxian theories of value and distribution and the Neo-Schumpeterian-Kaldorian explanation of technological progress and productivity growth. Rather than identifying inexorable tendencies or stages of capitalism, it is emphasized the existence of multiple conflicts (between nations, between classes, and among classes), whose mediation is considered to ultimately depend on the political dispute regarding the direction of economic policies.

There are plentiful other possible interactions between 'micro' (firms and industries), 'meso' (input-output relationships) and 'macro' dimensions (the level and composition of aggregate demand, as well as monetary and financial elements). As institutions[279] and public policies are added into the discussion, the attempt to build a (heterodox) micro-macroeconomic coherent framework gets even more complicated and controversial. In any case, we believe that a careful discussion about heterodox microeconomic foundations must be at the cornerstone of this endeavor.

[279] For a discussion on the role of institutions in the surplus approach, see Medeiros (2001) and Cesaratto and Di Bucchianico (2020).

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