

POWER IN THE MARKET: ON THE DOMINANT POSITION

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VERY PRELIMINARY

1. Introduction

1.1 The idea of imperfect competition

Chamberlin (1935: 3) states that, “it has, in the main, been assumed that the price system is like this – that all the phenomena to be explained are *either* competitive *or* monopolistic, and therefore that expedient of two purified and extremes types of theory is adequate”. In some case paradoxical results occur that, as analyzed by Clark (1923: 417), “if all the competitors followed suit instantly the moment any cut was made, each would gain his quota of the resulting increases in output, and no one would gain any larger proportion of his previous business than a monopoly would gain by a similar cut in prices. Thus the competitive cutting of prices would naturally stop exactly where it would if there were no competition”. In other words, (Chamberlin, 1935: 4) “*perfect* competition – it would seem – gives the same price as perfect monopoly”. And in this prospective, Knight (1921: 193) points on there does seem to be a certain contradiction “in the idea of theoretically perfect competition after all” and moreover “in view of the fact that practically every business is a partial monopoly [...] it is remarkable that the theoretical treatment of economics has related so exclusively to complete monopoly and perfect competition”¹.

In this paper we pore over a very wide market situation, where there is more than one competitor (hence, it is not a monopoly), but one firm (or a group of firms, but not all) has a relevance (thus, is not a perfect atomistic competition context): the dominant position, which, in our opinion, represents the illustration of power in the market.

We can consider this market situation as a peculiar plight of monopolistic competition, or rather, the general market outcome is a sort of combination of individual and group equilibrium². In particular – as we will displayed – it will be revealed results which

¹ In a more radical direction Sraffa (1926: 542) who upholds that it would “abandon the path of free competition and turn in the opposite direction, namely, towards monopoly”.

² Chamberlin (1935: 69) defines in analogous terms monopolistic competition; see also Hart (1985) for detailer on monopolistic competition. However in this work the analytical framework will be different.

cannot be come to light by either perfect (or pure) competition³ or monopoly theory; namely, the positional effects⁴. These effects can trigger a cumulative and circular causation⁵, namely the monopolization of market. We believe that this approach – in accordance with the Chamberlin’s request for more realistic analysis – is an useful tool in order to understand and, in particular, to apply the norms on dominant positions.

1.2 The Dominant Position: a first quick look

Article 82 (former Article 86) of the European Union Treaty states: “any abuse by one more undertakings of a dominant position within the common market or in a substantial part of it shall be prohibited as incompatible with the common market in so far as it may affect trade between Member States”.

In one of the first Article 82 cases, *Hoffmann-La Roche*, the European Court of Justice gave the definition of market dominance, which is still used nowadays: “[the dominant position] relates to a position of economic strength enjoyed by an undertaking, which enables it to prevent effective competition being maintained on the relevant market by affording it the power to behave to an appreciable extent independently of its competitors, its customers and ultimately of the consumers. Such a position does not preclude some competition, which it does where there is a monopoly or quasi-monopoly, but enables the undertaking, which profits by it, if not to determine, at least to have an appreciable influence on the conditions under which that competition will develop, and in any case to act largely in disregard of it so long as such conduct does not operate to its detriment”.

The *Hoffmann-La Roche* delineated also the concept of abuse of a dominant position, as a behaviour “which, through recourse to methods different from those which condition normal competition in products or services on the basis of the transactions of commercial operators, has the effect of hindering the maintenance of the degree of competition still existing in the market or the growth of that competition”.

Abusive behaviour consists mainly of exclusionary practices⁶ as predatory pricing, exclusive dealing, refusal to supply, and tying.

It is worthy to emphasize that European law does not punish the dominant position in itself, just its abuse. However, in the practice of European law, a dominant firm might not be allowed to engage in the same practices as non-dominant firms.

In the following paragraphs we look into the reason for not punishing a dominant position (that is, what Pareto-improvement the presence of a power can determine in the market), the dynamic of abuse (as a result of positional and cumulative causation effects) and the role of special responsibility, that is, borrowing the Hohfeld’s (1919) words, a form of countervailing power or immunity.

³ The use of perfect instead of pure competition is not trivial. As shown Chamberlin (1935: 6) *pure* describes “competition unalloyed with monopoly elements”, whilst *perfect* “may be interpreted to involve perfection” like perfect knowledge, condition particularly stressed by Knight (1921).

⁴ See appendix.

⁵ See appendix.

⁶ Possible exceptions are price discrimination across member states, which occupies a special place in view of the economic integration objective of EU, and “exploitative abuse”, which consists of charging excessive prices to buyers or extorting too low prices from suppliers (see, Motta).

2. An economic analysis of the dominant position

2.1 Dynamic of abuse

In competition law the dominant position is accepted, that is, an *undertaking having a dominant position is not itself a recrimination*. The reason of this stems from the Pareto improvement deriving from the presence of a dominant firm; it can be explained by the argumentation of Schumpeter-visits-Chicago approach⁷. This approach takes a relaxed view towards dominant firms, retaining that they are in general good for consumers, create lots of jobs, innovate and exploit scale economies.

In order to distinguish the benefits from the costs of the presence of a dominant position, we may stress from the aforementioned article 82 of treaty two elements concerning the dominance concept; dominance is an economic strength that enables the undertaking the *power*:

- A) to behave to an appreciable extent independently of other agents, that is to act so as its conduct does not bring about harms to itself.
- B) to have an appreciable influence, in terms of easing, on the market conditions by methods different from competition on the merits.

Point A can be restated in the following terms: the inability of the remaining agents to react to some (=appreciable) actions of firm in dominant position; on the other hand, point B illustrates the firm in dominant position's ability to deteriorate the competition⁸ on the merits in another kind of competition.

In game theoretical words these abilities can be clarified with qualifications regarding the strategy sets of the agents. For Point A, the dominant position can put in practice *some* strategies to which other agents cannot react: so, we call them as *no replaceable strategies*. Therefore, these strategies can give rise to a positional added value, that is, their relevance increments for the fact that there is asymmetry among strategy sets. More precisely we can distinguish two no replaceable strategies: if the no replaceable strategy is played only for its positional adding value, it is called positional strategy; on the contrary, if the no replaceable strategy is played no matter what the counterparts can react (that is, its adding value is irrelevant for the firm calculus), it is denoted as regular strategy.

Then, in this diversity among strategy sets or action-reaction correspondences, strategy can be selected for its positional value, that is, in this situation the firm in dominance "uses" the market asymmetry leading to a distorted behaviour and competition, that is, a *perversus usus=ab-usus*. In other terms, a choice crucially induced by the market imperfectness is an abuse of that imperfectness, that is, a part's choice essentially caused by its dominance is an abuse of dominant position.

⁷ In this terms is defined by Canoy et Al.

⁸ Roughly speaking, the notion of competition – for being non-trivial – has to be contextualised in oligopolistic framework. Competition in an oligopoly context can usefully be illustrated by (strategic) interdependences among agents. It provides that if one agent plays a strategy, the counterparts strategically react to it. Hence, in the competitive oligopoly context the equilibrium is *codetermined* by all agents' preferences and actions. It implies that, albeit the agents have different weights in determining the equilibrium (i.e. for different cost structures), every agent, has a marginally relevant role. Only in this context we can explain point A and B.

The classic case of abusive behaviour seems to respect this consideration. In fact, in a normal competition generally no agent chooses a predatory pricing strategy if the competitors can react symmetrically; but the choice of this strategy *can* be rational only if the counterparts can not react. Also refusal to deal, tying and bundling practices and exclusive dealing are strategically irrational when the counterparts can really counter-replicate to them. In each of the previous circumstances the positional element is essential for understanding the abusive behaviours.

In conclusion we identify in the action-reaction asymmetry the sense of “independent behaviour” of a dominant firm and in the positional strategy the economic rationality of an abusive behaviour.

Point B is coherent with point A. As studied by Hirsch (1976), a competition affected from positional effect can determine a competition on/for these positional effect, then a positional competition. Moreover, positional competition is much harder, and sometimes more violent, than normal competition or competition for merits. Indeed, in the case of positional competition investments cannot move to a non-conflictual sphere owing to the fact that positional competition selects strategies considering the relative asymmetry among strategy sets, whilst the competition on the merits is not based on some relative consideration, but on the quality and price of produced good. For instance, we have a competition on the merits if all the firms investing (for reducing the cost of production) harder, they may all increase their profits because productive inefficiencies are reduced and demand is increased. On the contrary, the same is not true for positional competition. If all invest (for reaching the positional strategy) harder none can improve its profits more than the others. Furthermore, “*social scarcity* [thus positional competition] constrains the welfare of humankind much more than *natural scarcity* [in our context represented by competition on the merits]” (Pagano 1999, p.???)

Obviously, a positional competition favours who is at that moment in dominant position, that is, the firm that already owns positional strategy. And then, while every other competitor invests for obtaining positional strategies (determining – by definition of positional effect – that any agents will obtain actually the positional adding values), the firm in dominant position will be already moved, before than others, to reach new positional strategy.

Then, it may occur cumulative and circular causation of monopolization market, that is, exactly what the US § 2 of the Sherman Act forbids: the attempt to monopolize the market⁹. Symmetrically in EU, in order to prevent it, the antitrust right introduces a sort of countervailing power or immunity.

2.2 The countervailing power: the special responsibility

Indeed, the firm in dominant position has a *special responsibility*¹⁰. The Court affirms: “a finding that an undertaking has a dominant position is not itself a recrimination but simply means that, irrespective of the reasons for which it has such a

⁹ The US Supreme Court affirmed that a firm with monopoly power “has the power to control prices or to exclude competition” (U.S. v. E.I. du Pont de Nemours & Co.).

¹⁰ In the EU non-dominant firm do not have special unilateral obligations. One exception does, however, exist the case of merger control, where a specific type of “attempt to monopolization”, called creation of a dominant position, is forbidden by European law.

dominant position, the undertaking concerned has a special responsibility not to allow its conduct to impair genuine undistorted competition on the common market” (Michelin, par. 57).

The court appears to be saying that the dominant position has some sort of negative responsibility, *not to allow its conduct*, i.e. the dominant firm has to abstain from certain behaviours. However, it is very clear that these behaviours are not allowed only because we are in the presence of a dominant firm, most likely the same behaviours are allowed for a normal (non dominant) firm. In other words the dominant firm has to follow practices and behaviours inspired by normal competition.

Therefore, this special responsibility justified in order to prevent a distortion of competition can be explained in terms of countervailing power limiting the dominant firm’s power in order to prevent a cumulative causation process leading to monopolization.

We can conclude on the role of special responsibility: the special responsibility of a dominant firm consists in preventing the positional competition and its cumulative and circular effects.

This point gives us an idea about the analogy between concept of *attempt to monopolize* in the US and *special responsibility of dominant firm* in EU competition law. It can be clearly connected with preventing of cumulative causation as showed above and thus with the European notion of dominance.

3. The joint dominance

3.1 (Horizontal) joint dominance

Article 82 is not limited to single-firm misconduct. Under the theory of collective or joint dominance, several firms can share and abuse a dominant position. When the Commission first tried to apply Article 82 to oligopoly, the Court of First instance rejected the argument (although the court upheld the finding of infringement under Article 81 as a restrictive agreement). To find that several firms together hold a dominant position, the court demanded that the firms be “united” by “economic links”, such as a network of interdependent intellectual property licenses. In this way, these firms in dominance indirectly synchronize the pricing and policy decision, an action often labelled “tacit collusion” or “conscious parallelism”. Judgments applying the analogous language about dominance in the Merger Regulation, which have been cited for the application of Article 82, imply that oligopoly interdependence might amount to collective dominance if the members could monitor each other effectively, if retaliation against defectors was credible enough to provide each member with an incentive to maintain co-ordination and if customer and consumer responses would not undermine co-ordination.

The analysis of joint dominance is quite analogous to individual dominance but for the fact that positional strategies are not under the “control” of one firm but a group of firms. The key point can be explained in positional terms; following (but diverging in some points from) Pagano (1999), in an economy of n individuals we can distinguish three positional strategies. In the first case, the control of strategy by an individual is related only with other individual’s no control; this can lead to bi-positional strategy. In

the second case, the individual's control of strategy is related to all the other $(n-1)$ individuals' control; this can lead to pan-positional strategy and it illustrates the circumstance of abuse of individual dominant position analyzed above. Finally, in the third case, the individual's control on strategy is related to more than one (but not all) other individual's control. This can lead to multi-positional strategy and it represents the joint dominance. Indeed, in joint dominance – as in individual dominance – the positional effects emerge between the dominant part and all others. But, unlike individual dominance, joint dominance has a commons effects¹¹; namely, in the dominant group, among the firms we find a *commons tragedy*. Indeed, to sustain the joint dominance can be necessary investments whose benefits will be consumed by the group in dominance. For instance, let's assume two firms in joint dominance in a geographical market; if a strong foreign competitor needs to merge with a small firm of a region for accessing in that geographical market, the strategy of the two firms in joint dominance can be to get their hands on that small firms before that the strong competitor does it. At this point the coordination between the two firms can fail owing to the fact each firm will prefer that the other invests for preventing the entry of strong competitor. It is the classical example of free-riding behaviour and represents the cost of preserving the joint dominance. Therefore, we can describe the boundaries of joint dominance in terms of equilibrium between the gains of it (that is, positional effects) and cost of preserving it (namely, free-riding behaviours). It explicates the reason for which a method for reducing costs of conserving a joint dominance is by a commitment. This commitment can be sustained by factors as transparency of market, degree of symmetry among firms in dominance and the ability of each of these firms to counteract to each deviation from preserving the dominance. These factors discourage the dissolution of joint dominance and, in fact, therefore, these are analyzed in every case of joint dominance.

3.2 Vertical joint dominance

Although it is accepted that firms horizontal related – that is, in the same market of product – can constitute the so-called economic links in order to form an (horizontal) joint dominance, it is not substantially analyzed and the normed for the vertical relationship. The crucial reason is the fact that the norms on dominance state regard the relevant market, then also the same market of products, whilst vertical joint dominance can be constitute in at least two different markets of product. Then, it can not merely applied the joint dominance normative.

Even if vertical joint dominance is not normed, it does not mean that this is not significant. Its relevance is strictly related to vertical competition concept. Normally, vertical competition is analyzed in a negative manner or not examined. Indeed, in general, when the productive and allocative efficiency (like in the case of double marginalization) or foreclosure effects are stressed, the vertical competition is essentially argued as anti-competitive and opportunistic behaviours. It stems from the fact that vertical relationships are usually studied assuming perfect complementarity among agents.

In this way, firm's strategies for modifying the relative strong in the vertical relationship are explored once in a blue moon. However, some authors outlined the importance of

¹¹ A clarifying example very analogous is the National Security; indeed it is a public good for citizens but a positional good among the State.

vertical competition (as alternative, but not only, to horizontal competition) for maximizing the welfare. One part has stressed the role of outside options in the problem of incomplete contracts between agents vertically related (Pantaleoni 1925 and more recently Nicita 1999 departing from Commons 1924 studies). Another part, following Galbraith (1956) and his idea of countervailing power, largely explains the effects of this competition. However, the main fault of these theories is probably the assumption that a counter-balancing power emerges spontaneously or endogenously.

In spite of this, Antitrust authorities in many cases applied implicitly the principle of vertical competition¹². Indeed, as vertical joint dominance represents the degeneration of vertical competition, so horizontal dominance represents the degeneration of horizontal competition. There is not theoretical *a priori* reasons for believing that economic links for forming a joint dominance can be constituted only by horizontal related agents and not vertical ones. Then, as Antitrust Authority is called to safeguard the horizontal competition by horizontal joint dominance, so it is called to safeguard the vertical competition by its degeneration: the vertical joint dominance.

Therefore, positional strategy and cumulative causation of monopolization must be analyzed in a wider approach, considering both vertical and horizontal pro- and anti-competitive incentive. However, the role of antitrust concerning on abuse of dominant position continues to be the analysis and punishment of behaviours crucially aimed by imperfectness of market, that is, by asymmetries among strategy sets: namely, positional strategies and positional competition.

4. Concluding remarks. A new perspective: effect-based vs form-based

The approach explained above is focused on the analysis of effects more than that of form. Indeed, we examine abusive behaviour stemming from positional strategy and not as result of market factors. A positional strategy is defined as the action chosen crucially for its positional adding-value. Then positional effects are the reasons of abusive behaviour and, subsequently, we retain that the investigation of abuse must be an investigation of positional outcomes on the market. Moreover, this result can be the cause of a dynamic consequence: the positional competition, which represents in this framework the more generally cumulative process triggered by the presence of power. In other words, positional competition favours who is already in an advantaged position. In conclusion, the dominant firm is related to two crucial and sequential effects: one static, illustrated in positional terms, and one dynamic, as a result of positional competition.

¹² Instances in this direction are Microsoft and GE/Honeywell cases. Microsoft has attempted to entry in the market (vertical related) of Netscape, that is, the browser market, by introducing Explorer. Contemporary, Netscape has stimulated the competition among operative system (then increasing its outside options) supporting Linux and reducing competition in its market merging with AOL (then decreasing Microsoft's outside options). It is clear that an action, which can appear pro-competitive as that of introducing a new competitor in the browser market, has triggered a vertical competition reaction, which then can not be understood by horizontal competition reasons. Symmetrically for GE/Honeywell case where a particular theory on vertical restraint (namely, Archimedean leveraging) applied in this circumstance is actually close to vertical competition approach.

APPENDIX: positional effects, circular and cumulative causation

We try to describe two (but we will try to unify them in one) characters of power, generally intended: on one hand, positional feature while, on the other hand, cumulative and circular causation. At a first glance we can formulate:

- A good, service, resource, action or strategy has positional feature when the marginal relevance of its “control” depends inversely on the counterpart’s control.

The (control of) power of command of a major general decreases with the raising of number of major general within an army (and vice-versa, it increases with the raising of number of private soldiers).

- A process is a cumulative and circular causation when each variable receives impulses and, in turn – as in an endless chain reaction – sends impulses.

A major general will attempt to increase his power (at time t) decreasing the soldiers’ countervailing power. If the major general will succeed in it, the new asymmetry at time $(t + 1)$ would provide with new means (more than previously) at the major general, who once again, may (more easily) increase his power decreasing the soldiers’ countervailing power. In other words, the asymmetry between *power* holders and non-holders will endogenously be accentuated (in a cumulative and circular causation). Indeed it is reasonable to assume that the actual power holder is in an advantaged position in being the future power holder.

We now wider analyze the two notions.

As Pagano (1999) noted, though in traditional economic theory we usually consider two types of goods (and their intermediate combinations), that is, private and public goods, it possible to individualize a third type: positional good. A positional good is an intrinsically (that is, socially) scarce good whose value is determined by its social environment¹³. In other terms, a positional cannot be increased by devoting more economic resources to it because its value is dependent on how much is owned relative to what other people own: the more people acquires a positional good the less its value. Real estate is said to represent a positional good because the value of land primarily depends not upon anything inherent to that land, but upon the social context in which that land is placed¹⁴.

In accordance with Pagano (1999) we can study positional good in the following way. Pure private goods are characterized by the fact that other individuals consume a *zero amount* of what each individual chooses to consume¹⁵. In the case of a pure public good, each agent must consume the *same positive amount* that other agents decide to consume. In an economy consisting of two individuals, a pure positional good is a good such that, given the consumption choice of one agent, the second agent must consume a *corresponding negative amount* of what the first chooses to consume. In this respect, positional goods define a polar case with respect to public goods (Pagano 1999). Unlike the case of private goods, here the consumption choices of the agents are interdependent and, unlike the case of public goods, the consumption of the goods differs between individuals having *different positions* (negative and positive consumption) relative to the good. Public good, on the contrary, determines a positive effect for a part and,

¹³ For instance, only after the appearance of Friday, Robinson perceived positional good.

¹⁴ Some people prefers to live in areas which are less crowded, and other people may want to live in a specific area close to the centres of business. Seeking to acquire space away from other people and trying to acquire land near a centre of business is inherently limited because in both cases you are only able to achieve what you want by keeping other people from acquiring it as well.

¹⁵ The other individuals are excluded from the consumption of private goods that do not belong to them and their position with respect to the consumption of these goods is not altered by the consumption choices of the other agents. In all cases they are excluded from the consumption of the goods consumed by other individuals. This exclusion is impossible in the case of a pure public good.

contemporarily, also positive effect for the counterparts. Reinterpreting in terms of nature of good, that is, using notion as excludability and rivalness (as showed in figure 2.1), we can observe:

- Both public and positional goods are non-excludable. Indeed, unlike private good, they determine externalities on more individuals: positive (negative) for the public good (bad), while some positive and other negative for positional one.
- Rivalness is the crucial distinction between public and positional good. The former, as it is known, is non-rival because positive externality on a part doesn't preclude the positive externality on other part. As showed above, for the private good there is not effect on non-owner, then we have textbook rivalness. Concerning on positional good, it has a positive externality together with a negative externality. For the same reasons for which we describe as non-rival a public good and as rival a private good, we may describe a positional good by the double contra-posed effect, thus by double rivalness.

	non-excludable	excludable
non-rival	PUBLIC GOOD	SPITE GOOD
rival	COMMONS	PRIVATE GOOD
double rival	POSITIONAL GOOD	

Figure 2.1

Unlike traditional economic goods, power inevitably involves different *positions* of the individuals with respect to other individuals; for this reason, following Fred Hirsch¹⁶ (1976)'s terminology, we can call this attribute of power as positional feature. Indeed, any positive amount of power must be jointly consumed with negative quantities of other legal positions. That is, it is impossible to exercise a power if somebody is not subject to the exercise of this power: positive amounts of power must be jointly consumed with negative amounts of – following the words of Hohfeld – immunities (see Pagano 2002).

The positional feature provides us with the framework in order to study power in accordance with Weber's definition. Indeed positional feature is determined by social constraint and precludes that every agents accept a power. The power becomes domination, following Weber's formulation, when positive effects of allocation of power are enjoyed also by non-holders. It is possible if and only if power allocation makes available saving of (opportunity) costs, thus surplus. It will be clearer below where it is analyzed the efficiency of emergence and allocation of power in a positive transaction cost context.

In conclusion we want to stress a crucial result – introduced, proofed and widely analyzed by Pagano 1999. The price of a good with positional feature (or for sake of simplicity, a positional good) has not only to pay the benefit of buyer but also the negative effect (or cost) on alternative buyers or non owners: namely, the price should be a sort of double (or multiple) price. Therefore, goods with positional feature prefigure market failures. Moreover, “the existence, enforcement or, even, the definition of property rights is as hard in the case of positional goods as it is for the case of public goods. However, the consequences of the failure to establish property rights have

¹⁶ Hirsch identifies in Wicksteed (1910) the first author who studied this concept.

opposite signs. In the case of public [...] goods, the consequences of this failure implies that agent consuming the public good does not get paid for other people's consumption; in the case of positional [...] good, the equivalent failure implies that agent consuming positive amounts is not charged for the negative consumption of other agent's consumption" (Pagano 1999, p. 71). This consideration stresses, once again, the idea of Weber of power as a will (the power holder) against other wills (who is not remunerated for negative effects). Moreover, we can also deduce that the bargaining and/or exchanging of power can not easily or trivially occur in a coasean market (namely in perfect competition). What is more – despite the difficulties of establishing a market for a positional good are very much the same as the ones may arise in the case of public good – even if we assume a coasean market for this positional good, additional difficulties may arise *ex-post*, after the allocation of a power. These *ex-post* problems are often unable to solve *ex-ante* and may have a negative feedback on the *ex-ante* desirability of having market transaction of positional goods. It can occur cumulative and circular processes which are causes and consequences of these *ex-post* difficulties. This is the issue of the following paragraph.

In essence the notion which Myrdal refers to as the *principle of circular and cumulative causation* and which plays an focal role in his analysis of uneven development¹⁷ can be stated in the following terms: “the underlying fact is that [given interdependences between all factors in a social context] any change in any one of the factors will cause changes in the others; these secondary changes are generally of a nature to support the initial change; through a process of interactions, where change in one factor continuously will be supported by reactions of the other factors, the whole system will have been given momentum to move in the direction of primary change, though much further” (Myrdal 1956, pp. 15-16). Thus, change becomes progressive and propagates itself in a cumulative way (see also¹⁸ Young 1928 and Kaldor – among others – 1985). Apparently different from circular and cumulative causation is the concept of institutional complementarities, that is, when, under particular conditions, the equilibrium becomes self-enforcing. In other terms, the variables, determining the equilibrium, are in a relationship of mutual reinforcement. Then a small difference among economic systems can trigger a dynamic process which leads to deeply divergent systems. It is, in few words, the foundation of the economic path dependence approach¹⁹, as well. In accordance with Mark Roe's (1996) paper, we

¹⁷ Indeed, due to the operation of dynamic economies of scale, industrial activity tends to concentrate in a few established centres which benefit from freeing and widening of markets at the expense of the industrial development of backward countries; the free play of market forces works towards inequality (see Myrdal 1957).

¹⁸ In spite of the term cumulative causation is due to Myrdal, the basic hypothesis appears in Young's analysis of economic progress. It is on this basis that Kaldor puts forward a definite *cumulative causation approach* to the economic process (see the survey of Ricoy 1987). On the other hand, Kapp (1976 p. 218) outlines that the interlocking circular interdependences (or circular cumulative causation) has a long history. “It played an important role in Malthus' analysis of the growth and the decline of populations. Thunen advanced an early version of it when he stated that the manual worker cannot rise into the class of entrepreneurs because he lacks the necessary schooling since his wage are low, in turn, is due to the fact that the poor have higher reproduction rates and hence the supply of labor is almost always higher than the demand, and consequently wages tend towards the subsistence level. Marx was the first to stress the fundamental reciprocal interaction between ‘productive forces’ and ‘production relations’ and the ideological superstructure. [...] and so did Knut Wicksell, within a narrower market framework, in his account of the inflationary expansion of credit resulting from a deviation of the money (market) interest rate from the natural, real rate of interests.”

¹⁹ We can describe succinctly the path dependence theory in the following terms: “men make their own history but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past” (Marx and Engels, vol. 1, p. 247). For empirical instances of path dependences, see David (1985). A very good survey can be found in the first chapters in Liebowitz and Margolis (???)

offer a categorization of path dependence. Path dependence can be weak (the efficiency of the chosen is tied with some alternative), semi strong (the chosen path is not the best but not worth fixing), or strong (the chosen path is highly inefficient, but we are unable to correct it). We can reinterpret this distinctions in terms of switching costs from lower to higher. In the semi strong path dependence some feasible arrangement exists in order for recognizing and achieving a preferred outcome. Williamson (1993, p. 140) offers the term *remediability* to describe the condition that such feasible alternatives exist²⁰. In this framework, market failure is not demonstrated unless a specific policy recommendation can be shown in which the benefits exceeds the costs, including all of the administrative costs of the policy.

In this work we want to join the circular and cumulative causation principle with institutional complementarities theory (which has among the founders Milgrom-Roberts 1990, and Pagano-Rowthorn 1994, Aoki 2001) and path dependence theory. The mathematical view is provided below, at the moment we want to emphasize that the idea of institutional complementarities is the same of cumulative and circular causation but for the fact that the former focuses on equilibrium self-enforcing whilst the latter states that “everything causes everything else [...] And there is generally no equilibrium in sight” (Myrdal 1978 p. 774, see also Kaldor 1985). In our opinion, the difference stems from the concept of equilibrium. The institutional complementarities equilibrium is a Nash equilibrium, then based on strategic interaction, on the other hand cumulative and circular causation is an economic equilibrium, based on marginal calculus²¹. However the idea and the formal analysis is the same.

Coming back to analysis of power, now we try to expose why and in which manner power is associated with circular and cumulative causation (or institutional complementarities and then path dependence). Intuitively, the power holder will attempt to preserve his power. For example, if in a community in order to solve an *empasse* in voting (then a Pareto inefficient circumstance) is established that one decided for others, that is, allocating a decision power at one individual, this individual will try to care for prolongation of this occurrence, choosing – for instance – an alternative which determines a further *empasse* in the next vote. Conversely, it can occur that this individual is not so strong for obtaining it, and then he will decide for the social best. Therefore, the allocation of power can sustain a circular and cumulative causation. In other words, it leads to a path dependence, which can be strong (like in the former case concerning the vote), semi strong or weak.

Thus, in the next paragraph we show that positional effect and cumulative causation (or institutional complementarity) can be studied jointly in terms of supermodularity.

Suppose that $f(x)$ is a utility function (or minus the cost function) for an economy of $n = \{1, \dots, j, k, \dots, n\}$ agents whose consuming levels are $x = (x_1, \dots, x_n)$; let's denote through $f(x_i + \varepsilon) - f(x_i)$ the i^{th} 's utility for an additional $\varepsilon > 0$ consume. The utility function $f(x)$ describes a positional good (like the power) if and only if the net additional utility for any additional amount of consume is always decreasing in the consume level of some²² other agent. For instance, taken two i^{th} 's crescent consume level x'_i, x''_i and two j^{th} 's crescent consume level x'_j, x''_j as shown in figure 2.1, if and only if

²⁰ Similar positions have been argued by Coase (1964), Calabresi (1968), Demsetz (1969), and Dahlman (1979), among others.

²¹ In order to explain widely this difference, let's consider the prisoners' dilemma. The Nash Equilibrium is Confess-Confess (or Not cooperate-Not cooperate), whilst economic equilibrium is Not Confess-Not Confess (or Cooperate-Cooperate).

²² Pagano (1999) distinguishes among different particular cases of "semi-positional" goods. Bipositional goods are defined by the fact that only one other individual consumes the corresponding amount while "multi-positional" and "pan-positional" goods are defined by the fact that many individuals.

$[f(x''_i) - f(x'_i)]_{x'_j} \geq [f(x''_i) - f(x'_i)]_{x''_j} \quad \forall i, j \in n : i \neq j$, then we are in presence of a positional good.

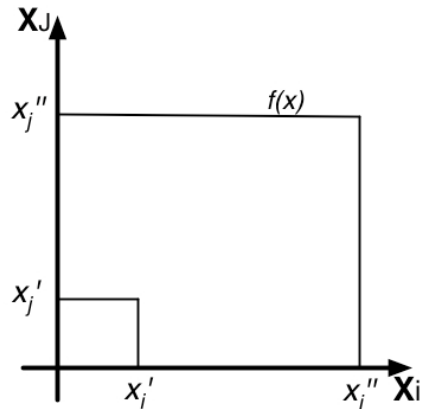


Figure 2.1

In other words, for a positional good the utility function has decreasing differences in the others' consume or equivalently has increasing differences in the others' minus consume. Increasing differences is a well-known condition for a utility function to be that of a system of complementarity²³ and Topkis (1998) shows that the economic notion of increasing differences or complementarity is equivalent to the mathematical concept of supermodularity. Indeed, suppose that $f(x)$ is a real-valued function on a lattice²⁴ X , if

²³ "One may sometimes conclude too readily that an old, familiar, and simple concept, exemplified in myriad commons situations, has little new to offer. In particular, how much novelty could be expected from the descriptive notion of complementarity" (Topkis, 1998 pag. 93). Complementarities are pervasive in economics, ranging from coordination problems in macroeconomics and finance to pricing and product selection issues in industrial organization. At the heart of complementarity there is the notion, due to Edgeworth (1925), that the marginal value of an action or variable increases in the level of another action or variable. Complementarities have been a recurrent and somewhat contentious topic of study for economic analysis. Indeed, while Paul Samuelson (1947) in his Foundations stated that "in my opinion, the problem of complementarity has received more attention than is merited by its intrinsic importance", he later corrected himself in 1974, on the occasion of the 40th anniversary of the Hicks—Allen revolution in demand theory, when he stated at the very beginning of his paper that: "the time is ripe for a fresh, modern look at the concept of complementarity. Whatever the intrinsic merits of the concept, forty years ago it helped motivate Hicks and Allen to perform their classical *reconsideration* of ordinal demand theory. And, as I hope to show, the last word has not yet been said on this ancient preoccupation of literary and mathematical economists. The simplest things are often the most complicated to understand fully".

²⁴ A binary relation \leq on a set X [writeable as (X, \leq)] specifies for all x' in X either that $x' \leq x''$ is true or that $x' \leq x''$ is false. If $x' \leq x''$ and $x' \neq x''$, then $x' < x''$. A binary relation \leq on a set X is *reflexive* if $x' \leq x''$ for each x in X , *antisymmetric* if $x' \leq x''$ and $x'' \leq x'$ imply $x' = x''$ for all x' and x'' in X , and *transitive* if $x' \leq x''$ and $x'' \leq x'''$ imply $x' \leq x'''$ for all x', x'' and x''' in X . A partially ordered set (or *poset*) is a set X on which there is a binary relation \leq that is reflexive, antisymmetric, and transitive.

Milgrom and Roberts (1990) Definition (poset): a reflexive and transitive relation on a set is called a partial order; a set with a partial order on it is called a partially ordered set or a poset.

Suppose that X is a poset and X' is a subset of X . If x' is in X and $x \leq x'$ ($x' \leq x$) for each x in X' , then x' is an *upper (lower) bound* for X' . If x' in X' is an upper (lower) bound for X' , then x' is the *greatest (least) element* of X' . If x' is in X' and there does not exist any x'' in X' with $x' < x''$ ($x'' < x'$), then x' is *maximal (minimal) element* of X' . A greatest (least) element is a maximal (minimal)

$f(x_i \vee x_j) + f(x_i \wedge x_j) \geq f(x_i) + f(x_j)$, for all x' and x'' in X , then $f(x)$ is supermodular on X . Function $f(x)$ is called submodular if $(-f)$ is supermodular. A function that is both supermodular and submodular is a valuation.

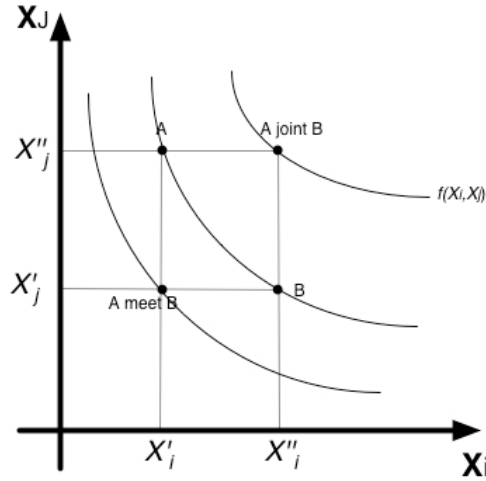


Figure 2.2

An example (shown in figure 2.2) can clarify it. Taken two consume set A and B : the joint is the consume set composed from maximum elements, whilst the meet from minimum elements. If the sum of functions between meet point and joint point is more than the sum of functions between point A and point B , then the function is supermodular; that is, $f(A \vee B) + f(A \wedge B) > f(A) + f(B)$. If it is lower, then the function is submodular. If in some cases is more and in other cases is lower then the function is a valuation. Notice that we can re-write supermodular condition as $f(A \vee B) - f(A) > f(B) - f(A \wedge B)$ that expresses the increasing differences. So it is simple to verify that the function in figure 2.1 is submodular. In other words a positional good is described by the submodular effect.

At this moment we show the correlation with a cumulative causation. Once more, let $f(x)$ is a utility function for an economy of $n = \{j, k\}$ agents whose consume levels are $x = (x_i, x_j)$; taking two i^{th} 's crescent consume level x'_i, x''_i and two j^{th} 's crescent consume level x'_j, x''_j the cumulative causation pre-conditions are:

$$f_i(x'_i; x'_j) - f_i(x''_i; x'_j) < f_i(x'_i; x''_j) - f_i(x''_i; x''_j)$$

$$f_j(x''_j; x''_i) - f_j(x'_j; x''_i) < f_j(x''_j; x'_i) - f_j(x'_j; x'_i)$$

where f_i represents the utility function for i and f_j for j .

The cumulative causation pre-conditions derive from submodular conditions. Such process does not exclude that the level of payoff of one strategy is strictly higher than that of the other for the

element. A poset can have at most one greatest (least) element, but it may have any number of maximal (minimal) elements. Distinct maximal (minimal) elements are unordered. If the set of upper (lower) bounds of X' has a greatest (least) element, then this least upper bound (greatest lower bound) of X' is the *supremum (infimum)* of X' . If two elements, x' and x'' , of a poset X have a least upper bound (greatest lower bound) in X , it is their *join (meet)* and is denoted $x' \vee x''$ ($x' \wedge x''$). A poset that contains the join and the meet of each pair of its elements is a *lattice*.

Definition (lattice) A poset is called a lattice if every pair of elements has a supremum also known as their joint (denoted through \vee) and an infimum also known as their meet (denoted through \wedge).

agents of one or both domain(s) regardless of choice of strategy in the other domain. In such a case the preferred rule(s) will be implemented autonomously in the relevant domain, while the agents in the other domain will choose the strategy that maximizes their payoffs in response to their institutional environment. However, if neither rule dominates the other in either domain, the agents in both domains need to take into account which strategy is chosen in the other domain. Therefore, under the special submodular conditions²⁵ there can be two pure Nash equilibria, namely $(x''_i; x'_j)$ and $(x'_i; x''_j)$.

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²⁵ The matrix 1 describes the submodular condition in a non-cooperative game theory framework. If $d > a$, $h > e$, $g > f$ and $c > b$, then there are undominated strategies and two Nash equilibria, namely $(x''_i; x'_j)$ and $(x'_i; x''_j)$.

Submodular game

$$I^N \begin{matrix} & x'_j & x''_j \\ x'_i & [a, f & c, g] \\ x''_i & [d, h & b, e] \end{matrix}$$

where $a - d < c - b$ and $e - h < g - f$

Matrix 1

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