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X-Efficiency

Harvey Leibenstein

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JEL Classifications

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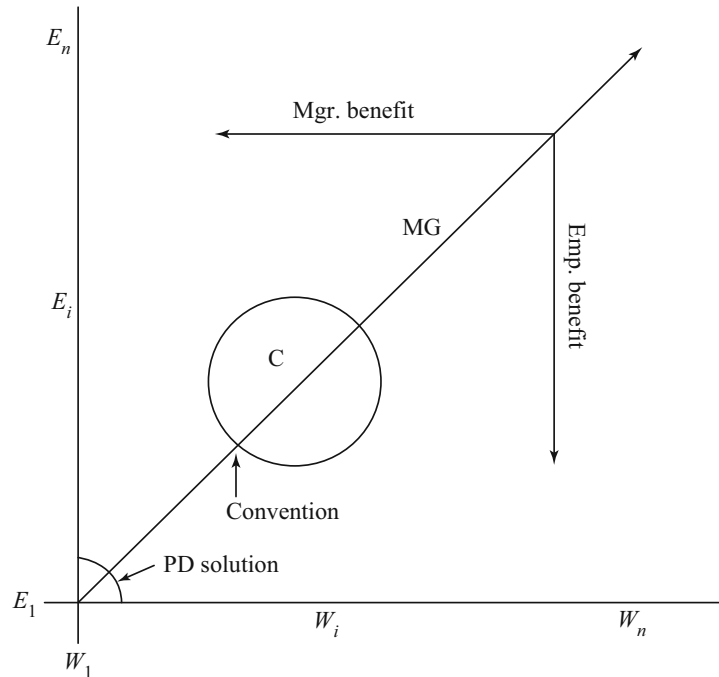
One has to distinguish the X-efficiency concept from the theory intended to explain it. As a concept X-inefficiency is similar to technical inefficiency. Leibenstein originated the concept of X-inefficiency because of a belief that there is nothing technical about the most substantial sources of non-allocative inefficiencies in organizations. At the time of the original article (Leibenstein 1966), it seemed that no available concept, such as organizational inefficiency or motivational inefficiency, implied all the elements that could be involved in non-allocative inefficiencies. Hence, the comprehensive term, 'X-inefficiency', was used.

X-efficiency theory represents a line of reasoning based on postulates that differs from standard micro theory. A brief statement of the postulates and other elements of the theory follows. (a) *Relaxing maximizing behavior*: it is assumed

that some forms of decision making, such as habits, conventions, moral imperatives, standard procedures or emulation, can be and frequently are of a non-maximizing nature. They do not depend on careful calculation. Other decisions attempt at maximizing utility. In order to deal with the max/non-max mixture we use a psychological law, the Yerkes–Dodson Law, which essentially says that at low pressure levels individuals will not put much effort into carefully calculating their decisions, but as pressure builds they move towards more maximizing behaviour. At some point too much pressure can result in disorientation and a lower level of decision performance. (b) *Inertia*: we assume that functional relations are surrounded by inert areas, within which changes in certain values of the independent variables do not result in changes of the dependent variable. (c) *Incomplete contracts*: we assume the employment contract is incomplete in that the payment side is fairly well specified but the effort side remains mostly unspecified. (d) *Discretion*: we assume both that employees have effort discretion within certain boundaries, and that the firm, through its top management, has discretion with respect to working conditions and some aspects of wages.

Under these postulates the firm does not control all of the variables. Rather, the variables are controlled by employees on the one side, and management on the other; both jointly determine the outcome. Thus, this is a standard game-theory type problem. Given the postulates it is easy to

X-Efficiency, Fig. 1



suggest that a latent Prisoner's Dilemma problem exists. Employees have an incentive to move towards the minimum-tolerated effort level (E) and the firm has the incentive to move towards the minimum-tolerated working-condition-wage level (W). This is illustrated in Fig. 1, where the discretionary effort options run from E_1 to E_n , $E_1 < E_i \dots < E_n$ and the discretionary working-condition – wage options run from W_1 to W_n , $W_1 < W_i \dots < W_n$. Under individual maximizing behaviour employees would want to end up at E_1 , and the firm would want to offer W_1 . This is the Prisoner's Dilemma solution. The optimal solution is $E_n W_n$. However, the theory argues that in general the Prisoner's Dilemma solution will be avoided. The reason is that a system of conventions, which depends on the history of human relations within the firm, is likely to lead to an outcome that is usually intermediate between the Prisoner's Dilemma outcome and the optimal solution. In Fig. 1 the line with the arrow MG represents a locus (one of many) of 'mutual gain' situations. That is, for any point on the locus there is a point further up in the direction of the arrow that involves greater effort, greater

firm revenues, and a division of the increase in quasi-rents such that both wages and profits are improved. In other words, both the employees and the firm can gain.

We should note that for every effort option that employees choose the firm will want to choose the minimum wages and working conditions, W_1 . Similarly, for every W the firm chooses the employees will want to choose E_1 . This is the Prisoner's Dilemma outcome, which the arguments that follow will suggest is not likely to occur. However, this adversarial-relations problem between employees and managers is compounded by another free-rider problem. Every employee has a free-rider incentive to move to the tolerated minimum level E_1 , even though he or she might want others to work effectively. Since all employees and managers face these incentives, overall effort would be reduced to the minimum if they all followed their individual self-interest. Clearly, in this organizational situation individual rationality cannot solve the Prisoner's Dilemma problem. Something akin to 'group rationality' (see Rapoport 1970) is required to achieve an improved solution.

A formal theory of conventions (social norms) has been developed in recent years based on the work of T. Schelling, D. Lewis, and E. Ullman-Margalit. The basic ideas are that conventions should be viewed as solutions to multi-equilibrium, coordination problems and that conventions can provide superior solutions to the Prisoner's Dilemma outcome. An example is whether automobiles should be driven on the left or the right. Everyone driving on the right is a desired outcome, and everyone driving on the left is a desired outcome, but a mixture of left-hand and right-hand driving has a negative payoff. Obviously, a convention is required to choose between all left-hand or all right-hand driving. A coordinated solution is superior to an uncoordinated outcome. However, the various coordinated solutions that are possible need not be equally good. Thus, different times of starting work may not be equally preferred, but a coordinated time may still be preferred to an uncoordinated time. Hence, the conventional hours of starting work need not be optimal.

The point of all this is that effort conventions and working-condition conventions can bring about a non-Prisoner's Dilemma solution. This is shown by the point *C* in Fig. 1. The circle surrounding the point represents the inert area surrounding the solution. The distance between *C* and $E_n W_n$ represents the degree of X-inefficiency in the system. Thus, the effort convention is a coordinated solution that is superior to uncoordinated individual behaviour. Similar remarks hold for managerial decisions. Of course, the value of *W* has to be viable in the sense that it must represent a long-run profitable outcome, although not necessarily the maximum profit level.

There is a difference between the creation of a convention and adherence to it. The creation may come about through various means, such as the leadership of some managers, or some employees, or by some initial effort levels being chosen arbitrarily. Once established, a convention reduces the flexibility of employees' behaviour. Thus, new employees will adhere to the convention, and possibly support it through sanctions on others.

Although stable to small changes of its independent variables, an effort convention need not stay at its initial level indefinitely. The concept of inert areas suggests that a large enough shock can destabilize a convention. Once destabilized it is no longer clear whether the dynamics of readjustment will lead to a superior or inferior situation for both sides, or a situation under which one side gains at the expense of the other. Such considerations (and fears) help to stabilize the convention.

It is of interest to note that under low-pressure conditions the postulate of nonmaximizing behaviour enables us to recognize and understand why firm members may stick with their conventions and impose supporting sanctions even in situations where they would be better off not doing so. Non-calculating, situation-response behaviour helps to shore up the convention-solution to the Prisoner's Dilemma problem, and to shore up the persistence of non-optimal conventions. This helps to explain the existence and persistence of X-inefficient behaviour.

An illustration of X-inefficient behaviour was described in an article in the *New York Times* (13 October 1981) that compared two identically designed Ford plants, one in the UK and one in Germany, both designed to produce the identical automobile utilizing the same manpower and equipment. Nevertheless, the German plant produced 50 per cent more automobiles than its UK counterpart with 22 per cent *less* labour. Despite the identical plant design, the different effort conventions help to explain the X-inefficient result in the UK plant.

The theory permits a number of inferences to be drawn, some of which (stated without proof) are as follows. Firms generally operate *within* rather than *on* their production frontiers. Given the output, costs per unit are generally not minimized. Innovations are generally not introduced when it is optimal to do so. Less output is not necessarily associated with more desired leisure. The price of the product can have an influence on the cost of production.

There have been a number of measurements of X-inefficiency and empirical tests of its inferences. Professor Roger Frantz (1987) has estimated that over 50 empirical studies exist that

either measure the degree of X-inefficiency or provide econometric results that help to confirm the theory.

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Xenophon (c430 BC–c355 BC)

Henry W. Spiegel

Xenophon was a disciple of Socrates who made a name for himself as a military and political leader. Although he was a man of action rather than a philosopher, he wrote on many subjects and some of his writings touch on economic matters – the division of labour, management, the nature of wealth, public finance, and the relationship between gold and silver. In the *Cyropaedia*, a work ostensibly devoted to the education of a prince, Xenophon comments on the excellence of the king's table, where everything is prepared by specialists. He then goes on to elaborate this thought, stresses the advantages of the division of labour as far as the quality of goods is concerned, and makes the division of labour limited by the extent of the market:

In small towns, the same workman makes chairs and doors and plows and tables, and often this same artisan builds houses, and even so he is thankful if he can only find employment enough to support him. And it is, of course, impossible for a man of many trades to be proficient in all of them. In large cities, on the other hand, inasmuch as many people have demands to make upon each branch of industry, one trade alone, and very often even less than a whole trade, is enough to support a man (Book VIII, s. ii, 4–6).

Xenophon's reference to the matter differs from that of Plato in that he does not relate the division of labour to human inequality and the stratification of society. Marx, who was of the opinion that Adam Smith had not contributed anything new about the division of labour (*Capital*, Vol. 1, ch. 12, s. 3), cited Xenophon's passage in full (*ibid.*, s. 5).

Xenophon, a soldier and gentleman farmer, assembled thoughts on the management of farms and households in *The Economist*, the opening chapter of which contain an enquiry into the meaning of wealth. According to Xenophon, a man's wealth is only what benefits him or what he knows to use. A true gentleman should engage in agriculture and war, not in mechanical arts, which do damage to mind and body. John Ruskin found much to praise in this work, especially the view about wealth (1876, p. xxxix), which has parallels also in J.A. Hobson's *Work and Wealth* (1914).

Xenophon is also credited – although not unanimously – with the authorship of *Ways and Means to Increase the Revenues of Athens*, an early essay in the field of public finance, in which numerous suggestions are made to realize the goal indicated in the title. Xenophon proposes to admit a larger number of guest workers, improve the port facilities, construct markets and inns for visitors, establish a government-owned merchant fleet, increase the production of silver by the government-owned mines, and have the city acquire slaves to be hired out to private users. His plea for government enterprise has occasionally been commented upon and he has been called a mercantilist. Opportunity for comment is also provided by his view about the respective merits of gold and silver. Silver,

he states, will never lose its value, while an abundance of gold will cause its value to fall and that of silver to rise. Implied here are visions of demand and supply and of an equilibrating mechanism; as for the substance of his view about gold and silver, modern authorities accept it as plausible in the light of the conditions of the time, when Persian gold coins circulated more freely in Greece and silver was apt to disappear into hoards, be exported, and exposed to wear and tear on the coinage (Burns 1927, pp. 467–72).

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