

AN INVESTIGATION OF EFFICIENCY CONCEPT IN PRIVATISATION: A SURVEY

M. L. Rupasinghe

1. Introduction

State-owned enterprises (SOEs)¹ have played a major role in economic growth of most countries. However, most of the SOEs are said to be inefficient. Inefficiency of SOEs has led policy makers to seek remedial solutions. For example, Margaret Thatcher-then premier of the UK-came up with the proposal of privatisation of SOEs in the early 1980s². Many privatisations under Thatchers government could achieve better performance after privatisation. Thus, it is generally accepted that the UK is the pioneer of modern privatisation³.

Remarkable change in SOEs in the UK and its success invited other countries for privatising of their SOEs. By 1992, more than eighty countries had implemented programmes of privatisation (Kikeri et al., 1992). Earnest & Young (1994) estimated this number as more than 100. If this trend had been continued, it can be assumed that all the countries would have implemented or are planning for privatisation by now. Particularly, the trend towards privatisation in the former Soviet Union and other planned economies particularly in the Eastern Europe has been remarkable. These socialist countries accepted privatisation as mean to revitalise their economies and improve efficiency of SOEs. The acceptance of the privatisation strategy by these counties was aimed at achieving different objectives. The most commonly perceived objective is improving efficiency of SOEs⁴. Accordingly, any assessment or evaluation of privatisation must consider the efficiency aspect. This paper, therefore, aims at making a thorough review of efficiency concept in the light of privatisation.

This paper consists of five sections. The next section provides different definitions of efficiency in Economics. Rationale of efficiency improvement by privatisation is presented in Section III. Section IV discusses methods of measuring efficiency and the last Section is the summary of this paper.

11. Defining Efficiency

Efficiency is not a homogeneous concept and has a large number of dimensions (Milon (1987)). Among these different definitions of efficiency, the Pareto efficiency or Pareto optimal is so significant that it is considered as the only theoretical definition of economic efficiency (Lang, 1980). According to the neoclassical paradigm, perfectly competitive markets secure Pareto efficiency, which is alternatively called economic efficiency or allocative efficiency (Rausser et al. 1987). The definition given by Rausser et al. indicates that economic efficiency is a synonym of allocative efficiency. Allocative efficiency is one of the two aspects of efficiency frequently referred to. The other one is technical efficiency. Kay and Thomson provide simple definitions as follows:

Productive efficiency requires that whatever is done should be achieved at minimum cost; allocative efficiency implies that what is done meets consumer needs at prices which reflect the costs of provision (Kay & Thomson, 1986, P.20).

Bailey (1995) also provides similar meanings to efficiency aspects like Key and Thomson and adds emphasis to the focus. The discussion made so far on efficiency basically focuses on two types: allocative and productive. Sometimes the latter is referred to as X-Efficiency. The production efficiency or X-Efficiency seems to be more relevant for an enterprise-specific study on three grounds. Firstly, production efficiency is more relevant in privatisation issues on economic and managerial grounds. On the economic ground, privatisation policy is implemented within the competitive forces. In a competitive market, there cannot be a difference between private and public enterprises in pricing their products. This conclusion suggests that allocative efficiency is not important relative to production efficiency. Secondly, on the managerial argument, privatisation of SOEs basically changes the decision-making environment, objectives, incentives to the management and accountability. Such changes directly reflect on the production efficiency rather than on allocative efficiency. Finally, normative type, welfare analysis in neoclassical theory is less useful for analysis in positive economics.

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Theory of X-Efficiency

Perfect rationale with optimal behaviour of economic agents is fundamental in Neo-classical economics. In real world, however, the standard theories based on such assumptions fail to answer some problems and to explain some situations. Further, SOEs as well as private firms frequently function suboptimally. Frantz (1988), for instance, cites that data are available to support the argument that the neoclassical theory is inconsistent in following situations:

...(1) data showing that firms were able to increase their output by making relatively simple changes in the internal organization of the plant; (2) data showing that firms were not operating according to the principles of marginal analysis; (3) macro data showing that something other than physical labour and physical capital was playing an important role in the growth of several industrialized nations . (Frantz, 1988).

As a solution to these exceptional issues, Leibenstein (1966) came up with the theory of X-Efficiency. The X-Efficiency theory simply concentrates on the use of inputs as Leibenstein has pointed out below:

The X-efficiency idea, in a narrow sense, is an extremely simple one. Suppose that certain inputs have been allocated to a firm. These inputs can be used with various degrees of effectiveness within the firm. The more effectively they are used the greater the output. When an input is not used effectively, the difference between the actual output and the maximum output attributable to that input is a measure of the degree of X-inefficiency. In this context X-efficiency is to be contrasted with allocative efficiency, the latter being the form of efficiency commonly considered in neoclassical economics.... (Leibenstein, 1978, P.17)

Of course, the X-efficiency theory can be further extended to capture other aspects of behaviour of the firm. This would be more useful if such a discussion is made compared to neoclassical theory which is frequently referred to in the theory of the firm. Table 1 summarises the main components of the conventional (i.e. neoclassical) and X-efficiency theories. It is important to note here that the controversy on neoclassical and X-efficiency theories has been continuing. As a result, a number of articles were published⁵.

Table 1 A Comparison of Neoclassical and X-Efficiency Theories

Components	X-Efficiency Theory	Neoclassical Theory
Units	Individuals	Households and firms
Psychology	Selective rationality	Maximisation or minimization
Effort	Discretionary variable	Assumed given
Inert areas	Important variable	None
Interpersonal Interactions	Some	None
Agent -principal relationship	Differential Interests	Identity of interests

Source: Leibenstein, H. 1978, *General X-Efficiency Theory and Economic Development*, p. 20.

Efficiency Issues for Privatisation

It was found in economic literature that different explanations are given to the concept of efficiency. Among them productive efficiency is more relevant for privatisation because the main argument for privatisation is that the private sector operates more efficiently. Efficient operation inevitably leads to low cost of production. It is needless to state that reduction of cost makes enterprises more profitable. Thus cost or profit variables can be used to assess how privatisation improves efficiency.

III. Rationale of Efficiency Improvement by Privatisation

Having decided to investigate production efficiency, this section attempts to investigate how ownership changes from the state sector to private hands improve efficiency of SOEs. Four theoretical underpinnings support the efficiency argument in privatisation: competition, agency theory, property right theory and public choice theory.

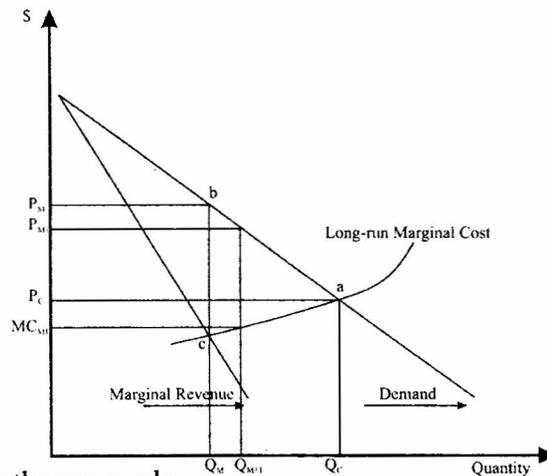
Competitive Forces

Privatisation is often implemented on SOEs which are usually protected from competition. This is done so on the assumption that competition promotes efficiency. Competitions in the product and capital markets encourage efficient operation of the firm. Efficiency improvement through product market is discussed first and capital market follows.

Product Market and Efficiency

Basic economic fundamentals assert that product market is a good allocator of resources of an economy on the basis of the principle of voluntary exchange where both parties involved-buyer and seller-benefit from the exchange. This implies that the resource allocation in a competitive market is efficient because willingness of consumers to pay for a commodity is exactly met by the opportunity cost of producing that product (Holcombe, 1988). The allocation resources is said to be efficient from the viewpoint of the society when price is equal to the marginal cost of production. As already stated, resource allocation is said to be efficient when the products are priced at marginal costs (MC). That is output should be expanded to the point where MC equals the valuation by consumers (Millward, et al. 1983). To elaborate the welfare implications of this rule, let us look at Figure 1. Deliberately simplified relationships are given for a hypothetical, competitive industry. The long run MC curve can be interpreted as long run supply curve. At point 'a', MC equals

Figure 1. Market Models and Efficiency



P_M = Price in the monopoly
 P_c = Price in the competition
 Q_M = Quantity supplied in the monopoly at price P_M
 Q_c = Quantity supplied in the competition at price P_c
 $P_M > P_c$: and $Q_M < Q_c$
 bca = deadweight/welfare loss

to consumer valuation. Accordingly, price is set at P_c and quantity produced is Q_c . Competitive firms in the industry produce altogether Q_c output given the price P_c . Now, assume that the same figure represents demand and production information of the only firm in the industry (i.e. Monopolist). The standard precepts of monopolistic behaviour guide profit maximising pricing rule when marginal revenue (MR) is equal to MC. Thus, the monopolist sets the price at P_M and produces Q_M output.

From the view points of the society, price set in competition (P_c) is relatively lower compared to the monopolist's price (P_M). The consumer pays only the marginal cost of the production. On the other hand, monopolist produces less output (Q_M) than the competitive output (Q_c). These differences lead to another important concept called 'welfare loss'. For instance, consider that the consumer demands one more unit that is indicated as Q_{M+1} . For the Q_{M+1} th unit, the consumer is prepared to pay the P_{M1} price. The P_{M1} price is greater than its marginal cost MC_{M1} (i.e. $P_{M1} > MC_{M+1}$) yet the monopolist does not supply output exceeding the Q_M . Consequently, the society as a whole loses the opportunity of consumption. Thus, the area covered by 'abc' is called 'deadweight loss' or 'welfare loss' of the monopoly. On the basis of the deadweight loss, one can argue that the competition is more desirable than the monopoly. If so, the question arises 'why monopolies do exist?' As it can often be seen, public monopolies do exist due to many reasons. Among them the concept of natural monopoly is more important. Efficient operation of the firm can simply be viewed through its behaviour in a competitive environment. Obviously, an inefficient firm cannot satisfy the consumer demand: consequently, it cannot survive in the market. For instance, no firm can ignore cost minimising behaviour and set price for its product(s) such that it covers inefficiencies in the production because consumers shift their demand to other rival substitutes in the market. The same result can be expected for poor quality.

The competition in the product market can be considered as an incentive mechanism to stimulate internal efficiency of the firm as well as of the product market (Vickers & Yarrow, 1988). Vickers & Yarrow cited Hart (1983) and stated that competition in the product market influences the incentives given to the managers by the shareholders. Increasing rewards to the managerial efforts, for example, can reduce the unit cost.

Efficiency Improvement through Capital Market

A typical modern firm has to operate efficiently in the presence of competitive capital market⁶. If its performance is poor, the firm faces the threat of take-over bids that may remove the existing management. Thus, the management (i.e. the agent) has to run the firm to maximise shareholders' objective. According to the property right theories, the shareholder's objective is to maximise profits comprising two components: capital gains and dividends. Capital gain is brought by increases in share price. In turn, share price of a company goes up mainly on its potential to earn higher profits. For instance, if a company generates losses continually, the share price falls and its shareholders prefer to sell shares. An investor may buy majority or all of the shares which gives the right to new owners to remove, if they wish, the existing management. These changes are stemming from the fact that shares are marketable and the market is competitive. Such takeover bids put the pressure on management to operate the firm efficiently (Curwen, 1978). Efficient operation of the firm enables its management to directly meet shareholders' objective of profit maximisation by proposing dividends for the shareholders' general meeting. Also, dividends contribute positively to increase share prices which, in turn, leads to achieve the profit maximisation objective. Thus, competitive forces in the share market insist on the management of a firm to operate efficiently.

The discussion made above arises from the underpinnings of Property Rights and Agency theories. That is, shareholders (principal) have exclusive rights to profits of the company, which is driven by the managers (agent). But this argument is weakened by managerial theories, which state that the management has its own objective rather than profit maximisation. Three managerial theories, which identify managerial objectives as: maximisation of managerial utility (Williamson, 1967); maximisation of sales revenue (Baumol, 1958) and maximisation of corporate growth (Marris, 1964). In addition, behaviour theory proposed by Simon (1959) argues for 'satisficing' behaviour instead of rational behaviour. The achievement of these non-profit-maximisation goals, in brief, is not compatible without simultaneous achievement of the goal of profit-maximisation.

Agency Theory Approach

Privatisation of SOEs can be investigated through economic and organisational theories since SOEs are organisations that utilise limited resources of the economy. Recent developments of 'behavioural' and 'managerial' theories of the firm are more useful than the classical model of owner-manager who single-mindedly operates the firm to maximise profits (Fama, 1980)⁷. Agency Theory links Economics and organisational theories; therefore, it is very useful and relevant to analyse issues involved in privatisation.⁸

Principal-agent relationship is clearly observable in SOEs which are operated by managers who are not the owners or entrepreneurs. The owners of such a firm can be considered as the principal and the management as the agent. Obviously, it is possible to have more principal-agent relationships within the firm. Privatisation changes principal-agent relationship and other related factors. Table 2 summarises such changes between private and public firms⁹. Principal-agent problems are central to the agency theory and solutions to some of these can be found through organizational changes from privatisation. However, the principal-agent theory with the emphasis on managerial efforts, incentives and control is relevant to the topic at hand because in the case of privatisation, principal changes from state sector to the private sector.

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Table 2 Summary of Principal-Agent Theory on Public and Private Firms

Characteristic	Private Firm	Public Firm
Principal	Individual(s)	Government
Agent	Manager	Manager
Objectives of Principal	Profit maximisation	1. High consumer welfare 2. Not too high profit
Informational Status of Principal	Very well Informed	Less well informed
Managerial efforts	Optimal	Less than optimal
Rewards to the Manager	Rewarded efficiently	Rewarded lower or higher than efficient
Control	Efficient	Lower than efficient
Price setting	Marginal-cost Pricing is Chosen to Maximise profits	Marginal-cost pricing is chosen only if consumer and producer surplus is maximised

Source: Bos, D and Peters, W., 1991, 'A Principal-Agent Approach on Manager Effort and Control in Privatised and Public Firm' in *Privatisation and Economic Efficiency* eds. Attiat F. Ott and Keith Hartley, Aldershot: Edward Elgar, pp. 26-51.

Consequently, objectives of the principal also change. According to fundamental microeconomic principles, an entrepreneur, usually referred to in the private sector, tries to maximise profit (Henderson & Quandt, 1980). As a result of the changes in the principal and the objectives, incentive system to the agent will be changed. Such changes in objectives of the principal and incentives to the agent lead to increase efficiency of SOEs.

Property Rights Argument

Clearly defined private property rights are essential to ensure efficient allocation of resources through the price system. Privatisation programs in any country promote the role of the price in resource allocation. This role will be undermined if property rights are weak as explained in the following quotation.

Prices are guides to how goods are allocated only if people have incentives to make offers and respond to them, as expressed by prices. If exchangeable private-property rights in goods are weak or illdefined, prices will have less influence (Alchian & Alien, 1983, P 91).

According to the argument in the above quotation, right ownership of SOEs is weak because they are owned by the state. Strictly speaking, ministers who are in the top of the SOE organisational structure are usually democratically elected. Obviously, objectives of such policy makers are clearly different from those of private sector counterparts. Privatisation changes the form of property right ownership from state to private sector. Simultaneously, rights to profits are clearly defined. They are diffused and uncertain when enterprises are SOEs. The underpinnings of the Public Choice Theory strengthen the property right argument as explained in the following section.

Public Choice Theory¹¹

The cornerstone of the above definition of public choice theory is 'egoistic rationality'. Van Widen (1988) also called egoistic rationality as the fundamental behavioural hypothesis of the public choice. Accordingly, individuals (a) strive after their own interest, (b) in a rational way, and (c) try to maximise utility'. Within this framework, public choice theory encompasses the behaviour of different agents involved in the process of political decision-making. The main agents are: voters, politicians, political parties, pressure groups, interest groups, bureaucrats, etc. who represent the government and/or private sector of the economy. Accordingly, public choice theory concerns the interaction of the two sectors of the economy.

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On the basis of the egoistic rationality, there would be enough opportunities for politicians to achieve maximum utility (i.e. the objective of retaining the office and being re-elected) at the cost of other constituents. For example, politicians may tend to expand state-sector, particularly SOEs, to satisfy their voters. Similarly, policy formation may favour interest groups and pressure groups rather than betterment of the economy as whole.

IV. Efficiency Measurement

As indicated earlier, economic efficiency can be defined in terms of either the allocative or production efficiency. However, the researchers concerned with privatisation have mainly focused on production (also known as technical) efficiency as explained in the previous section. Technical efficiency deals with the efficient use of inputs. The focus of technical efficiency is on productivity of inputs. Efficient use of inputs enables the firm to operate on or closer to production frontier. Consequently, it can be argued that efficient use of inputs inevitably leads to the achievement of profit maximisation objective¹². Technical efficiency can be measured in three alternative ways: a) the factor productivity approach; b) the production frontier approach and c) the profitability approach.

a) Factor Productivity Approach

The change of ownership of the SOEs due to privatisation may affect the productivity. Any change positive change of productivity inevitably leads to improvement in efficiency. Defining productivity is not an easy task Broch(1965) sees productivity as an elusive concept. Any analysis of productivity essentially involves with output(s) and inputs. Such an analysis can be extended by taking input and output prices. Econometric analysis of productivity is based on an estimation of production function. Most researches are concerned with total factor productivity (TFP) while others are concerned with labour productivity (LP), a partial productivity measure.

b) Production Frontier Approach

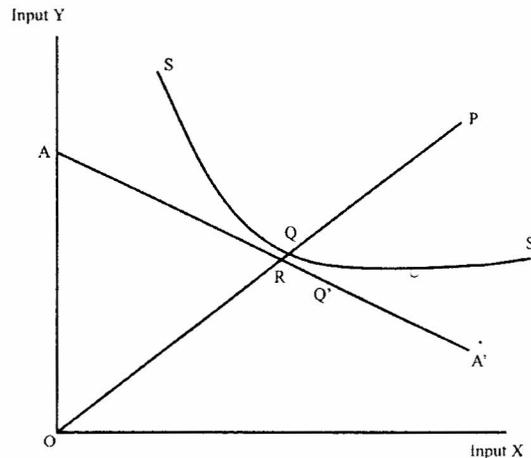
Production function shows the relationship between maximum possible output obtainable from given quantities of inputs at a given technology. Production frontier is defined on the basis of the information provided by

the production function. Therefore, no producer can produce above the production frontier. If a producer operates on the production frontier, he/she is said to be efficient while any production below the frontier is regarded as inefficient. This inefficiency, as already mentioned, can be described in terms of technical and allocative efficiencies using Figure 2 (Farrell, 1957). Three

assumptions were based for Figure 2: a) the efficient production is known; b) production function exhibits constant returns to scale; and c) the firm employs only two factors of production.

An inefficient firm can use a combination of the two inputs represented by point P to produce any output given by SS' isoquant. An efficient firm can produce the same output by operating at point Q on the isoquant SS'. The proportion of inputs used by

Figure . Production Efficiency



both firms is the same. But the inefficient firm uses more inputs. In fact the efficient firm uses only a fraction of inputs used by the inefficient firm. Therefore, the technical efficiency of the firm P can be defined as the OQ/O_p . The unity or hundred percent of this ratio can be defined as perfectly efficient and less than one values as less efficient. Only inputs and output were considered in the above analysis of technical efficiency.

Prices of inputs were ignored so far but they have to be taken into consideration. This is done by adding AA' line to Figure 2. The slope of this Line is the ratio of the two factor prices. The input combinations given

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by point Q and Q' are not equally efficient when prices of inputs are taken into account. That is, the production at Q is costly than at Q'. Accordingly, the price efficiency of point Q can be defined as the ratio of OR/OQ which can be interpreted as the allocative efficiency. The technical efficiency and price efficiency ratios can be used to define another concept of efficiency called overall or total efficiency. This can be defined for the firm at hand as OR/OF which is equal to the product of the two efficiency ratios.

All aspects of efficiency discussed above are based on the assumption that the efficient production frontier is known. This could be estimated in two alternative ways: by an engineer on a theoretical basis or on the basis of best results observed practically. Farrell (1957) concludes that even an engineer is likely to overlook some problems in the process of complex computational process. Therefore, he prefers to use the best estimate to unattainable ideal standard. To derive efficient production frontier, Farrell used non-parametric approach.¹³ He was the first to utilise this approach and he emphasised simplicity and the applicability of this methods as compared to more complex alternatives.

c) Profitability Approach

For empirical purpose, inputs and output data of SOEs and subsequently privatised firms required for using the above two methods are not available in many developing countries. It is difficult to obtain the required data when firms operate competitive markets. Consequently one has to use alternative methods. Profitability data of firms, however, are usually available from financial reports.

As previously mentioned, cost and profit functions can be used to address efficiency of firms as these concepts are interrelated. Accordingly, financial statements, which are usually published by all firms, can be used to obtain data required to measure efficiency. It appears that policy makers also tend to use financial viability of SOEs as a measure of efficiency. For instance, they often emphasise financial losses generated by SOEs. These firms are categorised as inefficient because Treasury has to cover their losses.

Aravidsson (1985) argues that the purpose of performance evaluation is to find out how well an activity, a programme or has agency fulfils or has fulfilled its objectives. More importantly, Baily's (1995) definition on X-Efficiency furnishes profit maximisation as a corollary to

productive efficiency. On the other hand, financial efficiency can be used as a measure of economic efficiency as argued by Vining & Boardman (1992).

Although accounting rates return have serious limitations as measures of business performance, they have been employed extensively in previous studies and evidence suggests that they are significantly correlated with economic rates of return (Vining & Boardman 1992: 220).¹⁴

Thus, it draws attention on financial performance in measuring production efficiency. United Nation (1984) also recognises that financial profitability as a perfect measure of financial efficiency of enterprises which produce and market manufactured goods and services. The argument behind this notion is that if an enterprise with profit maximisation objective produces and sells commodities in the market, financial profitability is a good indicator of efficiency of that firm. In turn, if a firm produces a commodity of public good nature financial profitability alone is not a successful measure of efficiency and indirect, non-financial benefits to the society also should be considered.

A couple of studies are found to support efficiency measurements through financial performance. Five such studies are Megginson et al . (1994); Clare & Johnson. (1993) ; Hutchinson (1991); Swanston & Wolde-semait (1989); and Powell (1987). The indicators used and their methods of calculation are given in Table 3.

V. Summary

Privatisation of SOEs is widely adopted by most of the countries today as the main strategy to improve efficiency of the public sector. It is argued that the change of ownership of SOEs from state to private sector improves efficiency of SOEs. Such argument gains conceptual supports from the theory of competition, principal-agent

Table 3 Summary of the Financial Indicators of Efficiency

Indicator	Method of Calculation	Author(s) and the Year of Study				
		Clare & Johnston (1993)	Swabston & W-Semait (1989)	Powel (1984)	Megginson et. el 1994	Hutchinson 1991
1.1 Rate of Return	(EBIT) or (EAIT) / (Total Capital) or	X			X	X
1.2 Profitability	(EBIT) / (Net Capital)	X	X	X	X	
<hr style="border-top: 1px dashed black;"/>						
2. Productivity	(Sales) / (Number of Employes) or (Value Added) / (Total Assets) or (Value Added) / (Payroll)	X	X X	X	X	

Notes : 1. EBIT = Earning before interest and taxes ; EAIT = Earning after interest and taxes

2 . The above list summarizes only the main indicators used by the studies indicated.

theory, property right theory and public choice theory. This paper examined alternative meanings of efficiency concept and methods of measuring them. Three types of efficiency were identified: allocative, production /technical and X-Efficiency. Among them, production/technical efficiency was found as the most relevant aspect for research on privatisation. The X-Efficiency is also useful in analysing sub-optimal behaviour of SOEs and privatised firms. However neoclassical economists criticised the percepts of the theory of X-Efficiency. Factor productivity, production frontier and financial profits can be used to measure efficiency. Availability of data is instrumental in choosing the method of measurement for empirical studies.

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NOTES

1. Definition of the term 'SOE' is complex. This complexity is obvious in two aspects: ownership and functions. SOEs may be owned by different levels of the government such as federal, state or provincial in different proportions. On the other hand, SOEs perform a variety of activities and functions range from production and provision of essential services to commercial products. Such a multifariousness was clearly recognised by Gills (1987).

2. A generally accepted single definition of the term 'privatisation' is not found. A number of related but different definitions were given to privatisation in different studies. For instance, see Kay & Thomson(1986); Cook & Kirilspatric (1988) Berg & Berg (1997); Ramanathan (1991); Santopietro & Shabman (1992); Linblom (1977). These definitions of privatisation mainly depend on methods of privatising SOEs. Pirie (1988) identified twenty-one methods of privatisation. Among them transferring ownership, contracting-out, franchising, use of vouchers are more important (Samad & McMaster, 1996). All these definitions accept the reduction of the role of the state. Such a reduction can be done using different means. Among them, divestiture seems to be popular in countries where SOEs have been playing a vital role. Deregulation is seemed to be common in economies such as the USA where private sector is more dominant.

3. Megginson et al. (1994) argue that Konrad Adenauer government in federal Republic of Germany launched the first large-scale, ideologically-motivated 'denationalisation' programme on Volkswagen in 1961. Further, with a broader meaning of privatisation, one can argue that privatisation was recognized in *Wealth of Nation* by adams Smith in 1776.

4. Obviously, there are some other reasons such as changes in political ideologies. For further details on privatisation in former planned economies in Europe, see; Fallenbuchi (1991); Mujzel(1991); Amar (1991); Krzyzak (1993); Horne (1995); cray(1996); Laban & Wolf(1993); Korani (1992); Savas(1992); Rider (1994); Trupiano (1993); Leeds (1994); Lintz (1994); Nelson & Kuzes (1994) and Zajicek & Heisler (1995).

5. For instance, some of them are: Leibenstein (1972, 1973, 1977, 1978a, 1978b, 1979, 1982, 1983); de alessi (1983a, 1983b); Stigler (1976); DiLorenzo (1981) and Schap (1985).

6. Firms can be of different forms of organization. Basically, they fall into private and public sectors. Private sector firms can mainly be owner-managed, sole-proprietorships or partnerships or joint stock companies. A typical modern firm is referred to the joint stock companies where owner and the manager are clearly different.

7. An excellent summarised coverage on theories of the firm is given by Pappas & Brigham (1983).

8. Among different definitions the one quoted below tries to capture all aspects of agency theory.

Agency theory refers to a contract in which one party is designated as the principal and another, the agent. The agent contracts to carry out certain activities for the principal, and the principal contracts to reward the agent accordingly (Parrow, 1986).

9. An alternative model is presented by Vicars & Yarrow (1988). Also, a number of models aimed to address different aspects of Agency Theory are found in Bambag & Spremann (1987).

10. Agency problems could be due to two factors: individuals' self interest behaviour and asymmetric information. Welfare of the principal and the agent is affected by the decision of the other. In turn, each individual has some limits to fully observe the actions of the other. Discussion of such agency problems is beyond the scope of this study.

11. Borooah (1993) defines the public choice theory as an invasion by economics of political science. What Borooah meant here is applying positive economic methods in public sector events. For more comprehensive definitions, see, Muller (1976); Quiggin (1987) and Van Widen (1988).

12. Efficient use of inputs is only one of the factors that affect to profitability of a firm. In addition here can be some other factors such as demand and macroeconomic policies. On the assumption of the stability of other factors, it can be argued that profit maximisation is corollary to technical efficiency. For instance see, Baily (1995).

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13. Farrell' s appraoch was subsequently extended and applied by determinisic and stochastic production frontiers. For instance, see Farrell & Fieldhouse (1962); Seitz (1970); Afrait (1972); Forsund, F.R. et al. (1980) and Kalirajan & Obwona (1994).

14. Vining & Boardman (1992) sited a numbr of studies to support their conclusion. They includes: Fischer & McGowan (1983); Salamon (1985); Kay & Mayer (1986);Scherer et al. (1987); and Jacobson (1987).

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