# Wage Bargaining and the Efficiency Dividend in Public Enterprises

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## Abstract

*An important aspect of the process of microeconomic reform is the improved operational efficiency of public trading enterprises. This paper argues the importance of appropriately distributing the efficiency dividend amongst the key players including the owners (ie., Governments which expect greater dividends), producers of the output (ie., workers and management who expect greater wages and salaries) and consumers (who expect better quality output at lower prices). The paper first evaluates the currently available measures of the efficiency dividend in public enterprises, including factor productivity and performance indicators. It then demonstrates that inappropriate use of these measures by management and/or workers during the wage bargaining process can lead to misunderstanding of the extent of the dividend and how it should be distributed. This in turn can undermine the reform process. Amongst the conclusions reached are that single factor productivity measures should not be used during the wage bargaining process.*

## 1. Introduction

One of the most important features of the sustained effort to achieve better economic performance in Australia over the past decade and a half has been the continuing process of microeconomic reform. An important part of this process has been the efforts of both Federal and State Governments to improve the operational efficiency of their trading enterprises. A number

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of notable improvements have occurred which have contributed to the emerging importance of appropriately distributing the so-called efficiency dividend.

The efficiency dividend in a public enterprise refers to the overall economic gain which occurs when the enterprise in question improves its performance in transforming its productive inputs into outputs of goods and/or services. It occurs in response to improved productivity performance by all relevant parties including the owner (ie. the Government), the management team and the workers. Notable examples of improved practices by each of these agents include corporatisation and deregulation, pursuit of best practice benchmarking and quality management, and greater attention to workplace flexibility, multi-skilling and training. The issue of distributing the efficiency dividend concerns who benefits economically from the enhanced performance of the public enterprise. Although it is widely agreed that the beneficiaries should include all the key players including the owner (ie. the Government which expects greater dividend payments), the producers of the output (ie. the workers and management who expect higher wages and salaries), and the consumers (ie. the corporate and/or household sectors which expect better quality output at lower prices), it is not widely agreed how this distribution should be decided.

The achievement of an appropriate distribution of the efficiency dividend which accrues to public enterprises constitutes a vital part of the microeconomic reform process. This is the case because an inappropriate distribution of the dividend carries a significant risk of alienating key contributors to the microeconomic reform process and it also risks impeding the economy's rate of capital accumulation. The purpose of this paper is twofold. *First*, it reviews the methods currently available to measure the efficiency dividend in public enterprises and points to their relative strengths and weaknesses. These measures include single factor productivity, total factor productivity and performance indicators. *Second*, it demonstrates that inappropriate use of these measures by management and/or workers during the wage bargaining process can lead to the emergence of misunderstandings about the extent of the efficiency dividend and how it ought to be distributed. It is appropriate here to emphasise that this paper does not seek to derive new theoretical or empirical results on the measurement of productivity and/or performance in public enterprises. Rather, the focus is on the policy issue of what is implied by the currently available measures of productivity and performance for the appropriate distribution of the efficiency dividend in public enterprises. This latter point constitutes the main contribution of the paper.

The paper is structured as follows. The next section tackles the first objective of the paper by summarily describing the alternative ways of measuring the efficiency dividend. Section 3 points to the importance of achieving an appropriate distribution of the dividend and spells out the implications of alternative measures for the wage bargaining process. The final section summarises the main arguments which are presented in the paper and draws together the conclusions.

## 2. Measuring the efficiency dividend

The purpose of any economy is to add value to its endowment of resources by converting them into outputs of goods and services, and to affect the efficient exchange of these outputs amongst alternative uses. Economists employ two concepts of efficiency to evaluate an economy's performance. Productive efficiency (or 'X'-efficiency) concerns how much output can be produced from a given quantity of inputs, or alternatively, what quantity of inputs is required to produce a given level of output. Allocative efficiency concerns how effectively the economy sets appropriate prices in order to ensure that its resources, other inputs and outputs of goods and services are allocated to their most effective use. Our concern here is with the former concept of efficiency, that is, with productive efficiency.

There are three commonly used measures of performance in relation to productive efficiency; namely, single factor productivity, total factor productivity and performance indicators. Since these are the options which are currently available to measure the public enterprise efficiency dividend, this section summarily describes and evaluates the relative usefulness of each.

### *Single Factor Productivity*

Single factor productivity measures an enterprise's performance by calculating the ratio of the quantity of output which is produced over some time period to the quantity of a single input such as labour, capital or land, which is used to produce the output. To fix ideas, consider an enterprise which employs two factors of production, labour, $L$, and capital, $K$, to produce a single output, $Y$. The single factor productivity measure of the performance of labour, $SFP_l$, and capital, $SFP_k$, are described in equation (1) as the simple ratios of output to the quantity of the input which is used in its production.

$$SFP_l = \frac{Y}{L} \qquad SFP_k = \frac{Y}{K} \qquad (1)$$

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This measure of productive efficiency is also known as average factor productivity, it is popular amongst a wide variety of analysts and has merit in facilitating broad comparisons of certain aspects of the performance of enterprises, industries, sectors and/or economies between each other and over various time periods. The main advantage of the single factor productivity measure of performance is its intuitive simplicity coupled with its low demands in terms of data requirements. In spite of its popularity and common usage, however, it suffers from methodological and measurement problems which render it unreliable for making fine-tune comparisons of performance. Most of these are well accepted and documented by, for example, the ACTU (1986), the BCA (1986), EPAC (1989) and Covick (1990). The three most important problems with the single factor productivity measure of the performance relate to the measurement of the input, the measurement of the output(s), and the inability to calculate the input's stand-alone contribution to the generation of the output(s). A few comments on each of these problems is warranted here.

The single factor productivity measure of performance assumes that the single input is well-defined and readily measurable, which is usually not the case. For example, the quality of labour inputs is often diverse and variable, encompassing characteristics such as commitment, effort, flexibility, motivation, training and willingness to engage in skills development. This point applies equally well to management. The problems with defining and measuring the capital stock are well known. As Harcourt (1972) and others have noted, the quantity of capital cannot be measured independently of its price. The quality of capital depends upon characteristics such as its age, its vintage and the amount and type of embodied technology. Green (1990) discusses these issues in greater detail.

Single factor productivity also assumes that the enterprise's output is well-defined and readily measurable, which is often not the case. The quality of output is often as important as its quantity, although it is difficult to measure. With multiple time-varying outputs (due to, for example, changes in market demand and in production technologies), aggregate measures which are commonly obtained by summing the monetary value of each output are faulty when relative prices change.

The most critical weakness inherent in the single factor productivity measure of performance is that it is incapable of measuring the specific stand-alone contribution of the input in question to the quantity of output. This arises because the ratio of output to the specific input is contaminated by the inclusion of the effects of many other factors. For example, the productivity of labour in a single product enterprise is measured by the ratio of the quantity of output to the quantity of labour employed, and is often

referred to as output per worker. This measure of single factor productivity, however, does not measure the extent to which the output is produced exclusively by labour, because it incorporates the joint effects of all other inputs in addition to labour which have been used during the time period in question. It also includes the effects of all other inputs which have been used in the past (such as previous investment in capital equipment, process development, management training and/or worker training programs). In addition, single factor productivity includes the effects of substitutability between the inputs, changes in the production technology and variations in capacity utilisation. The dependence of average labour productivity on the capacity utilisation rate is important when the measurement is being carried out over the business cycle. For example, if output per worker is being measured over a time period in which the firm increases its capacity utilisation rate, any attempt to measure labour's productivity by using a single factor productivity measure will give a false impression of the extent to which the extra output is due to higher labour productivity. This concern is likely to be especially relevant as an economy emerges from recession, because during such time periods many enterprises will be moving from low to higher rates of capacity utilisation.

## *Total Factor Productivity*

Total factor productivity measures an enterprise's performance by calculating the ratio of the quantity of its output to some index of inputs including labour, capital and perhaps other inputs. Continuing our example of an enterprise which uses labour and capital to produce a single output, $Y$, which is measured in constant prices, total factor productivity, $TFP$, is described in equation (2) as

$$TFP = \frac{Y}{L^{\sigma} K^{(1-\sigma)}} \qquad (2)$$

where the denominator consists of the product of indexes of labour, $L$ and capital $K$, weighted by their earnings shares in total income, $\sigma$ and $1-\sigma$. The precise form of this relationship will vary with the specific form of the production function which is used. In order to clarify the wage bargaining issue in the context of distributing the efficiency dividend, the simplest case is adopted here which uses the Cobb-Douglas function with constant returns to scale. It should be noted, however, that the measurement of total factor productivity is not independent of variations in the returns to scale assumption.

Kendrick and Grossman (1980) discuss this measure in the context of the United States, Englander and Mittelstadt (1889) discuss it in relation to OECD countries, while the BCA (1986), the ABS (1989) and Covick (1990) discuss it in relation to Australian incomes policy and performance measurement. Total factor productivity suffers from the same weaknesses as does single factor productivity when addressing the issues of measurement of inputs and outputs. With regard to measuring the specific contribution of some input to the production of output, however, total factor productivity is much more sophisticated than single factor productivity. This is because the inclusion of multiple inputs allows the separate identification and calculation of each inputs' stand-alone contribution to output, it allows identification of input substitutability, and it is more sophisticated in its treatment of variations in production technology.

### *Performance Indicators*

Performance indicators measure the efficiency with which an enterprise achieves preset goals defined in terms of both its outputs and/or its outcomes. Performance indicators have been used to measure productive efficiency since the early part of the present century in both private and public sector enterprises and agencies. The advantages and disadvantages of this approach to measuring a public enterprise's performance have been outlined and debated by, *inter alia*, Considine (1988), Painter (1988) and Alford (1990) together with the references contained therein. Kearney (1991) discusses the advantages and disadvantages of performance indicators for measuring performance in Australian public service agencies, and demonstrates how they can be constructed so as to encompass either single or total factor productivity as components of an overall performance indicator index.

The main advantage of performance indicators is that they are more general and more flexible than either of the former two measures. Unlike the previous two measurements, this approach does not rely exclusively upon the establishment of some relationship between quantities of outputs and quantities of inputs. Performance indicators consequently do not suffer from the kinds of output and input measurement problems associated with the earlier measures of productive efficiency, because the outputs and/or outcomes can be appropriately specified so as to ensure their accurate measurement.

That is not to say, however, that this approach to performance measurement is devoid of weaknesses. Two main weaknesses have been identified. *Firstly*, the construction of performance indicators is of necessity more subjective in nature than the productivity-based measures. This introduces

the possibility of disagreement over the precise formulation of the indicator, and it also allows for the emergence of some esoteric results. *Secondly*, performance indicators which are couched in detailed terms have the potential to induce conservative management behaviour which may stifle efficiency-enhancing innovation. It is worth noting, however, that these weaknesses can be minimised by designing indicators on the basis of wide-ranging discussion, by ensuring the existence of a competent supervisory facility and by allowing sufficient flexibility to ensure the possibility of revisions where these are judged to be appropriate.

The conclusion which emerges from this section is that the efficiency dividend which accrues to public enterprises which improve their performance over time can be measured in three ways; by single factor productivity, by total factor productivity, or by some kind of performance indicator. The first of these measures is not recommended because it is incapable of measuring the stand-alone contribution which a specific factor makes to the production of output. The latter two measures both have their advantages and disadvantages which ought to be considered. On balance, it seems justifiable to suggest that more productive use could be made of performance indicators which contain total factor productivity as a component of the overall index, but which also include other appropriate indicators of performance such as quality of output, price, the level of customer satisfaction and the dividend paid to the owner.

## 3. Wage Bargaining and the Distribution of the Efficiency Dividend

As mentioned in the introduction to this paper, it is important that the efficiency dividend which accrues to public enterprises which improve their performance is appropriately distributed. Any attempt by some party (either the owner, the management or the workforce) to use an inappropriate measure of productive efficiency which overstates or understates the extent of improvement in the enterprise's performance along with the specific contribution of some factor to this improvement, should be seen in its true light as attempting to secure an unearned proportion of the distribution of the dividend. This imposes a threat to the microeconomic reform process by alienating the other key players.

All key players have a vested interest in properly measuring any improvement in the enterprise's performance. However, in measuring the contribution of specific factors towards achievement of the improved performance, the vested interests diverge. For example, management typically

has a vested interest in securing a conservative measure of labour's contribution to performance enhancement, while the workforce has the opposite interest. Specifically, the attempt to base wage rise demands on the single factor productivity measure of labour productivity is potentially damaging to public enterprises and to the overall process of microeconomic reform. Seen in its true light, it amounts to an attempt by the suppliers of labour to appropriate an unjustifiable proportion (which may considerably exceed 100 percent) of the efficiency dividend. The overall economic effects of this would be to reduce the return on capital and to discourage further investment which will impede economic growth and curtail employment generation.

Given that performance enhancement occurs over time, it is useful to demonstrate the consequences of using inappropriate measures of the efficiency dividend by examining the relationship which exists between the alternative measures of single and total factor productivity when we take growth rates over time. In what follows, the growth rates of variables are denoted by lower case symbols replacing their upper case counterparts. For example, the growth rates of single factor productivity, *SFP*, total factor productivity, *TFP*, output, *Y*, capital, *K*, and labour, *L* are denoted by, respectively, *sfp*, *tfp*, *y*, *k* and *l*. The interested reader should consult Covick (1990) who provides a more detailed and extensive discussion of the issues which are raised here. In this case, equations (1) and (2) become, respectively, (3) and (4).

$$sfp_l = y - l \qquad sfp_k = y - k \tag{3}$$

$$\begin{aligned} tfp &= y - \sigma l - (1-\sigma)\, k \\ &= y - l - (1-\sigma)(k-l) \end{aligned} \tag{4}$$

Combining equations (3) and (4) allows examination of the relationship which exists between these two measures of performance over time.

$$tfp = sfp_k - \sigma(l-k) \tag{5'}$$

$$= sfp_l - (l-\sigma)(k-l) \tag{5"}$$

The two versions of equation (5) relate the total factor productivity measure to the two single factor productivity measures related to capital and labour. Equation (5') states that the growth in total factor productivity is equal to the growth in average capital productivity less a proportion, $\sigma$, of the difference between the growth in the labour force and the growth in the capital stock. It shows that total factor productivity will be less than the single factor average productivity of capital whenever the employed labour

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force is growing faster than (or contracting more slowly than) the capital stock and *vice versa*. Putting this another way, the single factor average productivity of capital tends to overstate the contribution of capital to the production of output relative to the total factor productivity measure of performance in situations where the capital stock has increasing amounts of employed labour. By way of comparison, equation (5") states that the growth in total factor productivity is equal to the growth in average labour productivity less a proportion, $(1-\sigma)$, of the difference between the growth in the capital stock and the growth in the labour force. It shows that total factor productivity will be less than the single factor average productivity of labour whenever the capital stock is growing faster than (or contracting more slowly than) the employed labour force and *vice versa*. Putting this another way, the single factor average productivity of labour tends to overstate the contribution of labour to the production of output relative to the total factor productivity measure of performance in situations where the labour force has increasing amounts of capital to work with.

This latter case has occurred in recent years in many public enterprises which have embraced microeconomic reform while undertaking substantial investments in new capital stock and at the same time curtailing their growth in employed labour. To argue that labour has become very much more productive and that this has been the main cause of the enhanced performance of these enterprises is to misuse the simple average labour productivity measure and to ignore the role of capital.

The argument stated here also applies at the national level where the consequences of basing wage claims and settlements on the single factor productivity of labour can also be seen clearly. Covick (1990) has lucidly described this situation. He demonstrates that adherence to a wages policy which is based upon maintaining the growth rate of wages equal to the growth rate of average labour productivity has the effect of holding labour's share of national income constant. By implication, however, it also holds capital's share constant – in spite of what is happening to the rate of investment and the capital stock. But it is the rate of return on funds employed rather than the share of capital's return in national income which importantly contributes to the determination of the aggregate level of investment. So this policy would have the effect of depressing investment in the economy – which is precisely what Australia does not need. It would do this by insisting that capital's share in national income remains constant even if more is invested. In other words, it would ensure that the return on capital would decrease with more investment.

## 4. Summary and Conclusions

One of the most important features of the sustained effort to achieve better economic performance in Australia over the past decade and a half has been the continuing efforts of Federal and State Governments to improve the operational efficiency of their trading enterprises. Although much discussion has taken place about the size of the resulting efficiency dividend, the issue of appropriately distributing this dividend has not been adequately addressed. The distribution issue is important insofar as an inappropriate distribution of the dividend carries a significant risk of alienating key contributors to the microeconomic reform process and it also risks impeding the economy's rate of capital accumulation which will impede further progress in the future.

This paper first reviewed the methods which are currently available to measure the efficiency dividend in public enterprises and pointed to their relative strengths and weaknesses. These measures include single factor productivity, total factor productivity and performance indicators. It then demonstrated that inappropriate use of these measures by management and/or workers during the wage bargaining process can lead to the emergence of misunderstandings about the extent of the efficiency dividend and how it gets distributed. This in turn is capable of impeding the reform process by alienating key players. The conclusion is therefore reached that emphasis on single factor productivity measures such as average labour productivity should be replaced with the more sophisticated measures of performance when public enterprises are bargaining over the distribution of their efficiency dividends.

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