



RESEARCH NOTE

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What Do You Mean, Productivity?

Mainstream economic theory has long argued that in any economy, rising living standards are dependent upon rising levels of output relative to the inputs used in production. Simple as this may seem it is clear that the concept of productivity in much political debate is ill-informed. This note looks at the concept of productivity and the problems associated with determining its growth and measurement.

There can be little doubt that most productivity discussion is conceptualised in terms of how labour relates to production. Public utilities proclaim improvements in this area on the basis of cutting work-force numbers. The private sector employ measures that focus on ratios such as 'tonnes of paper per employee' or 'kilolitres of beer per employee'. And politicians show a marked preference for viewing Australia's productivity performance in terms of 'real output per hour worked in manufacturing'.

These and similar references indicate a specific conceptualisation of productivity based on the partial measure of labour's average contribution to production. They may in fact amount to an accurate recording of productivity movements in the processes to which they refer. But it is equally possible that they fail to account for the numerous 'residual' changes in inputs and outputs that are not so readily calculable. The problem in drawing any solid conclusions from partial formula-

tions is not knowing whether all such residuals are adequately constituted within derived measures. What specific contribution does capital make to productivity? Or how are qualitative changes in inputs and outputs to be accounted for? For economists, questions such as these have provided grist for the mill in productivity arguments for years.

On a general level, there is little disagreement that productivity is a relationship between output (O) and resource inputs (I) used in production processes; that this relationship can be expressed as a ratio (O/I); and that because it has limited significance on its own it has to be compared with corresponding ratios over time.

Nor is there much dissension that derived ratios can be applied to a national economy, individual industries or a specific production process. Partial assessments can be made to determine the productivity of individual inputs, relating some measure of output to some individual 'factor' input (land, labour and capital) used in production. As productive output depends on resource inputs and the efficiency with which they are used, if output rises in relation to inputs over a given time then an increase in productive efficiency, or productivity, is said to have occurred; and vis versa.

It is at this point that agreement between economists begins to fade. It is by no means clear, for example, that changes in output

can be solely explained by corresponding changes in levels of inputs used in production. The introduction of new technologies, changing market conditions, developing economies of scale, alternative management techniques, improved work-force skills, qualitative changes in resource inputs and productive output, and so on, have all been argued as having an impact on productivity outcomes in ways that are not always reflected in the raw statistical data on inputs and outputs.

Modern modes of production also frequently utilise a variety of primary and intermediate inputs at a number production stages to produce an array of outputs. Any assessment of these opens the way for individual preferences to creep into the selection of the most important 'residuals' believed to have had an impact on the productivity of a particular process under study, as well as to what weightings best reflect the motive forces behind productivity movements. Even if such residuals could be factored in with any confidence, it is quite another thing to assume that this is possible for productivity measures of entire economy.

It is also difficult to reduce inputs and outputs to some common base for comparative purposes. This is particularly so in relation to the contribution of capital in the production of output. Indeed, it is a highly arbitrary exercise to determine what price deflators

should be employed to determine the real value of equipment investment, and what depreciation rates should be applied to assess the 'consumption' of capital. It is moreover debatable as to whether capital is 'homogenous' over time and space, and thus capable of being aggregated into some tangible measure for comparative purposes, or whether any real possibility exist for aggregating capital equipment and reducing it to some common denominator.

There remains considerable difficulty in precisely quantifying the productivity of professions such as clerks or teachers. In sectors where these forms of employment predominate, the orthodoxy is to use employment or some other tangible resource input as a base indicator of productive output, effectively defining productivity as an index of factor inputs divided by itself. This again opens the way for discretionary weighting being applied to productivity measures to avoid the useless conclusion that no productivity growth occurs in these sectors.

Even more problematic, it is by no means clear what causes productivity to grow and decline. Key determinants have been variously identified in the age of capital equipment; level of research and development; extent of technology transfers through foreign ownership; type of management and diffusion of education and work-skills; ability to adopt 'best practice' techniques; ratio of production employees to total employment; level of government intervention, extent of industrialisation and composition

of labour and capital; prevalence of industrial concentration and propensity to undertake high risk, high cost innovations; global economic cycles; changes in weather patterns; and even the frequency of wars.

By no means exhaustive these conceptual and measurement problems highlight the potential for considerable uncertainty as to what productivity estimates actually say about the performance of individual production processes, and indeed the economy as a whole.

Inherent in the same array of problems is that the measurement of labour in industries producing tangible output is far less subject to debate than the productive use of capital in industries producing intangible output.

This problem clearly contributes to a bias in the way productivity is commonly conceptualised. It is simply much easier to take arguments in this area down paths of least possible resistance and focus on labour's more identifiable relationship in the production tangible output.

The proposition here is that political discussion on the issue of productivity is prone to use partial notions of productivity, such that remedies commonly accepted start from the notion: *that which can be measured presupposes that which can be improved.*

Stating this is not to infer that capital investment or managerial improvement in the service and public sectors do not command considerable attention. Nor also

is it to imply that a restructured labour market will not have a decided impact on Australia's future productivity performance. At issue is where the balance (or rather, the bias) of preferred solutions lie in the way productivity is conceptualised and thought improved. On any reckoning, it is apparent that there is an ever-increasing weighting being placed in terms of the above argument.

To the extent that this occurs, it clearly distracts from less discernible, though equally important alternative causes of Australian productivity growth and decline. There is thus a far greater need to reiterate the importance of the whole range of factors that make up the totality of productivity and the determination of its growth.

A fuller version of this briefing note can be found in *Labour Economics and Productivity*, vol.5, no.2, 1993.

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