



## The Higher Education and Research Group: Explainer Series

### **UNIVERSITY COST MEASUREMENT and PRODUCTIVITY ASSESSMENT: Introducing the Research and Education Efficiency Frontier (REEF) Methodology**

The need to measure costs and productivity in higher education is crucial for the effective and efficient use of resources. University management needs to understand its costs to employ scarce resources productively. Those who administer government policy need to understand the costs to direct funding in a valid and efficient manner.

The approach the Higher Education and Research Group (HERG) uses to provide valid and reliable data on costs, efficiency and productivity is empirical. That is, it is based on actual outcomes within the university sector. This approach avoids using data derived from surveys and focus groups or more theoretically determined 'cost drivers' and assumptions on the behaviour of costs.

The analytic approach employs econometrics and is known as the Research and Education Efficiency (REEF) methodology. It was originally created to support the needs of universities to enhance cost efficiency and effectiveness in providing high quality teaching and research and to measure growth in university productivity.

REEF is an application specially designed for the higher education sector, given its dual missions of education and research. The REEF methodology involves the collection and curation of data directly relevant to the teaching and research functions of universities.

The general approach has its origins in the work of Nobel Prize recipient Harry Markowitz. The work that followed was commonly applied where there was a need to measure cost and productivity outcomes when there were two or more desired outputs from one entity. The presence of two or more outcomes, together with shared or 'joint' costs, is one of the key challenges REEF deals with.

Universities might be seen as an extreme case of what is known as the 'joint and common cost' problem. That is where the same resources are used to produce two or more outcomes. In the case of universities, the two outcomes are teaching and research. There are many 'shared costs', not least of which is the cost of academic staff, who are commonly the key resource in both the production of research and the delivery of education.

As noted, universities are seen as an extreme example of the joint and common cost problem as there is no fixed or given relationship between the two key university outcomes across the higher education sector. The proportional relationship or 'mix' between teaching and research is not fixed across universities at a single point in time nor across time for a given university. Solving for a single outcome 'optimisation' is not possible. It is, however, possible to provide a multivariate analysis of the inputs – expenditure and academic labour in supporting the chosen mix of output research and education. This solution is complex and might be best thought of as a 'line of best fit' through the data. The result provides costing data as well as data on cost efficiency (at a point in time) and productivity (over time).

REEF is agnostic as to whether a university seeks to be highly research intensive or teaching focussed – or anywhere in-between. It can and does provide cost data and productivity measures for individual universities as well as for the sector as a whole. Further, with the availability of relevant data, it can look within individual universities and measure costs and productivity at more granular levels.

Common solutions to the joint and common cost problem found in other applications or industries are not likely to provide the necessary valid and reliable cost estimates in the higher education sector. In part, this is because of (1) the incentives available to universities (and individuals within universities) and (2) the nature of funding mechanisms relevant to the higher education sector.

For a more detailed understanding of the cost measurement implications of the joint and common cost problem, please see the more detailed explainer document: [University Costings: Solving the Joint and Common Cost Problem](#).