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EFFICIENCY IN ENGLISH HIGHER EDUCATION 1996/97 TO 2008/09: THE EFFECTS OF ESTIMATION METHOD, UNIVERSITY TYPE AND MERGER ACTIVITY (0228)

Publicly funded sectors are under pressure to deliver more for less, and none more so than the English higher education sector. There has been speculation that funding cuts can be absorbed by efficiency savings (Mandelson 2009) which might be achieved to some extent by the closure or merger of some universities (Griffiths 2010). Whilst the measurement of efficiency in universities has been the subject of previous studies, two aspects have been largely ignored. The first concerns the appropriate technique for estimating efficiency: there are no accepted criteria for choosing between the possible approaches, and few studies have investigated the extent of the similarity between the outcomes of different approaches. The second concerns the effects on efficiency of merger activity in the higher education sector about which little is known, yet there are already instances of proposed mergers following cuts in public funding in UK higher education (Baker 2011; Matthews 2011). This paper attempts to fill these gaps in the literature.

The efficiency of an organisation can be assessed by examining outputs produced in relation to inputs used. Estimation of such a relationship is potentially problematic when the firms under examination produce multiple outputs from multiple inputs *and* the outputs are produced jointly from a set of inputs, in which case the estimation should capture this 'jointness' of production. Estimation could be facilitated by replacing the multiple outputs with an aggregate measure of output calculated using some pre-defined weights (for example output prices), but estimates would be biased if the weights chosen were incorrect, or, in the case of using prices, revenue maximisation did not apply (Coelli and Perelman 1999). A more popular approach is to replace the multiple inputs with a single cost variable, but this is inappropriate if input prices are not available, or if cost minimizing behaviour does not apply (Coelli and Perelman 1999).

The distance function approach offers an attractive alternative: it allows for both multiple inputs and multiple outputs (Coelli and Perelman 2000; Rodríguez-Álvarez *et al.* 2004; Tonini 2004); it does not assume any particular optimizing behaviour on the part of the firms; it does not require a knowledge of prices of either inputs or outputs (Coelli and Perelman 1999; Coelli 2000; O'Donnell and Coelli 2003; Uri 2003a; 2003b; Rodríguez-Álvarez *et al.* 2004); and it does not require prices to be exogenous (Baños-Pino *et al.* 2002). The problem with the distance function is its estimation: non-parametric estimation methods can easily handle the multi-dimensional nature of production, but make no allowance for stochastic errors. Parametric estimation methods take into account stochastic errors but are complex and require substantial degrees of freedom. To date, the numerous empirical studies of efficiency in English higher education which take a distance function approach use non-

parametric estimation methods (Athanassopulos and Shale 1997; Glass *et al.* 2002; Flegg *et al.* 2004; Glass *et al.* 2006; Johnes 2006; Flegg and Allen 2007a; 2007b; Johnes 2008).

This paper uses both parametric and non-parametric methods to estimate and compare the efficiencies of English HEIs. The empirical analysis is based on an unbalanced panel of data covering 13 years from 1996/97 to 2008/09. SFA is used to estimate a translog distance function based on a specification of inputs and outputs which incorporate both quality and quantity. DEA is applied to the same set of inputs and outputs.

The time period covered by the sample also allows a crude examination of the effect of merger activity on performance as reflected by the parametric and non-parametric efficiency scores. A merger is defined as the union of two or more institutions to form an entirely new entity. The focus of this paper is horizontal merger (i.e. the merger of institutions within the higher education sector) rather than vertical merger (the merger of institutions across education sectors). Historically, mergers have not been popular in the higher education sector possibly because they have often been in response to crisis, or because they have been associated with a loss of identity (Berriman and Jacobs 2010). Despite this, a merger may have benefits which accrue from returns to scale, as a consequence of increased administrative, economic and academic efficiency (Skodvin 1999; Harman 2000), or returns to scope if the merging institutions have complementary activities (Skodvin 1999). An empirical analysis of the efficiency effects of merger in the context of higher education is new to the literature and is particularly relevant if mergers are likely in the wake of financial cuts.

The first main finding from the study is that the level of average efficiency in the English university sector varies significantly by estimation method: 75% to 80% using parametric methods, and 80% to 95% using DEA methods. Moreover, the rank correlations between parametric and non-parametric efficiencies are significantly positive but low (0.259 to 0.450). Policy-makers should therefore be aware that the choice of methodology could affect their conclusions regarding relative efficiency of HEIs.

Mean efficiency has varied only slightly over time: there is a small degree of technical efficiency decline (possibly caused by the rapid expansion which took place over this period in English higher education). There is limited evidence of slight positive technological change. This is in line with previous results for the English higher education sector (Johnes 2008).

The typical HEI involved in a merger has efficiency which is similar to (or slightly higher than) the average non-merging HEI. The idea that mergers have been occurring in response to crisis therefore seems unfounded. The typical post-merger HEI is significantly more efficient than either pre-merger HEIs or non-merging HEIs, suggesting that merging is a positive activity. These results can only be a crude indicator as ideally there should be a control group of non-merging HEIs with similar

characteristics to those of the merging HEIs with which to make comparisons. It does seem to suggest, however, that mergers of adequately performing institutions seem to have a beneficial effect on efficiency. This is an important result and should be followed up by a much more detailed investigation into the effect of institutional mergers on efficiency.

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