England's Multilevel Model Based Value-Added School League Tables: Measuring and communicating statistical uncertainty to parents

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In England, the Government annually publishes a range of school performance measures based on students' attainments in national assessment exercises. An important justification for their publication is that these measures should help parents make meaningful choices as to where they send their children to school. The most sophisticated, referred to as 'contextual value-added' (CVA), is derived from a multilevel model which adjusts for student intake differences between schools in order to more closely measure the effects schools have on their students. Schools' CVA performances are presented as point estimates with 95% confidence intervals to communicate their statistical uncertainty. However, for parents choosing schools, it is schools' future performances when their children will actually attend these schools which are most relevant, not schools' current performances. Another concern is that many parents find CVA estimates and especially their 95% confidence intervals, difficult to interpret. Indeed, when the media republish schools' CVA performances, they do so in the form of 'school league tables' whereby schools are ranked by their estimated performances and the 95% confidence intervals are omitted altogether. In this paper we extend the Government's multilevel model to demonstrate the additional uncertainty which arises when predicting schools' future performances. We then describe a simulation method to produce simple graphical summaries of the uncertainty in schools' predicted ranks as a more accessible alternative to presenting 95% confidence intervals.

Key Words: school league tables, multilevel model, statistical uncertainty, value-added model