

# REVAMP

## Research summary 1



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## Wage returns to A level Mathematics

### Mathematics pays

Several studies over recent years have highlighted the importance of mathematical qualifications to individuals' earning potential. Research by Peter Dolton and Anna Vignoles<sup>1</sup> in the late 1990s focused on A level wage returns, in particular to mathematics, and their analysis has been influential on politicians' thinking. The analysis was based on the 1958 National Child Development Study, one of a series of national, longitudinal cohort studies.

Amongst that cohort of 'baby boomers' now aged 58 who had studied A levels — a much smaller proportion than do today — those with an A level in mathematics and/or computing had an average earnings premium of 7-10% at age 33, all other things being equal. Importantly, no other subject had a positive wage return.

This research has circulated in influential debates ever since, often misleadingly reduced to "if you take A level maths you will earn 10% more". Some of the important features of the original research have, however, been overlooked or distorted in retelling, for example:

- ♦ it was based on 18-year olds taking A-levels in 1976. Commentators have often assumed that the finding is time-invariant implying that the social, economic and educational conditions of the day have no bearing;
- ♦ it was based on average earnings at age 33, not across the lifespan as sometimes claimed;
- ♦ the finding is an average but many factors influence earnings including gender and location. For example, earnings in London are considerably higher than those in the regions;
- ♦ the analysis combined mathematics and computing. No other subjects were associated with higher future earnings. This has not helped in arguing for increased science participation and the computing angle has disappeared which is interesting given policy priorities;
- ♦ some analyses were of males only because of limitations in the main dataset.

### New research

This new research updates and extends the earlier work of Dolton and Vignoles. It is based on statistical analyses of the 1970 British Cohort Study (BCS) and earnings at age 34 in 2004. The models compare people in that cohort who studied A levels to see whether any income differences existed fifteen years later. This enabled us to consider whether the earlier findings might be time-invariant but also afforded new analyses of variations within the sample.

### Key findings

Based on a series of models of earnings for those completing at least one A level in the 1970 BCS:

1. mathematical skills, whether measured as ability scores at age 10, qualification grades at age 16 or completion of A level Mathematics, have strong and positive association with earnings at age 34;
2. wage returns to A level Mathematics for children born in 1958 and 1970 are broadly similar;

<sup>1</sup>Dolton & Vignoles (2002). The return on post-compulsory school mathematics study. *Economica*, 69(273), 113-142.

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## Key findings (continued)

1. Only mathematics and computing A levels are associated with a wage premium at age 34, as in the earlier study;
2. the premium on A level Mathematics varies between 2 and 21% of income but is further dependent upon a range of other factors;
3. Females born in 1970 earned around 20% less than their male contemporaries at age 34;
4. Regional variations in earnings are substantial with those outside London receiving considerably lower pay at age 34.

“People with an A level in maths go on to earn 7 to 10% more than similarly educated people without the qualification and it opens doors to a whole range of interesting careers”  
Nick Gibb, Minister of State for Schools, 2015.

## Implications for policy

Politicians have a laudable goal that all young people should study appropriate mathematics to 18. This research highlights the value of good mathematical skills and of higher level qualifications. For this group of A level students from 1988, mathematical competence at age 11 and O level grades at age 16 predicted later earnings, whether people had A level Mathematics or not.

Although A level Mathematics was associated with higher incomes for both the 1958 and 1970 birth cohorts, there is no guarantee that this will be so for today's 16-year-olds making choices in different times, particularly those persuaded to study A level Mathematics on the basis of this research.

The reasons for the 'return' are unclear. Is there something intrinsic about the learning gains from A level Mathematics that get rewarded, or does the qualification signal pre-existing qualities and competences to the employment market?

What is clear is that mathematical competence matters and so the development of new, engaging post-16 Core Maths qualifications is a worthy project if it encourages a significant upturn in post-16 mathematical study.

One of the striking features of the research is the differential income of males and females even with A level Mathematics. When this is compounded by the reduced likelihood of girls choosing to study mathematics post-16 (see Research Summary 4), this remains one of the outstanding challenges of increasing mathematics participation and ensuring fairer life chances.

***The full paper can be obtained from the link below or from the authors:***

**Adkins, M. and Noyes, A. (2016). Reassessing the economic value of advanced level mathematics. *British Educational Research Journal* 42(1): 93-116. DOI: 10.1002/berj.3219**

### Rethinking the Value of Advanced Mathematics Participation (REVAMP)

The REVAMP project was funded by the Nuffield Foundation and considers the value of A level Mathematics participation from several viewpoints. Five strands of work address the following:

- ◆ The economic return to A-level Mathematics (*Research summary 1*);
- ◆ The changing nature of A-level Mathematics participation over time (*Summary 2*);
- ◆ The relationship between A-level Mathematics and outcomes in a range of science and social science degree programmes (*Summary 3*);
- ◆ The policy trajectory of 14-19 mathematics education; and,
- ◆ Attitudes to post-16 study of advanced mathematics amongst 17-year-olds in England (*Summary 4*).

For more details visit <http://www.nottingham.ac.uk/research/groups/crme/projects/revamp.aspx>.

This project was funded by the Nuffield Foundation but the views expressed are those of the authors and not necessarily those of the Foundation.

