

Public Service Productivity

Education: Summary

This is a summary of the second ONS education productivity article, which estimates change in productivity of publicly funded education services between 1996 and 2006.

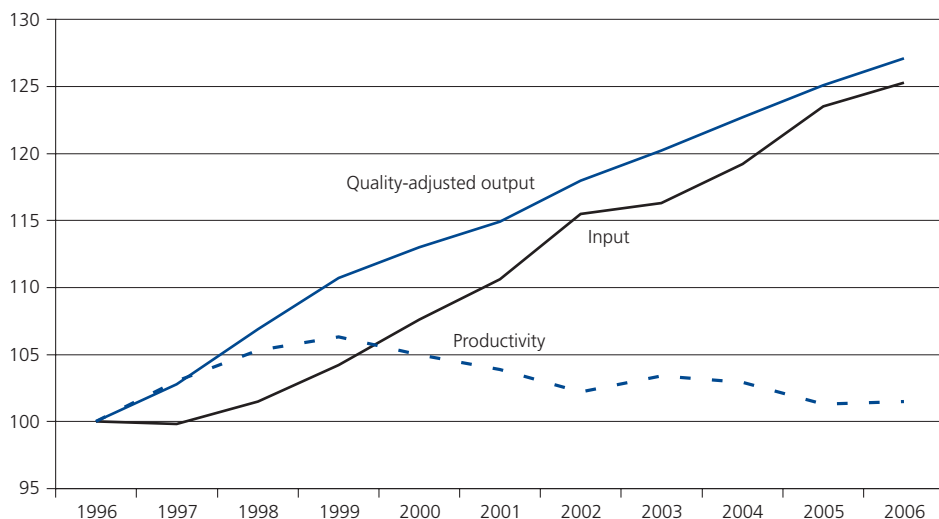
1. Key points

1.1 Estimates using latest data and revised methods (Box 2) show that:

- between 1996 and 2006, productivity rose on average by 0.1 per cent a year;
- between 1996 and 2006, quality-adjusted publicly-funded education output increased by 2.4 per cent a year;
- between 1996 and 2006, inputs grew on average by 2.3 per cent a year;
- between 1996 and 1999, productivity of publicly-funded education services increased on average by 2.1 per cent a year;
- from 1999 onwards, productivity fell on average by 0.7 per cent a year;
- the fall in productivity from 1999 onwards is associated with a decline in pupil numbers from 2000 and an increase in school support staff.

Figure 1
Public services quality-adjusted education productivity estimates

United Kingdom 1996=100



1.2 The pattern of productivity change may reflect:

- rising pupil numbers in secondary schools, improved attendance rates and improvements in GCSE grades, which have increased output but have required some targeted resources;
- falling pupil numbers in primary schools, with fixed and semi-fixed costs spread over fewer pupils. Where it is not locally feasible to close schools or reduce the number of classes, measured productivity will fall; spare capacity may be useful when the rising birth rate causes an increase in primary school enrolments over the next few years;
- the introduction of the workload reform package implemented in 2003, intended to reduce teacher workload. Part of this package was an increase of 50,000 support staff in England. The hours worked by these new staff may have substituted for the unpaid hours worked by teachers in the past, and hence increased the measure of inputs, leaving output unchanged;
- the increase in support staff numbers may improve the quality of education in ways which are not currently measured by the quality adjustment, for example, support to help the integration of pupils with special needs. Development work is planned to expand the quality adjustment to take account of an increased number of educational outcomes;
- time lags mean that some changes in resources, including expansion in pre-school education, could not yet have had any impact on the current quality measure.

1.3 estimates of productivity also need to be interpreted alongside other forms of corroborative evidence on the inputs, outputs and outcomes. It is unlikely that a single number for productivity will ever capture all the costs and benefits of the education sector.

Box 2

New methods

New methods since the last productivity article are:

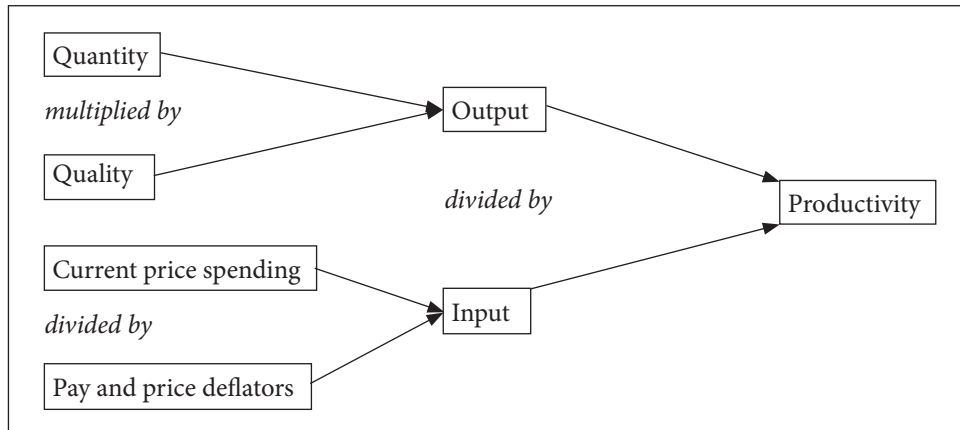
- first publication of separate output data for England, Scotland, Wales and Northern Ireland, and better way of adding them to UK output;
- new method for using GCSE results as quality measure for school education output;
- commentary on sources of error in measuring the quality of education;
- new quality measure for initial teacher training (ITT) courses;
- improved methods to allow for pay and price increases. Improvement to the quality adjustment, and further planned developments, are based on consultation from 2006-07 on previous methods; the strategy for future work was published separately in July 2007¹ (ONS 2007).

2. Background

2.1 Publicly-funded education¹ in 2006 in the UK, as measured in the National Accounts, was £48.9 billion, 3.8 per cent of GDP. Productivity of publicly-funded education is estimated by dividing annual figures for output from education (taking account of quality) by inputs to education (after making an allowance for pay and price increases) (figure 3).

¹ It excludes education in sixth form colleges or higher or further education colleges as these are funded through grants and transfers rather than directly by government.

Figure 3
Components of productivity change



Measuring the quantity of publicly funded education outputs

2.2 The quantity measure of education in the National Accounts includes:

- pupil attendance at government maintained schools – secondary, primary, special, nursery school and classes, and City Technology Colleges, and Academies;
- student numbers in government funded higher education courses – Health professional and ITT;
- Full time equivalent children in nurseries and nursery classes including those funded by government in the Private, Voluntary and Independent sector (PVI).

Figure 4
UK Index¹ for pupil numbers and attendance

United Kingdom		1995/96=100		
	Pupil numbers		Total number of pupils attending school	
	Index	Change on previous year (per cent)	Index	Change on previous year (per cent)
1995/96	100.0		100.0	
1996/97	100.9	0.9	101.3	1.3
1997/98	101.5	0.6	101.8	0.6
1998/99	102.0	0.5	102.6	0.7
1999/00	102.5	0.5	103.4	0.7
2000/01	102.8	0.3	103.2	-0.2
2001/02	102.6	-0.2	103.3	0.1
2002/03	102.5	-0.1	103.3	0.0
2003/04	101.9	-0.5	103.1	-0.2
2004/05	101.2	-0.8	102.4	-0.7
2005/06	100.4	-0.8	101.4	-1.0
Change 2005/06 on 1995/96		0.4		1.4
Pupil numbers and pupil attendance in 1995/96				
	8,993,000		8,307,000	
Pupil numbers and pupil attendance in 2005/06				
	9,026,000		8,419,000	

1 Full-time equivalent pupil numbers (includes pupils in pre-schools, primary schools, secondary schools, special schools, CTCs and Academies in the four countries).
 Scotland and Northern Ireland figures include estimates for preschool and special schools respectively
 Source: DCSF, Welsh Assembly Government, Scottish Executive, NISRA

2.3 Between 1995/96 and 2005/06, UK secondary school pupil numbers rose but primary school pupil numbers fell. Attendance rates increased in both sectors, particularly in secondary schools. Overall, pupil attendance increased by 1.4 per cent - a rise until 2000/01, partially offset by a fall thereafter - mainly driven by past changes in birth rate.

2.4 Between 1995/96 and 2005/06, pupil numbers rose in England but fell in Scotland, Wales and Northern Ireland. The fall in pupil numbers in Scotland and Northern Ireland has been partially offset by better pupil attendance rates.

Figure 5
Pupil attendance in maintained schools

United Kingdom									
1995/96=100									
	By type of school					By country			
	Pre-school ¹	Primary School	Secondary Schools	Special Schools	CTC/ Academies ³	England	Wales	Scotland ²	Northern Ireland
1995/96	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1996/97	101.3	101.2	101.4	100.6	107.1	101.4	101.1	100.9	100.4
1997/98	101.5	101.6	102.3	101.2	110.9	102.1	101.3	100.2	100.5
1998/99	104.9	101.6	103.8	101.3	114.0	103.0	101.4	100.9	99.3
1999/2000	103.7	101.6	105.9	100.9	116.6	103.8	101.8	102.7	98.9
2000/01	106.2	100.4	106.9	99.1	117.6	103.6	101.2	102.7	98.4
2001/02	103.1	99.8	108.2	98.6	121.1	103.8	101.2	102.2	98.1
2002/03	102.3	98.5	110.0	97.9	141.9	103.9	100.5	101.7	97.3
2003/04	99.8	97.6	110.9	96.3	183.8	103.8	100.0	101.3	96.7
2004/05	97.0	96.5	110.8	94.7	219.5	103.2	98.9	99.6	95.5
2005/06	98.6	94.8	110.2	93.7	260.3	102.2	97.2	98.8	94.1
Change 2005/06 on 1995/96 (percentages)	-1.4	-5.2	10.2	-6.3	160.3	2.2	-2.8	-1.2	-5.9
Pupil Attendance numbers in									
1995/96	250,000	4,626,000	3,322,000	95,000	13,000	6,821,000	446,000	712,000	328,000
Pupil Attendance numbers in									
2005/06	247,000	4,386,000	3,662,000	89,000	35,000	6,974,000	433,000	704,000	308,000

1 Excludes private, voluntary and independent pre-schools

2 Pre-school numbers in Scotland estimated from registration numbers

3 Academies came into existence in 2002

Source: DCSF, Welsh Assembly Government, Scottish Executive, NISRA

2.5 The majority of education output is from primary and secondary schools, but the index also includes pre-schools and funding for training of teachers, nurses and other health professionals. There was an increase of at least 59 per cent over the decade in the UK in the number of children in pre-school education, despite a steady fall in numbers of 3–4 year olds. This is likely to be an underestimate because of missing data from Wales for the private, voluntary and independent sector.

2.6 There was a 66 per cent increase in the index for students taking health courses in the UK. The index for initial teacher training (ITT) fell by 10 per cent for the UK, but with increases in Scotland and Northern Ireland. In England, there has been a shift from 3 year undergraduate to 1 year postgraduate courses for ITT and while student numbers are seen to have declined the total number of qualified teachers has increased.

2.7 Combining all these factors, the education output quantity index increased by 3.8 per cent from 1996 to 2006 (figure 6), though the index has been falling since 2003 reflecting the fall in pupil numbers. Between 1996 and 2006, the education output quantity index increased in England and Scotland but fell in Wales and Northern Ireland.

Figure 6
Quantity of publicly-funded education in the UK by Country

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	1996=100 Total growth 1996–2006 (percentages)
United Kingdom	100.0	101.0	101.7	102.9	103.7	104.1	104.9	105.3	105.2	104.6	103.8	3.8
England	100.0	101.1	102.0	103.1	103.9	104.4	105.4	105.9	105.9	105.4	104.7	4.7
Wales	100.0	100.9	100.9	101.4	101.5	101.6	101.8	101.5	101.0	99.7	98.1	-1.9
Scotland	100.0	100.1	100.7	103.1	104.5	104.7	104.5	104.6	103.7	102.5	102.0	2.0
Northern Ireland	100.0	100.5	99.8	99.3	99.1	99.0	99.2	98.7	98.0	96.5	95.1	-4.9

Source: National Accounts, Office for National Statistics

Measuring the quality of education

2.8 The quantity index does not take account of any change in the quality of education. The article uses a quality adjustment based on the Average Point Scores for GCSEs and the Standard Grade examinations in Scotland. Between 1995/96 and 2005/06, the average annual increase in this index was 2.5 per cent in England, 1.8 per cent in Wales and 1.2 per cent in Scotland.

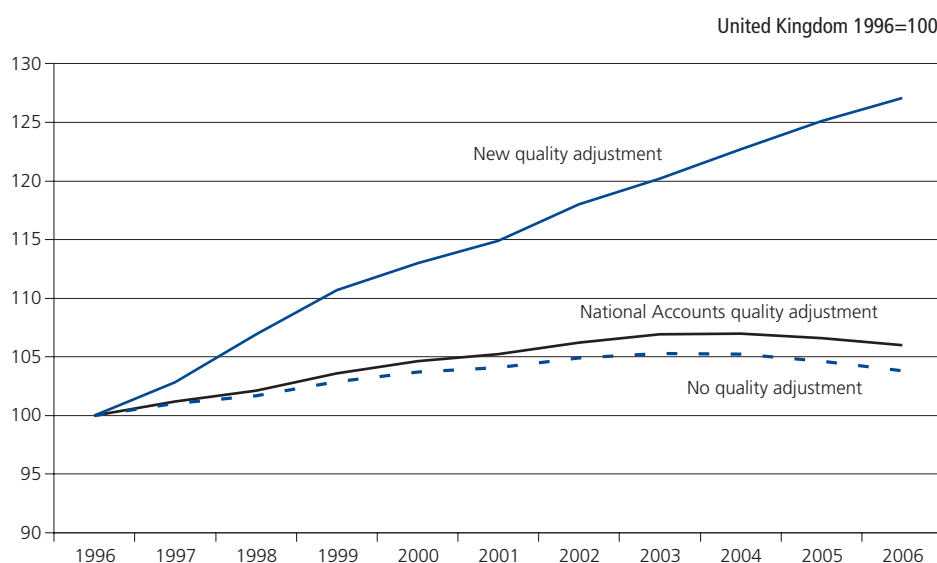
2.9 The new quality adjustment method like the current method in the National Accounts, is based on GCSE results, but with different assumptions about the way children learn and a different mathematical approach. The new method makes direct use of the annual change in the Average Point Score whereas the National Accounts takes an average over a number of years of the rate of change in GCSE results, with the disadvantage that it is not sensitive to the latest year's results.

2.10 Further development is needed to ensure quality is taken fully into account in the education output measure. The article reviews possible sources of error in the current method, and there are plans to address them. Sources of error include:

- any change in examination standards;
- time lags: any method based on GCSE results is slow to pick up improvements earlier in schooling;
- no account of A levels or other attainments after 16; index does not take account of increasing numbers of A* passes (capped at best 8 results);
- no measures of how schools support special needs pupils;
- narrow focus: examination attainment is an important school outcome, but it is not the only one (being healthy, being safe, making a positive contribution, enjoying and achieving, achieving economic well-being).

2.11 The indices for quantity and quality of education are combined for each country to give a UK education output measure. Quality-adjusted education output for UK increased by 27.1 per cent for the period 1996 to 2006, compared with 3.8 per cent when quality is not taken into account (figure 7).

Figure 7
Quality-adjusted measures of education output (1996 to 2006)



Source: Office for National Statistics

2.12 The education output trend is different in each part of the UK as a consequence of differences in pupil and student numbers and in the change in exam grades.

Measuring education inputs

2.13 The inputs to education are labour, goods and services, and capital consumed. Figure 9 presents the latest National Accounts estimates of labour and goods and services at current prices.

Figure 8
Expenditure on general government education inputs 1996 to 2006, current prices

	£ billion										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Labour	18.2	18.8	19.5	21.0	22.8	25.1	27.3	29.4	31.3	33.3	35.0
Goods and services (current)	6.8	6.9	7.3	7.5	7.7	7.8	9.0	9.7	10.3	11.6	12.3

Source: Office for National Statistics

2.14 For productivity measures, inputs at current prices need to be adjusted for pay and price increases, to give a measure of the volume of resources actually used. The inputs are deflated by:

Labour

- an earnings index for teachers (based on DCSF data on teachers' earnings);
- a new pay index for local authority support staff (based on hourly wage rates by occupation estimated in the Annual Survey of Hours and Earnings and its precursor, the New Earnings Survey);
- the public sector average earnings index (including bonuses) for central government staff working in education.

Goods and services

- a combination of producer and retail price indices are used as deflators for goods and services.
- 2.15** Labour costs are about 71 per cent of education expenditure. –the biggest element of labour costs is pay for teachers – about 80 per cent of the total. Teacher numbers have been relatively stable, but expenditure on support staff, particularly teaching assistants, increased sharply over the last decade, with staff numbers more than doubling between 1996 and 2006.
- 2.16** Goods and services are about 25 per cent of education expenditure. This includes the funding for initial teacher training, health professional courses and private nursery places. Capital consumed is estimated by capital services (about three per cent of the total)
- 2.17** The volume of inputs increased by 25.3 per cent between 1996 and 2006. The fastest increase was in the volume of expenditure on goods and services, reflecting the increase in expenditure on pre school education and health professional training.

Figure 9
Education inputs at constant prices

United Kingdom	£ billion										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Labour (£ billion)	25.5	25.5	25.8	26.7	27.9	29.0	29.6	29.4	30.1	30.9	31.2
Index (1996=100)	100	100	101	105	109	114	116	115	118	121	122
Goods and services (£ billion)	8.0	8.0	8.2	8.3	8.4	8.3	9.3	9.7	10.1	10.8	11.0
Index (1996=100)	100	100	103	104	105	104	116	122	126	135	138
Capital services Index (1996=100)	100	100	101	102	103	107	110	112	113	116	118
Publicly funded education inputs Index (1996=100)	100.0	99.8	101.5	104.2	107.6	110.6	115.5	116.3	119.2	123.5	125.3

Source: Office for National Statistics

Further information

- 2.18** The productivity article also presents some contextual information on change in education services, which tends to corroborate the information on quality, quantity and productivity used in the main measure. For example, analysis of Ofsted reports indicates improving standards of teaching. The article also sets out next steps to improve methods further.

Reference

- 1 Office for National Statistics (2007) *Measuring quality as part of public service output*, available at http://www.statistics.gov.uk/articles/nojournal/UKCeMGA_Strategy_Paper.pdf