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Hospital finances and productivity: in a critical condition?

Sarah Lafond, Anita Charlesworth and Adam Roberts

Research report

April 2015

About this report

This report focuses on the finances and productivity of NHS providers (NHS trusts and foundation trusts), drawing on their annual financial accounts and reference cost returns from 2009/10 to 2013/14.

All financial data in this report have been adjusted to 2014/15 prices using HM Treasury's Gross Domestic Product (GDP) deflators – a whole economy measure of inflation – as of January 2015

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Contents

Executive summary

In recent years the English National Health Service (NHS) has undergone major structural changes and has faced an unprecedented financial challenge. NHS providers have been at the sharp end of these changes, seeking to balance funding pressures with the need to sustain – if not improve – quality of care and meet rising demand. 'NHS providers' is the term used to describe the NHS health trusts (NHS trusts and foundation trusts (FTs)) across England responsible for delivering and managing NHS hospital care, community care and ambulance and mental health services.

In this report we examine the financial performance of NHS providers, focusing on hospitals. We identify areas of cost pressure using their financial accounts up to 2013/14 and quarterly reporting data up to December 2014 (Q3 2014/15). We also examine trends in efficiency and productivity from 2009/10 to 2013/14.

NHS providers' finances

- The financial performance of NHS providers in England (acute and specialist hospitals, mental health, ambulance and community trusts) has deteriorated sharply since 2013, from a net surplus of £582m* in 2012/13 to a net deficit of £108m in 2013/14. At the end of the third quarter of 2014/15 the deficit had grown to £789m.
- In 2014/15, the NHS as a whole (commissioners and providers) is projected to overspend its budget by £626m. This is despite the NHS receiving £250m of additional funding from the Treasury and a further £650m being transferred from planned capital investment to support day-to-day running costs.
- The deterioration in NHS provider finances is the result of their operating costs (staff costs, drugs costs, premises expenses, etc) rising more rapidly than the income they receive from the commissioners of care – clinical commissioning groups (CCGs) and NHS England. In 2013/14, NHS providers' operating costs rose by 1.9% (£1.4bn) while their income only increased by 1.0% (£0.7bn).
- These problems are most concentrated in acute hospitals. In 2013/14, 46% of acute hospitals were in deficit, up from 19% in 2012/13. The position of acute hospitals continues to deteriorate, with 76% in deficit at the end of the third quarter of 2014/15.

* All figures in this report are 2014/15 prices unless otherwise stated

– The biggest driver of rising operating costs is staff costs, which account for around two-thirds of NHS providers' operating costs. The number of permanent staff employed by the NHS rose by 2.3% in 2013/14, with the biggest increases in nursing staff, especially nurses in acute care settings and those working with older people. The rise in temporary staff was even greater (15.8%), resulting in spending on temporary staff growing by £1bn (27.4%) in 2013/14. Data for the third quarter of 2014/15 suggest that the pressure from spiralling temporary staff costs is continuing, with spending on agency staff alone rising by a further 30% for foundation trusts and 25% for NHS trusts.

– The earnings of permanent NHS staff have been broadly flat over the current parliament. Between 2009/10 and 2013/14, NHS average earnings fell in real terms (adjusted for inflation) by 0.51% a year, compared to a fall of 1.77% a year in average real terms pay in the private sector. But the cost of employing temporary staff in the NHS appears to be increasing, suggesting that the government's policy of managing NHS input costs by limiting headline pay may be reaching the limit of its effectiveness.

– NHS hospitals continued to experience rising rates of activity. Outpatient attendances, inpatient admissions and accident and emergency visits all increased in 2013/14 and over the parliament. But the rate of increase was slower than in previous years. Hospital admissions rose by 1.9% a year between 2010/11 and 2013/14 compared with a 2.8% a year increase in 2008/09 and 2009/10.

Hospital productivity and efficiency

– The deterioration in hospitals' finances is mirrored by declining productivity for acute and specialist hospital care. Crude productivity* fell by almost 1% in both 2012/13 and 2013/14 after increasing in the first two years of the current parliament.

– Productivity varies across the country and by type of hospital. Compared to the national average, hospitals in London, the North East, South Central and the East Midlands were the least productive; those in the West Midlands, the North West and the South West were the most productive. In 2013/14, small hospitals were 3% more productive than the average, with medium and large hospitals less productive.

– NHS hospitals have become more efficient over this parliament but our analysis shows that the rate of efficiency improvement averaged just 0.4% a year. This is substantially below previous estimates of efficiency improvement, which did not take into account the additional cost pressures in 2013/14. Work undertaken for Monitor and NHS England, analysing the rate of efficiency improvement up to 2012/13, found an annual improvement of around 1.2% a year.

– The NHS has been seeking to stimulate less efficient organisations to match the efficiency of the best. Our analysis shows that the relative efficiency and productivity performance of individual hospitals has changed very little over the last five years. Eighty-one per cent of the hospitals that were above or below average in 2009/10 stayed above or below average in 2013/14.

* Increases in acute hospital output, divided by increases in acute hospital input

Mental health trusts' productivity

– NHS mental health hospitals' activity increased by 0.7% between 2012/13 and 2013/14, while costs fell by 3.0% in real terms, leading to an annual productivity improvement of 3.7%. Our analysis used the new mental health clusters to calculate output.

Conclusion

The NHS faces a substantial funding challenge over the next five years. NHS leaders have called for additional real terms spending to rise to £8bn by the end of this decade. In return, they are seeking to deliver a further £22bn of efficiency savings. This will require productivity improvements of 2-3% a year.

Our analysis suggests that while the NHS did improve its productivity in the early years of this parliament, performance has now tailed off sharply and the crude productivity of hospitals has gone backwards over the last two years. This highlights the mountain the NHS must climb to square austerity with rising demand and expectations for the quality of care.

There is scope for further productivity gain, and the NHS should strive to improve efficiency and eliminate waste. However, unlocking that potential will almost certainly require a very different approach and focus from politicians and policy makers over the next five years. There needs to be much less focus on individual organisations' performance, and much more on looking at the health system holistically.

1. Introduction

In recent years the NHS has undergone major structural changes and has faced an unprecedented financial challenge. NHS providers have been at the sharp end of these changes, seeking to balance funding pressures with the need to sustain – if not improve – quality of care and meet rising demand. 'NHS providers' is the term used to describe the NHS health trusts (NHS trusts and foundation trusts (FTs)) across England responsible for delivering and managing NHS hospital care, community care and ambulance and mental health services.[1] The NHS also buys care from private and voluntary sector providers and GPs but these are excluded from this analysis as there is limited data on their costs and performance. Understanding the financial pressures facing NHS providers during this period of challenge and change is increasingly important.

In this report we examine the financial performance of NHS providers, focusing on hospitals. We identify areas of cost pressure using their financial accounts up to 2013/14 and quarterly reporting data up to December 2014 (Q3 2014/15). We also examine trends in efficiency and productivity from 2009/10 to 2013/14.

Health funding in England in context

2013/14 was a pivotal year for the NHS in England. It was the first financial year in which the health services operated within the structures established under the Health and Social Care Act 2012.[2] This included the abolition of primary care trusts and strategic health authorities, which have been replaced by clinical commissioning groups (CCGs) and a greater commissioning role for local authorities. CCGs are responsible for commissioning hospital, community and mental health services. Local authorities now receive a public health grant from Public Health England on behalf of the Department of Health (DH) to commission public health services. NHS England area teams are now responsible for commissioning a prescribed list of specialist services and primary care.[3] Health Education England is responsible for the education, training and personal development of NHS staff.[4]

Since the formation of the NHS in 1948, health expenditure has increased by an average of 3.7% per year in real terms[5] but, in recent financial years, it has grown at a much slower rate. Between 2009/10 and 2013/14, health expenditure* in England increased at an average annual rate of 0.7% in real terms, from £108.8bn to £112.0bn.[6]

* Health expenditure measured using total department expenditure limit (DEL) excluding depreciation

About this report

This report focuses on the finances of NHS providers (NHS trusts and FTs), drawing on their annual financial accounts from 2009/10 to 2013/14. It covers the following:

- Section two examines NHS providers' operating income and costs and their financial performance.
- Section three focuses on NHS providers' spending on staff and how patterns of spending have changed in recent years.
- Section four examines NHS providers' productivity and technical efficiency from 2009/10 to 2013/14.

All financial data in this report have been adjusted to 2014/15 prices using HM Treasury's Gross Domestic Product (GDP) deflators – a whole economy measure of inflation – as of January 2015.[7]

2. NHS providers' income and expenditure

At the start of 2013/14, there were 247 NHS provider trusts (including NHS Direct), of which 147 had achieved foundation trust status. During 2013/14, two NHS trusts, Kingston Hospital and Western Sussex Hospital, became foundation trusts. Fifty-seven per cent (141) of all trusts were acute hospital trusts (table 1).

Table 1: Total number of NHS and foundation trusts in 2012/13 and 2013/14*

	2012/13	2013/14
Acute	142	141
Ambulance	11	10
Community	17	18
Mental health	58	57
Specialist	20	20
NHS Direct	1	1
Total	**249**	**247**

In recent years, NHS providers have come under increasing pressure. NHS providers' operating costs rose at a faster rate than operating income in 2013/14 compared to 2012/13. Their income rose by 1.0% in real terms, from £73.3bn in 2012/13 to £74.0bn in 2013/14. Over the same period, their operating costs grew by 1.9% in real terms, from £72.4bn to £73.8bn.†

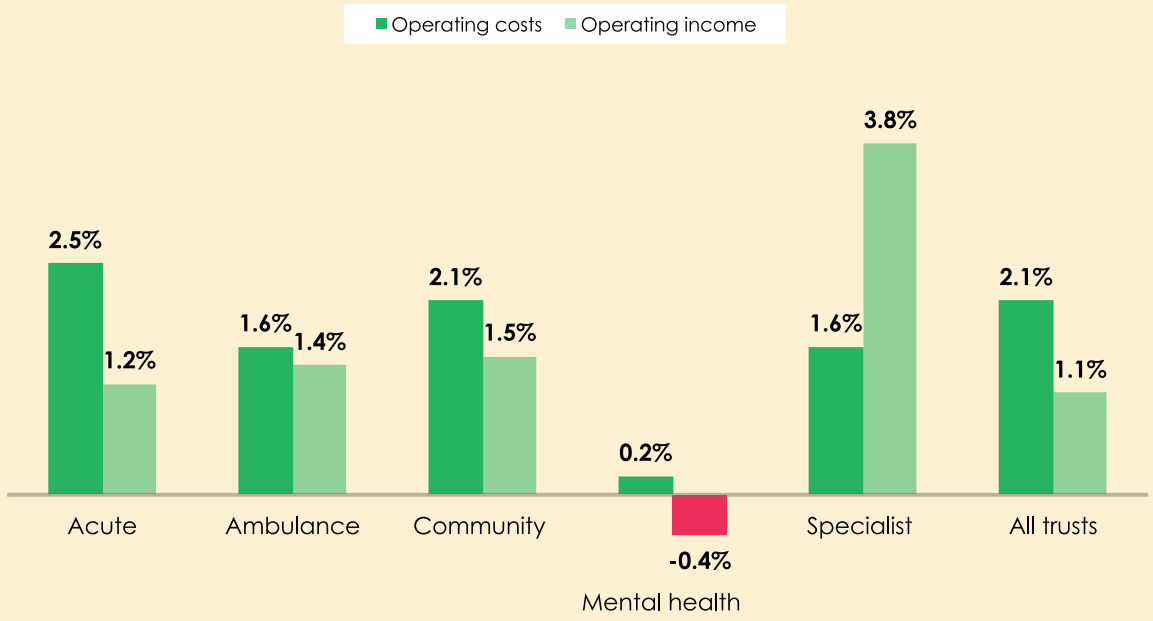
Operating costs have risen at a faster rate than operating income across acute hospitals, ambulance, and community health service trusts. However, the major pressures have been felt mainly in the acute sector, with the operating costs of acute trusts rising by 2.5% from 2012/13 to 2013/14 while income grew by only 1.2% over the same period (figure 1).

* Changes in number of trusts from 2012/13 to 2013/14: Scarborough and North East Yorkshire NHS Trust is now managed by York Teaching Hospital NHS Foundation Trust; Great Western Ambulance Service NHS Trust is now managed by South Western Ambulance Service NHS Foundation Trust; Gloucestershire Care Services NHS Trust is a new community hospital established on 1 April 2013; Oxfordshire Learning Disability NHS Trust, a mental health trust, merged with Southern Health NHS Foundation Trust

† Note: these figures include the impact of non-current asset impairments and HM Treasury technical budgeting adjustments and therefore do not reflect the financial position of trusts

Mental health trusts had the lowest rate of cost growth in 2013/14 but were unusual in that their operating income actually fell slightly in real terms. Specialist trusts were the only group of NHS providers whose income grew faster than costs – their operating income grew by 3.8% in 2013/14 while operating costs rose by only 1.6% (figure 1).

Figure 1: Annual percentage change in operating income and cost in 2013/14 by type of trusts, real terms



Source: Health Foundation analysis using trusts' financial accounts
Note: These figures exclude the operating costs and income of NHS Direct. In 2013/14, NHS Direct operating income was £78.9m and operating costs were £109.5m, as reported in NHS Direct's financial accounts

2.1 Financial performance

With operating costs growing faster than operating income, deficits are rising across the NHS provider community. In 2013/14, the net adjusted* deficit of NHS providers was £108m, with 67 trusts (42 FTs† and 25 trusts‡) reporting a deficit. While FTs produced a net adjusted surplus of £138m,§ NHS trusts reported a deficit of £246m. The net adjusted deficit is a marked deterioration in the financial health of NHS providers. In the previous year (2012/13) NHS providers produced a net adjusted surplus of £582m¶ with just 28 trusts in deficit.

In-year data shows that NHS providers' performance has deteriorated further in 2014/15. For the third quarter of 2014/15, Monitor reported that FTs were in net deficit of £322m. The NHS Trust Development Authority (NHS TDA) also reported that, by December 2014, NHS trusts were in net deficit totalling £467m. The total net deficit for both NHS trusts and FTs for the third quarter of 2014/15 was £789m, with 132 trusts in deficit (figure 2).

* Surplus/deficit before impairments and gains/(loss) from transfers by absorptions

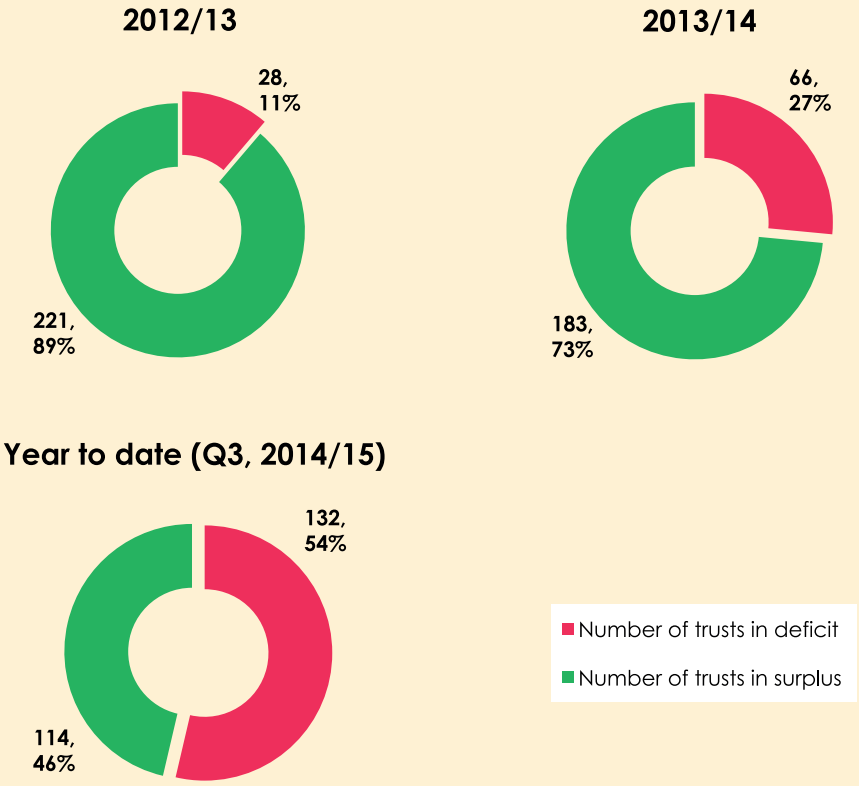
† Number of FTs reporting a deficit after including the consolidation of charitable funds (without the charitable funds, 41 FTs reported a net deficit)

‡ Figure includes NHS Direct, which was dissolved in March 2014

§ Surplus before impairment and gain/(loss) from transfers by absorption and before Monitor's modified absorption adjustment of £1.06m

¶ 2012/13 restated figures based on 2013/14 financial accounts of NHS providers

Figure 2: Number of NHS trusts in deficit in 2012/13, 2013/14 and Q3 2014/15



The deficit is concentrated in the acute sector; this is also the sector that has experienced the largest decline in financial performance compared to 2012/13 and 2013/14. At the third quarter of 2014/15 the acute sector reported a deficit of more than £920m, compared to a net surplus of £194m in 2012/13. This is more than a £1bn deterioration in acute hospitals' finances in less than two years (table 2).

Providers are not expecting to be able to claw back much of this deficit in the fourth quarter of the current financial year – they are projecting a year end deficit of £823m. NHS England report that commissioners expect to end the current year with a net surplus of just £197m. As a result, the NHS as a whole (commissioners and providers) is expected to overspend its budget by £626m.[8]

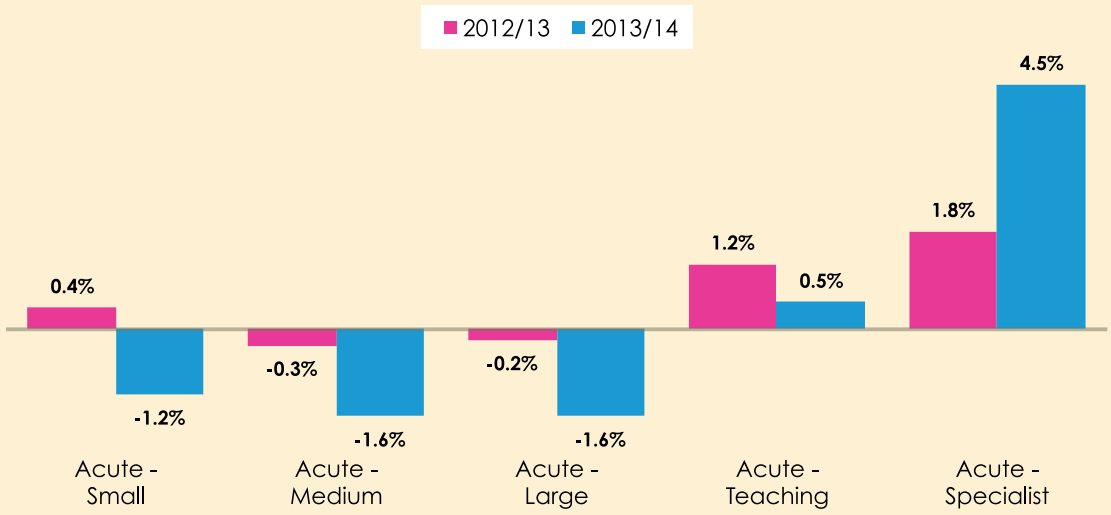
Table 2: Net adjusted year to date deficit by sector, Q3 2014/15, real terms

	Net adjusted deficit by sector			Proportion of trusts in deficit, year to date (Q3 2014/15)
	2012/13	2013/14	Year to date (Q3 2014/15)	
Acute	£194m	-£435m	-£920m	76%
Ambulance	£19m	£15m	£9m	50%
Mental health	£265m	£183m	£74m	21%
Community	£31m	£40m	£5m	16%
Specialist	£125m	£113m	£43m	28%
NHS Direct	-£52m	-£24m	n/a	n/a
Total	**£582m**	**-£108m**	**-£789m**	54%

Teaching hospitals were in net surplus in both 2012/13 and 2013/14; however, general acute hospitals of all sizes were in net deficit in 2013/14. The net surplus of teaching hospitals halved in 2013/14 compared to 2012/13. Large hospitals* have experienced the steepest decline in their finances, with their net deficit deteriorating from £26m in 2012/13 to £285m in 2013/14.

Figure 3 shows net surplus/deficit as a proportion of operating costs. Negative figures represent net deficit; positive figures show net surplus. Small acute hospitals reported a net deficit amounting to 1.2% of their operating cost in 2013/14, compared to the previous year when they reported a net surplus totalling 0.4% of their total cost. Both medium and large trusts' net deficit have worsened, from accounting for 0.3% (medium) and 0.2% (large) of their total operating cost in 2012/13 to accounting for 1.6% (both) in 2013/14. The net surplus produced by acute specialist trusts has grown as a proportion of their operating cost, from 1.8% to 4.5% (figure 3).

Figure 3: Variation in adjusted net surplus/deficit as a proportion of operating costs across acute trusts, by type, 2012/13 to 2013/14, real terms†



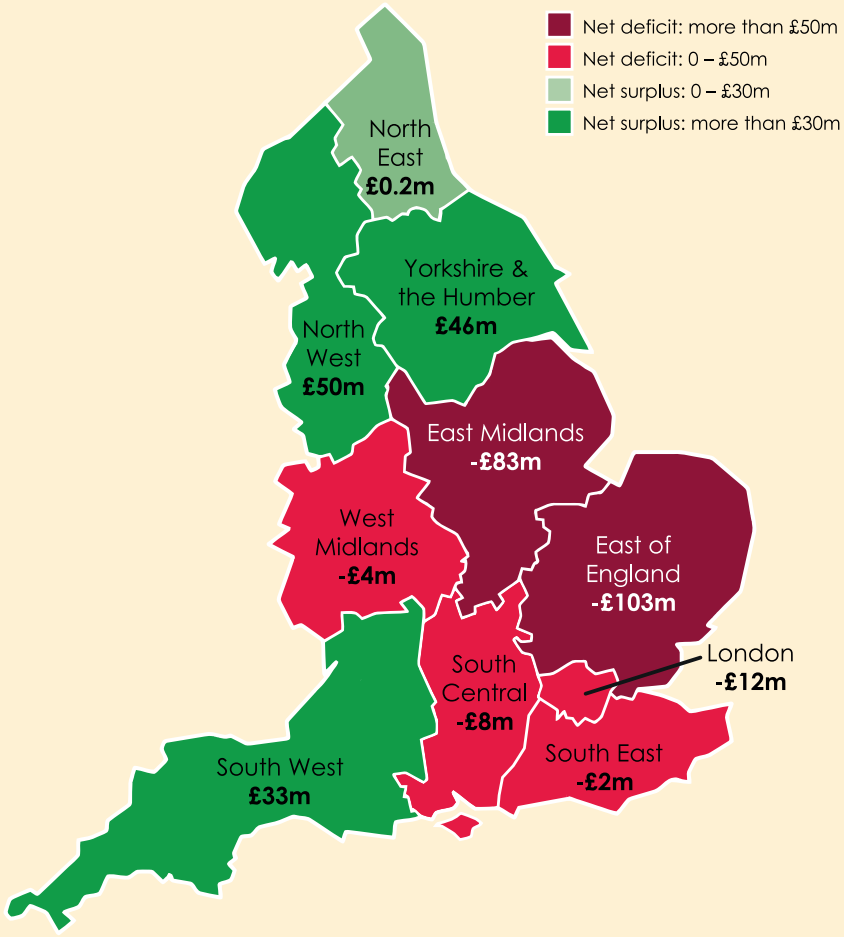
Note: Types of acute trusts have been grouped into small, medium, large and acute teaching trusts, based on DH classification.

Although the deficit is concentrated in the Midlands and the East of England, the financial performance of NHS providers has deteriorated in every region of England. The North East, Yorkshire and the South West retained a net surplus in both 2012/13 and 2013/14, despite a steep decline in their financial performances. The greatest variation was observed in the East of England, where the net adjusted surplus declined from £13m in real terms in 2012/13 to a deficit of £103m in 2013/14 (figure 4).

* Types of acute trusts have been grouped into small, medium, large and acute teaching trusts based on DH classification. Small hospitals refer to hospitals with about 250 to 500 beds and large hospitals can include up to 3,000 beds.

† Exclude Acute-Specialist trust (Royal National Orthopaedic hospital (RAN))

Figure 4: Adjusted financial performance of NHS providers in England in 2013/14



The increasing financial pressures on the acute sector partly reflect increasing demand for care. Hospital activity statistics show that between 2010/11 and 2013/14 emergency admissions increased at an average rate of 0.6%per year and the total number of admissions (elective and emergency) increased by 1.9% a year.[9] First outpatient attendances increased at an average rate of 1.6% a year.[10] Although the demand for hospital activity has increased in recent years, the growth rate of activity is not unprecedented (table 3).

Table 3: Average annual increase in hospital activity based on providers' time series, 2008/09–2013/14

	2008/09–2009/10	2010/11–2013/14
Outpatient first attendances	7.6%	1.6%
Total admissions	2.8%	1.9%
of which:		
non-elective	3.2%	0.6%
elective	2.6%	2.9%
A&E attendances	4.7%	0.6%

Most recent data suggest that this trend continued in 2014/15. Between April 2014 and January 2015, non-elective admissions increased by 1.0%, elective admissions increased by 3.0% and outpatient first attendances increased by 3.6%.[10]

3. Spending on staff

Staff costs are the largest single area of spending for NHS providers; the pay bill accounts for almost two-thirds (63% in 2013/14) of NHS providers' total expenditure. In 2013/14, NHS providers spent £46.5bn on staff, a real terms increase of 1.5% compared to the previous year. The total number of staff employed rose by 3.3% in 2013/14, from 1.04m 2012/13 to 1.08m in 2013/14. The number of permanent staff increased by 2.3%, from 965,000 in 2012/13 to 987,000 in 2013/14; the number of temporary staff increased by 15.8%, from 79,000 to 92,000.*

Temporary staff includes:

- agency
- fixed-term contract
- bank
- locum

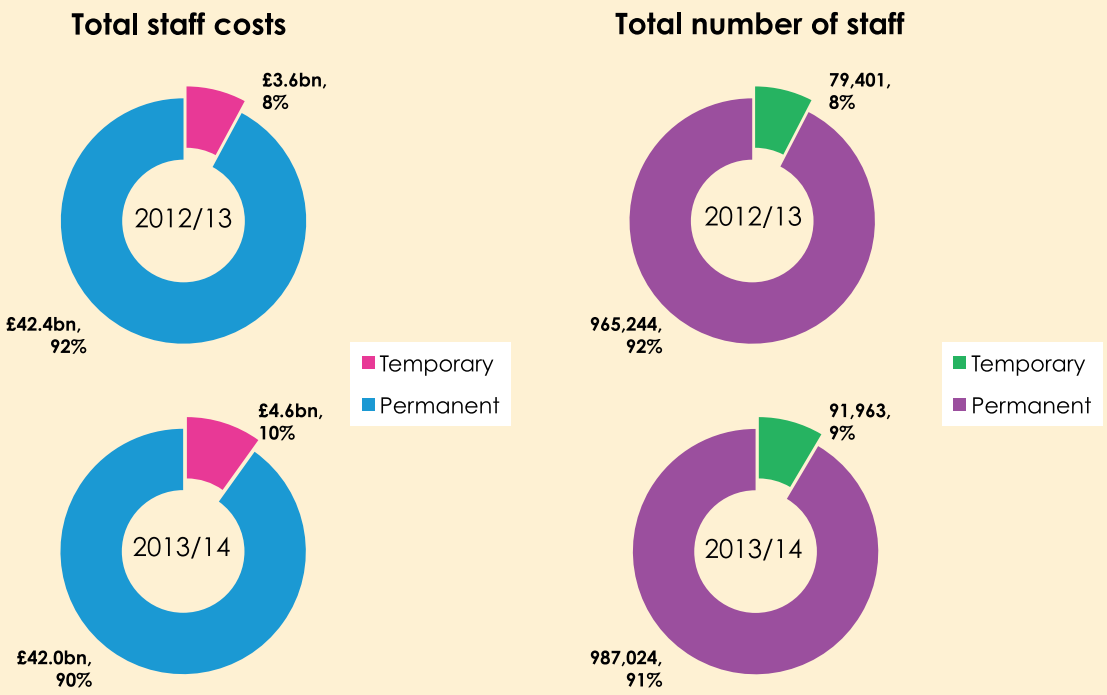
Although total staff costs increased by 1.2% from 2012/13 to 2013/14, spending on permanent staff fell by 1.0% in real terms, from £42.4bn to £42.0bn. Spending on temporary staff rose by 27.4% from £3.6bn to £4.6bn in real terms. The fall in spending on permanent staff, while headcount increased, suggests that more permanent staff may be working fewer hours and/or that pay restraint is holding down earnings for permanent employees.

The increased spending on temporary staff is continuing into 2014/15, with Monitor reporting that FTs had spent £1.3bn on contract and agency staff alone by Q3 of 2014/15, compared to £1.0bn by Q3 of the previous financial year, an annual increase of 30%.[11] Similarly, NHS TDA is forecasting that NHS trusts will spend £1.4bn on agency and contract staff at the end of 2014/15, compared to £1.2bn at the end of 2013/14 (a 25% annual increase).[12]

In 2012/13, temporary staff accounted for 8% of total staff costs and 8% of the total number of staff employed. However, in 2013/14, temporary staff increased to 10% of total staff costs, while the number of temporary staff rose at a slower rate to 9% of the total workforce. This suggests that the average cost of a temporary employee has risen (figure 5).

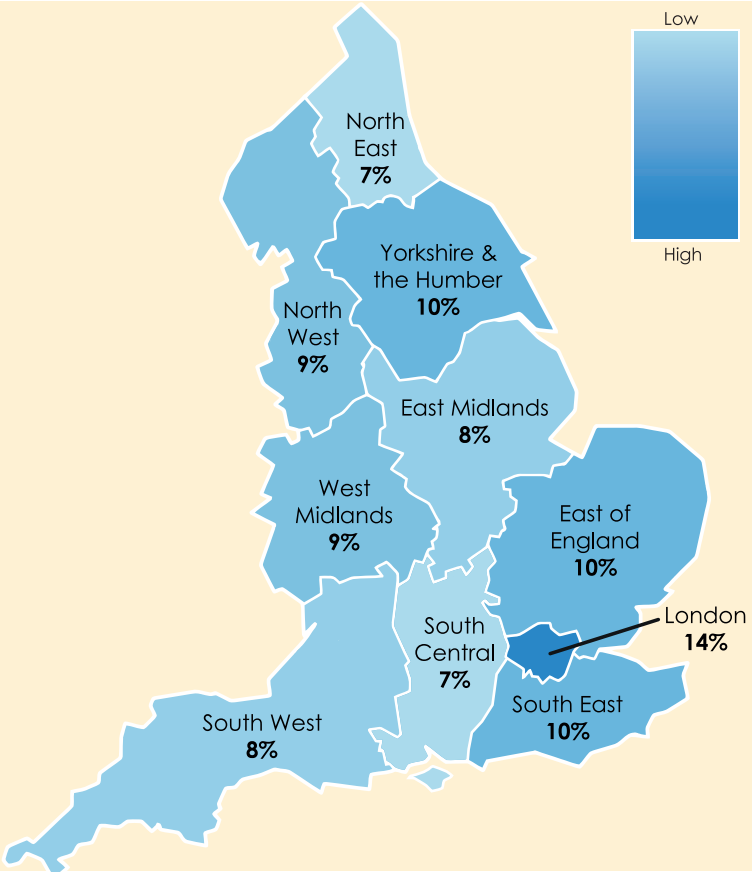
* Note: these numbers are based on the average number of staff and are not full-time equivalent

Figure 5: Total number and cost of temporary and permanent staff, 2012/13–2013/14



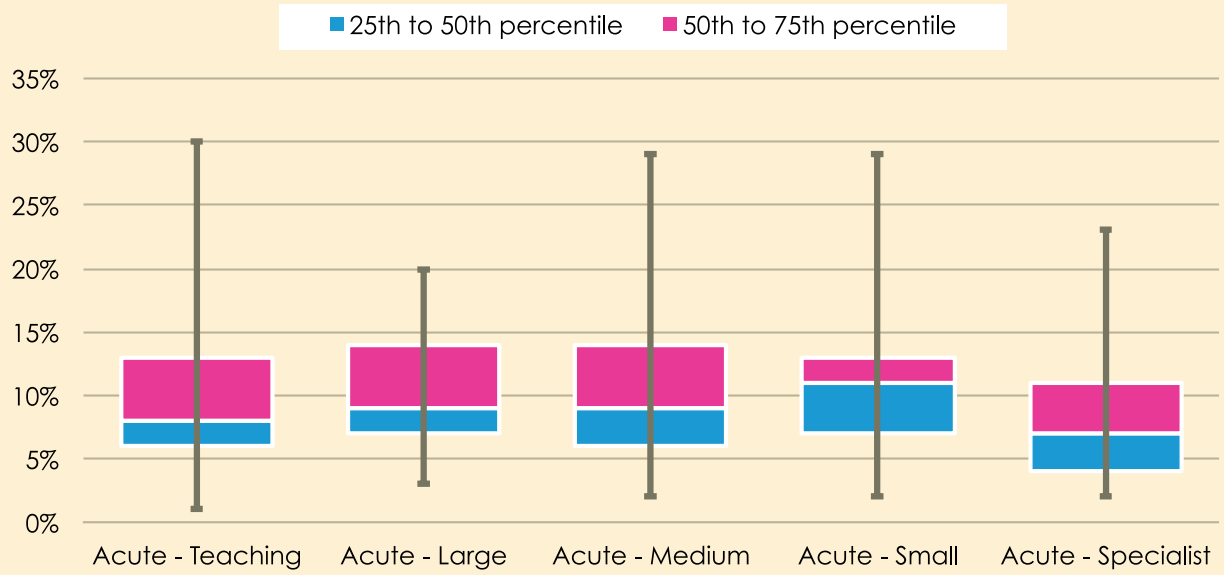
In 2013/14, while the total cost of temporary staff in England accounted for 10% of total staff costs, the use of temporary staff varied markedly across the country. It was lowest in the North East and South Central England, where it accounted for 7% of the total staff costs, and was highest in London, where temporary staff costs accounted for 14% of total staff costs (figure 6).

Figure 6: Temporary staff costs as a percentage of total staff costs in England, 2013/14



The use of temporary staff also varied between hospitals. Larger acute hospitals and teaching hospitals have the lowest percentage of temporary staff (10% and 8% respectively). This suggests that it might be easier for these trusts to recruit and that they are, therefore, less reliant on the use of agency staff. Figure 7 shows that the maximum proportion of temporary staff was just under 30% for teaching, medium and small acute trusts. In 2013/14, five trusts had more than 25% of their staff on temporary contracts.

Figure 7: Use of temporary staff by acute trust, 2013/14

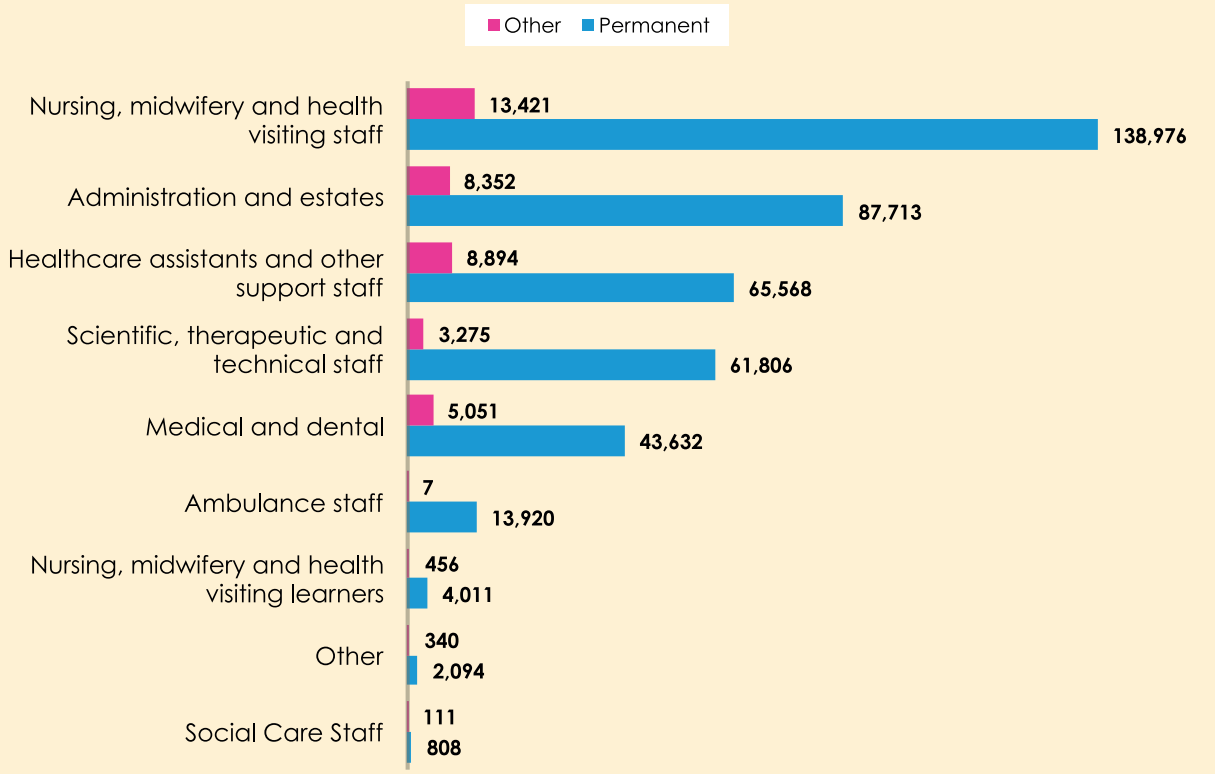


In 2013/14, the average annual cost of a temporary employee was around £50,000 which is 18% higher than that of a permanent member of staff.* It is important to note that these figures do not adjust for the skill mix of the temporary and permanent workforce and the proportion of staff working part time and full time; therefore, this variation in average cost may be due to higher-paid staff groups making up a growing proportion of non-permanent employees, or to temporary staff increasing their average number of hours worked.

Foundation trusts do not submit detailed breakdowns of the types of health care workers employed under temporary contracts. However, in 2013/14, in the 102 NHS trusts, medical and dental staff, health care assistants and other support group staff account for a higher proportion of the total temporary staff. Scientific, therapeutic and technical staff account for a higher proportion of the permanent staff than non-permanent staff (figure 8). This difference in skill mix may explain some of the difference in cost.

* Figures are rounded to the nearest 1,000

Figure 8: Skill mix of NHS trusts' permanent and non-permanent staff, 2013/14



Note: Figures on staff number by skill are not available for foundation trusts and this figure therefore only includes the 102 NHS trusts

To tackle the deficit, the government has implemented a policy of pay restraint across the public sector so that pay awards for health care workers have been limited over recent years (table 4). The government froze pay awards in 2011/12 and 2012/13 for all employees earning more than £21,000 a year, and established a flat rate increase of £250 for employees earning less than £21,000.[13] The government announced in the 2011 Autumn Statement that, following this two-year pay freeze (ending in 2012/13), public sector pay awards would average 1% for the next two years (table 4).[14] This 1% increase rate was in cash terms.

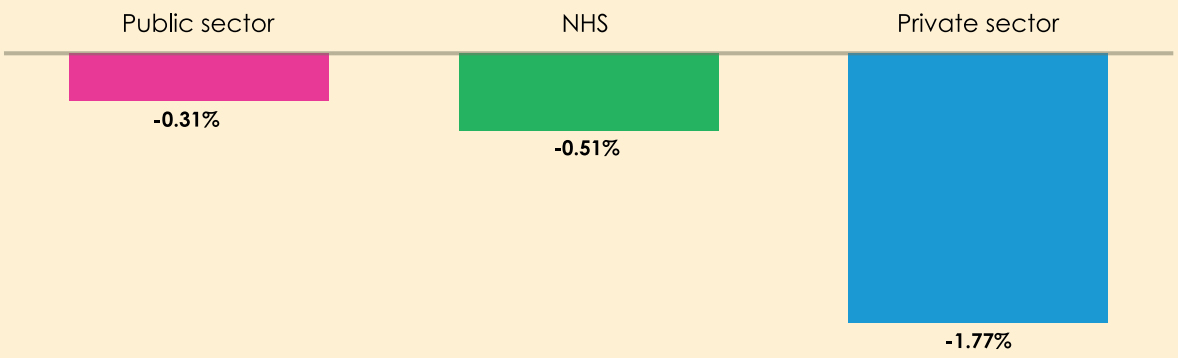
Table 4: NHS staff pay uplift from 2011/12 to 2013/14

Year	Pay uplift
2011/12	• 0% for employees earning over £21,000 • Flat rate increase of £250 cash for employees earning less than £21,000
2012/13	• 0% for employees earning over £21,000 • Flat rate increase of £250 cash for employees earning less than £21,000
2013/14	• 1% pay cap for all NHS staff

Consequently, between 2009/10 and 2013/14, average earnings of NHS and UK public sector staff fell in real terms, with an annual average fall of 0.51% (NHS) and 0.31% (UK public sector) during that period.

Although the pay growth was constrained in the NHS, pay in the private sector experienced a sharper fall over this period, with average annual pay per person falling by 1.77% in real terms (figure 9).

Figure 9: Annual average real terms change in average earning per person from 2009/10 to 2013/14



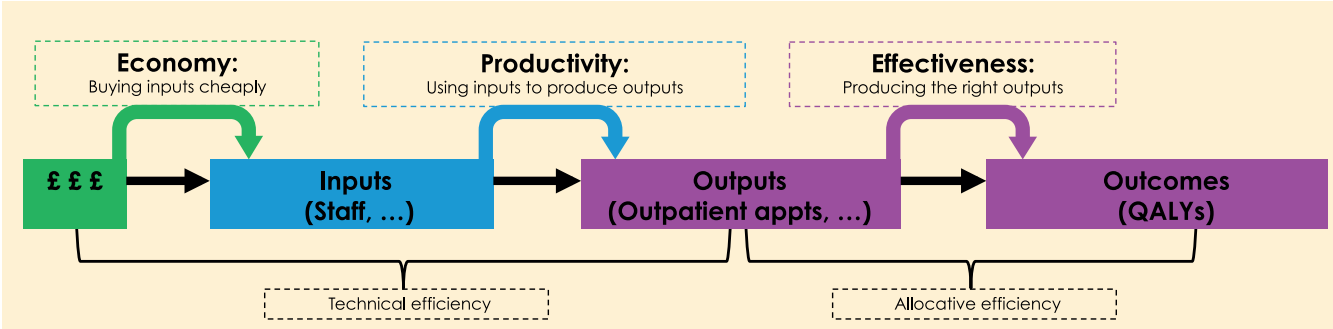
Source: HSCIC NHS Staff Earnings Estimates to January 2014; Provisional statistics, ONS Annual Survey of Hours and Earnings
Note: Average earnings for NHS staff in England exclude earnings of staff employed under bank and agency contracts. Public and private sector pay refers to average annual gross pay per person for all UK employees, while NHS pay refers to average earning per employee of the English NHS

4. Productivity of NHS providers

4.1 Background

In 2014, NHS England and the other system leaders set out a programme of service redesign for the next five years – the *Five year forward view.*[15] They argue that the NHS needs funding growth of 1.5% a year above inflation over the next five years, thus requiring additional funding – above inflation – increasing to £8bn in 2020/21. This would be less than half the historic annual growth in NHS funding (3.7%) and, on top of the last five years of relatively modest funding growth, would amount to the slowest decade of funding growth in NHS history.[16] NHS England suggest they could manage with limited funding growth, while maintaining quality and access to care, by delivering allocative and technical efficiency improvement in the range of 2-3% a year through a programme of system-wide service transformation. Figure 10 shows the difference between productivity, technical and allocative efficiency.

Figure 10: Productivity, technical and allocative efficiency



Source: Department of Health Report to Public Sector Efficiency Group, June 2014

Economists at the University of York estimated the quality-adjusted productivity growth for the NHS in England over the period 2004/05 to 2011/12.[17] They found that the annual productivity growth varied from -0.04% a year to 5.07% a year, with average annual productivity growing by 1.5%.[17] The government's official independent economic forecaster, the Office of Budget Responsibility (OBR), has also produced an estimate of health service productivity over a longer time period. This is calculated for the UK rather than English NHS and is a cruder measure than the University of York study. The OBR found that between 1979 and 2010 productivity in the UK health care sector increased by an average of 1.0% a year.[18]

The Office for National Statistics (ONS) recently produced a further analysis of productivity for publicly funded health care across the UK. This shows that, whereas the ONS had previously estimated productivity growth for 1995 to 2010 at 0.5% a year, 2011 and 2012 both saw productivity rise at above trend, so that between 1995 and 2012 annual average productivity growth across all NHS-funded care was 0.8%.[19]

A recent analysis conducted by Deloitte for Monitor and NHS England looked at the rate of (technical) efficiency improvement across hospitals between 2008/09 and 2012/13. It found that, after accounting for difference in hospital scale, quality, case mix and other uncontrollable cost drivers, hospital efficiency grew by an average of 1.2% a year.[20]

In the rest of this section, we examine acute and specialist hospitals' productivity and technical efficiency using two different methods:

- **Productivity increases,** defined as a ratio of hospital output (cost weighted activity) to hospital input costs (total cost in real terms).
- **Efficiency improvement,** following the methodology used by Deloitte. We model the logarithm of the total costs in real terms, adjusting for differences in cost weighted activity, hospital size, case mix and other uncontrollable cost drivers, to isolate the rate of efficiency improvement.

We estimate both these measures for the acute care components of these hospitals' activity and cost (ie excluding any community health service output or cost that they may deliver following the Transforming Community Services programme). The data used are from NHS trusts' and foundation trusts' reference cost returns.[21] Our measure of acute services includes non-elective, elective, day cases and accident and emergency activity. We exclude outpatient activity due to discontinuities in the reference cost data for outpatients. We also estimate productivity for mental health trusts from 2012/13 to 2013/14.

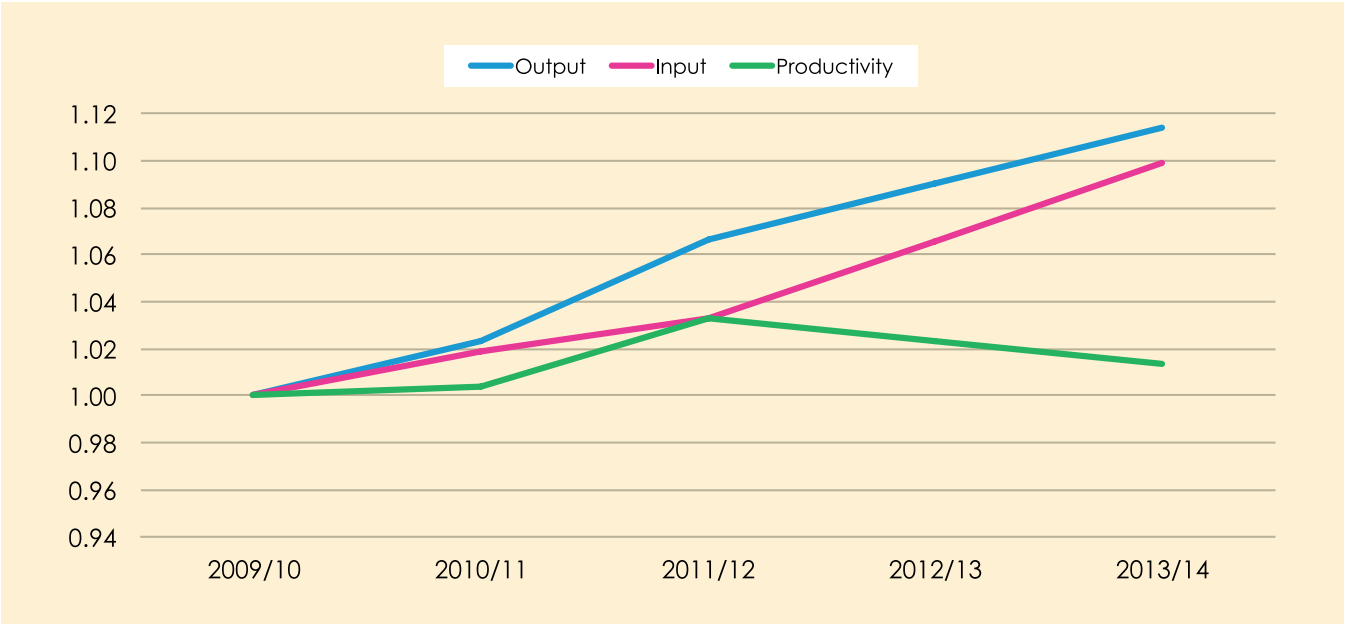
4.2 Provider-level productivity of acute trusts

Measuring productivity in health care is complex. Health care productivity can be defined as the ratio of quality adjusted output to the volume of input.[22] In our analysis of productivity increases, we have used the real terms total cost of delivering acute care adjusted by the market force factor (MFF)* and the case-mix adjusted activity, to produce an output/input. In this analysis, although we adjust for the case-mix differences between providers, we do not adjust for differences in quality, so it might be considered a partial or crude measure of productivity.

We find that between 2009/10 and 2013/14, productivity in terms of output/input increased by 1.3% overall – an annual average rate of productivity growth of 0.4%. During that period, cost weighted activity increased by 11% and input costs increased by 10% (figure 11). This low level of productivity growth was driven by the fall in crude productivity we observe in 2012/13 and 2013/14. Between 2009/10 and 2011/12 the annual average rate of productivity growth was 1.6% but, following the fall in productivity in 2012/13 and 2013/14, the average growth rate fell to 0.4% a year over the whole period 2009/10 to 2013/14.

* MFF accounts for adjustments made to national tariff based on variation in the provision of health care costs relating to the local area that is staff, buildings, land and equipment

Figure 11: Change in hospital productivity from 2009/10 to 2013/14



Using 2009/10 as a base year, we analysed changes in productivity each year up to 2013/14. Compared to 2009/10, productivity increased by 3.26% from 2009/10 to 2011/12, but fell by 0.94% in 2012/13 and 0.95% in 2013/14 (figure 12). Over the period as a whole (2009/10–2013/14), productivity increased at an annual average rate of 0.4%. The fall in productivity in 2012/13 and 2013/14 was driven by an increase in input costs of 3.16% and 3.15% respectively, while activity only increased by 2.20% and 2.17% during these two years.

Figure 12: Annual change in hospital productivity index from 2011/12 to 2013/14

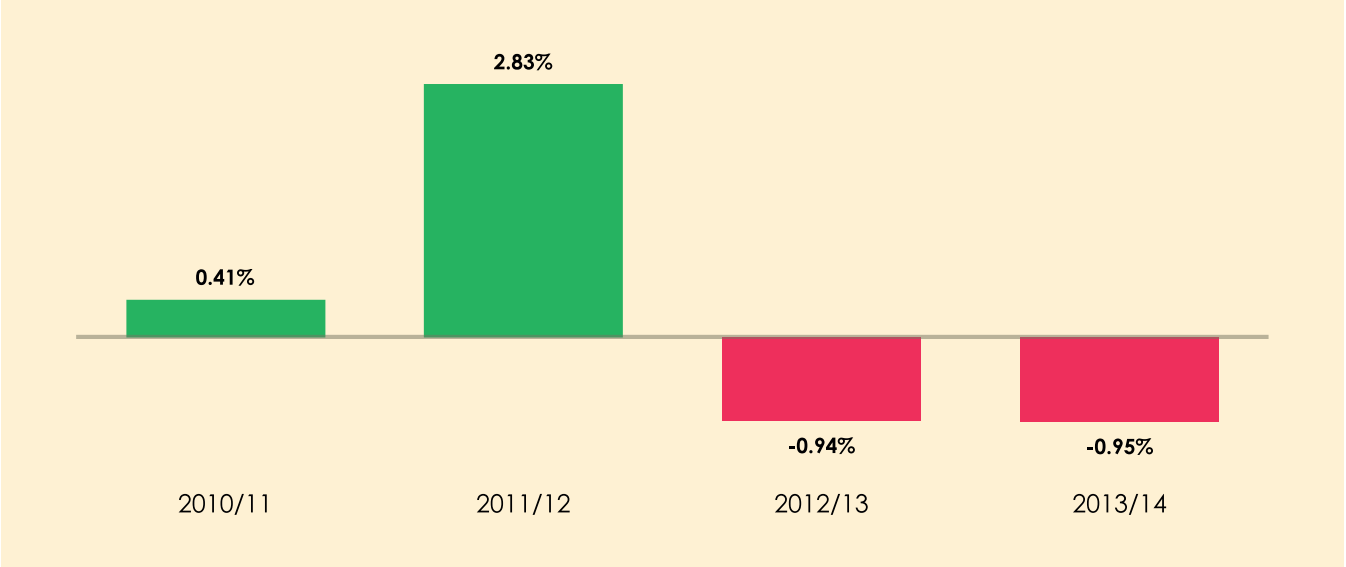
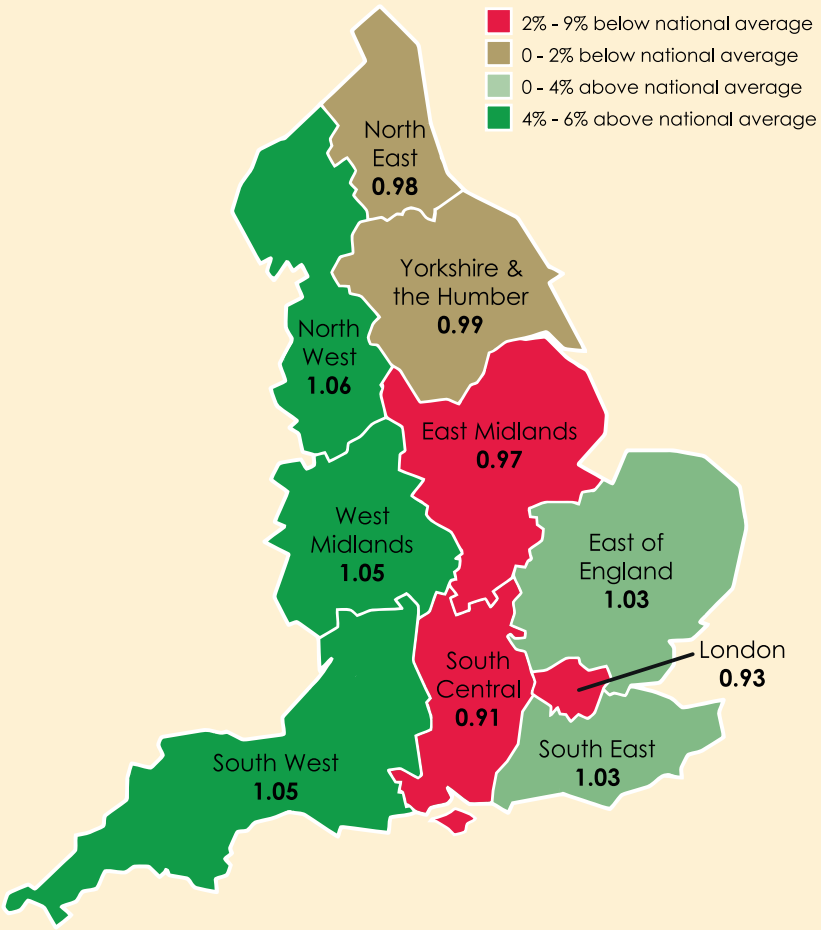


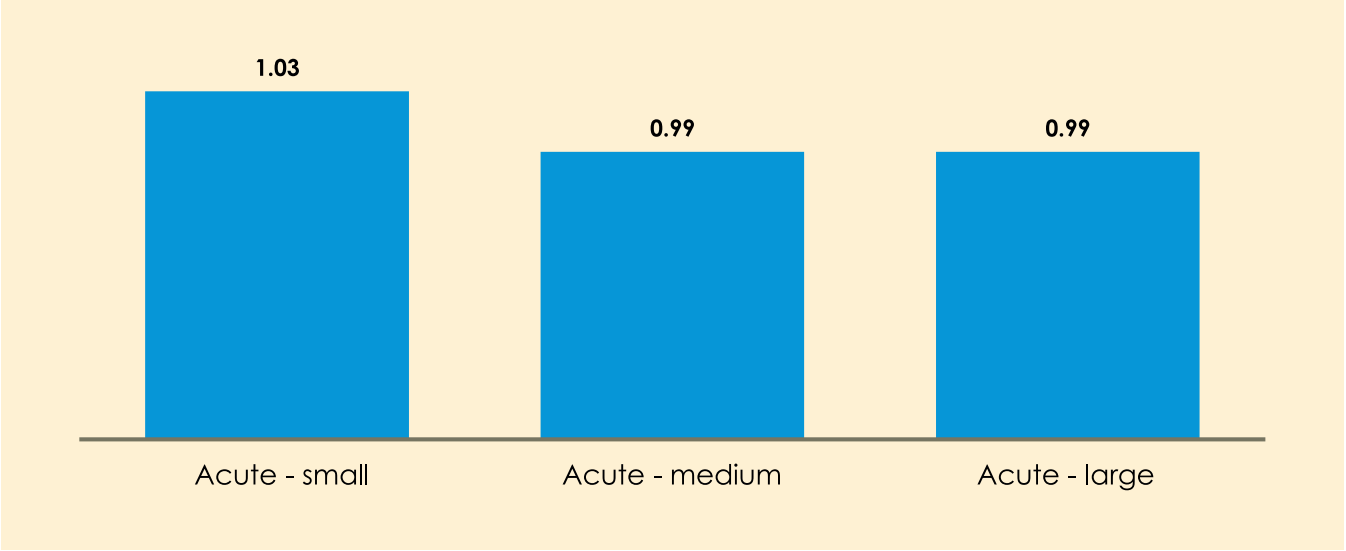
Figure 13 shows that crude productivity varies across England. The results of this analysis are similar to those of a previous analysis conducted in 2012, which found that London was relatively less productive.[23] Figure 13 shows that in 2013/14, compared to the national average, London, the North East, South Central and the East Midlands were the least productive regions; the most productive regions were the West Midlands, the South West and the North West. The two areas with the largest deficit, the East Midlands and the North East, are both less productive than the national average (3% and 2% below average respectively).

Figure 13: Average hospital productivity by region in England, 2013/14



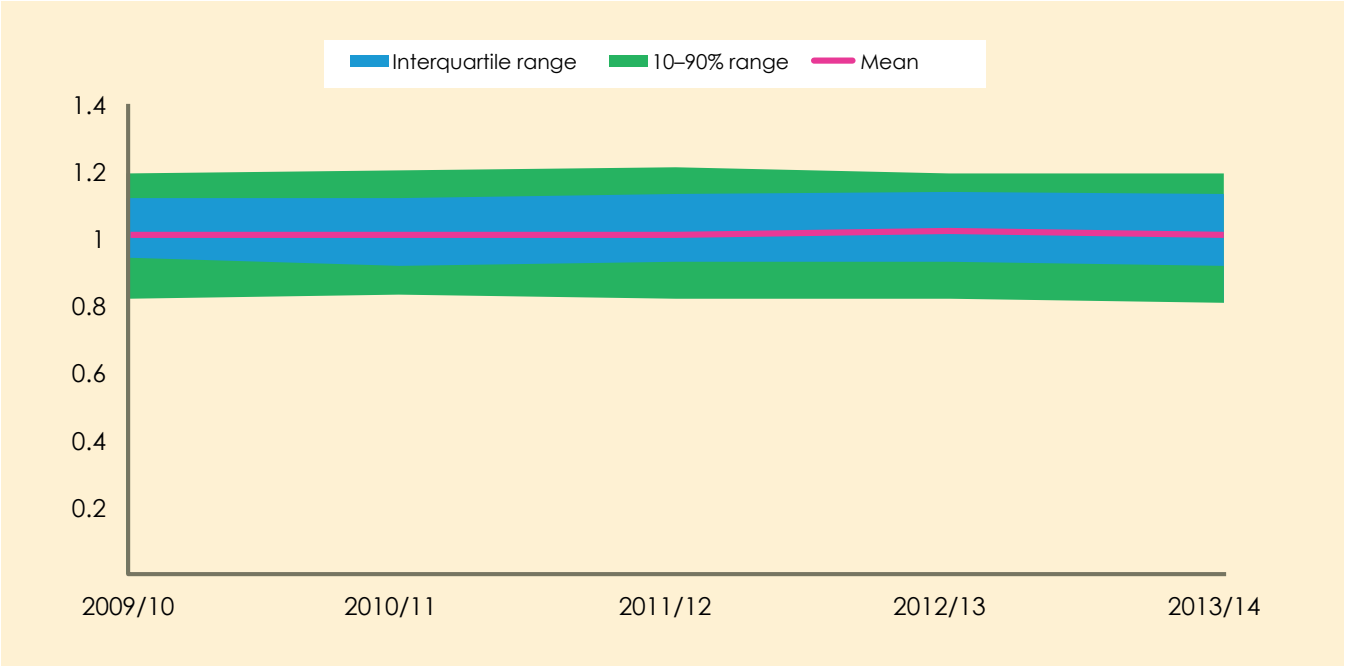
When comparing productivity by size of hospital,* we found that small acute trusts were more productive than large and medium acute trusts. In fact, small trusts were 3% more productive than the average, while medium and large trusts were less productive (figure 14).

Figure 14: Variation in productivity index of hospitals by size



Variation in productivity among acute hospitals changed little from 2009/10 to 2013/14. The upper quartile of the productivity index range increased from 1.12 in 2009/10 to 1.13 in 2013/14, while the lower quartile fell from 0.94 in 2009/10 to 0.92 in 2013/14 (figure 15).

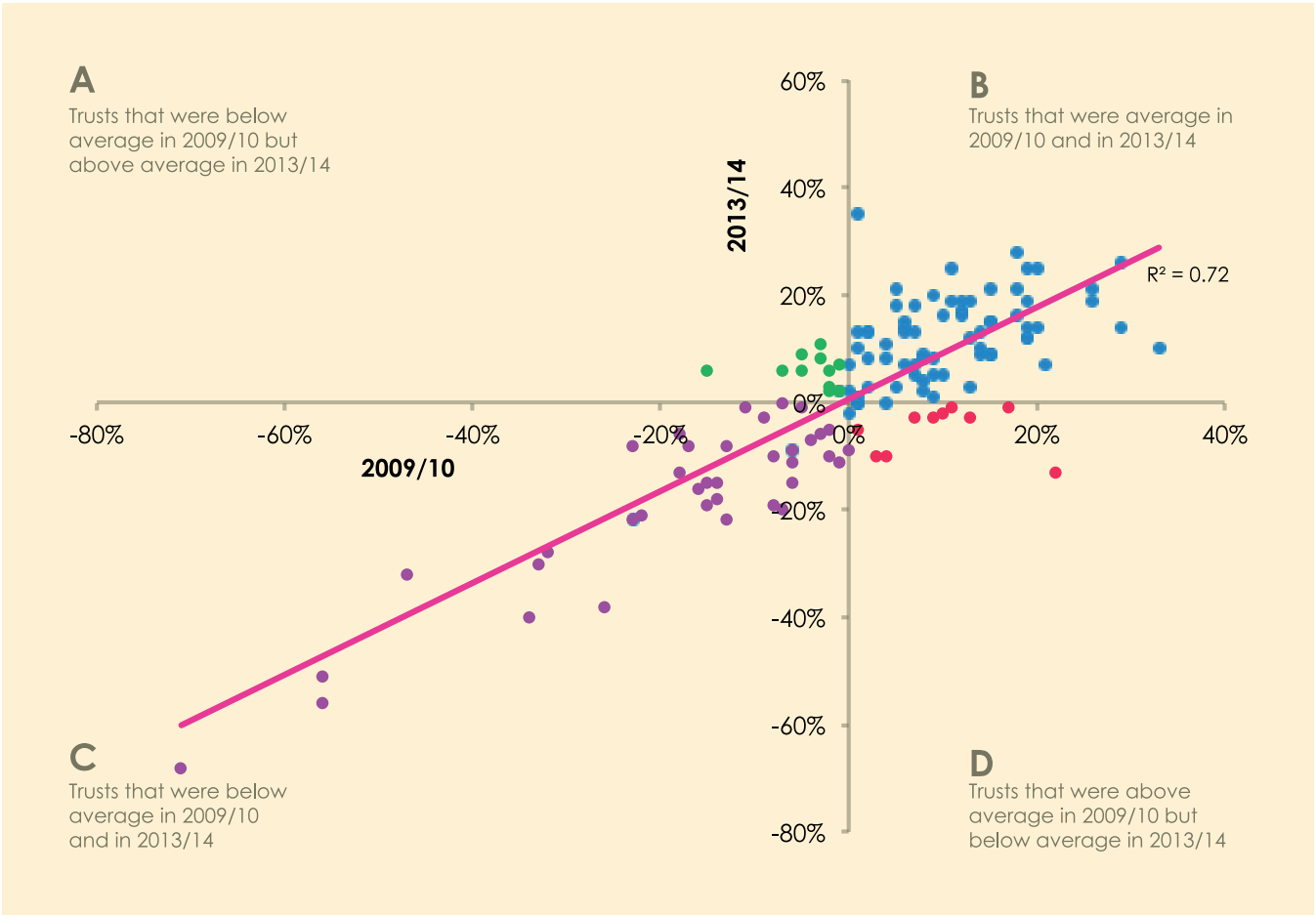
Figure 15: Variation in productivity of hospitals from 2009/10 to 2013/14



* Teaching and specialist trusts were excluded from this analysis

Figure 16 shows little change in relative productivity between 2009/10 and 2013/14. Eighty-one per cent of the trusts remained in the same relative position, ie those that were above average in 2009/10 remained above average in 2013/14 (quadrant B), and similarly for those below average (quadrant C). A minority changed their relative position, with 13 becoming more productive than average (quadrant A), and 12 becoming less productive than average (quadrant D).

Figure 16: Variation in productivity among acute trusts between 2009/10 and 2013/14

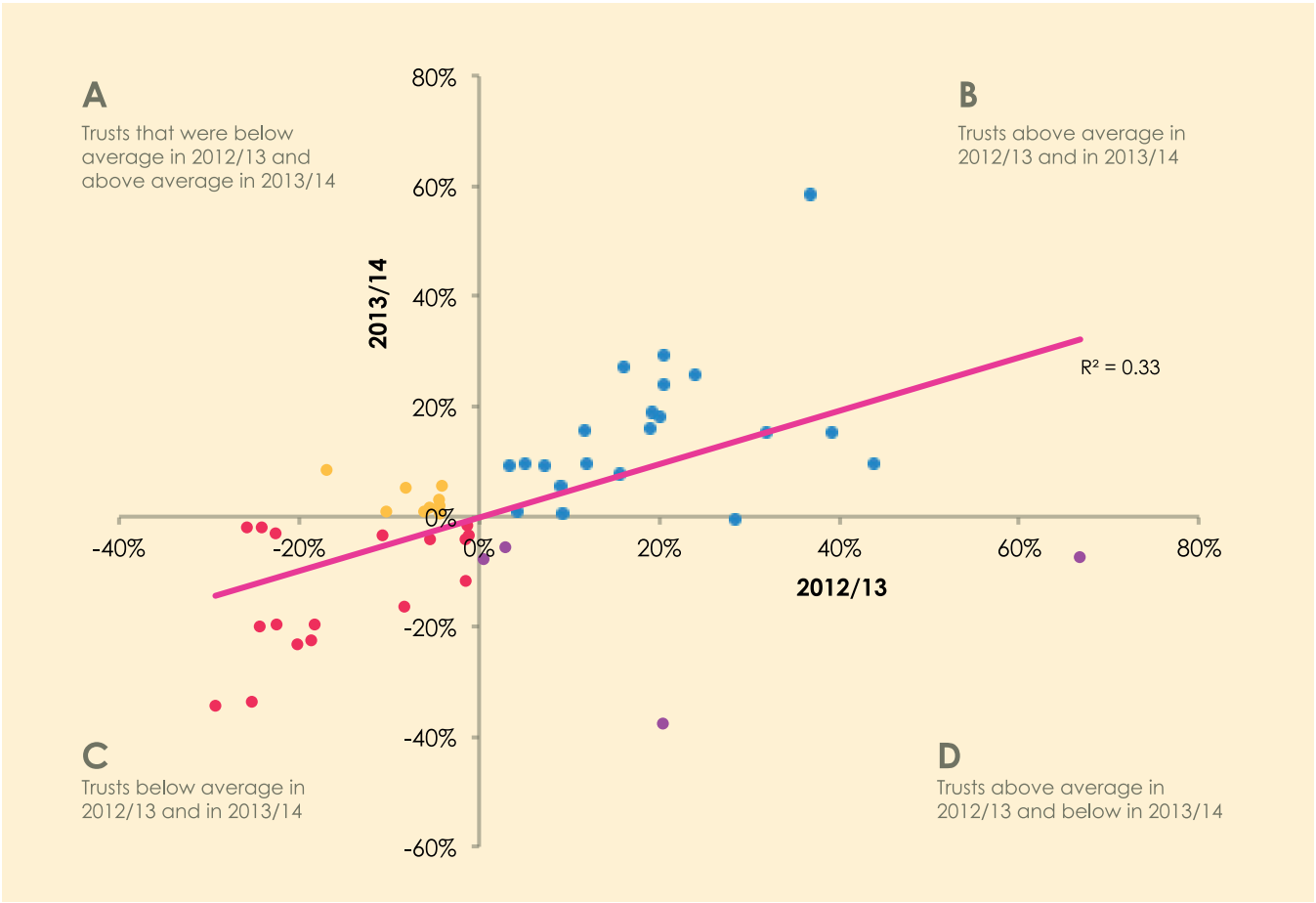


4.3 Productivity of mental health care trusts

The costs and activity of mental health and community health trusts have been excluded from the previous analysis, since there were significant changes in the coding of services provided between 2009/10 and 2013/14. Compared to 2010/11, mental health activity has undergone a near total reclassification.[17] In 2011/12, mental health clusters were introduced as a way of classifying mental health activity. We therefore analysed the input and output of mental health care activity for the last two financial years (2012/13 and 2013/14) using the mental health care clusters.

We find that mental health activity during that period increased by 0.7% while the total cost fell by 2.9% in real terms, leading to a productivity gain of 3.7%. Productivity varies among mental health trusts, but the productivity gap seems to be decreasing. In fact, the range of productivity reduced from 0.12%–1.67% in 2012/13 to 0.62%–1.59% in 2013/14. Figure 17 shows that, while most trusts that were above average in 2012/13 remained more productive than average in 2013/14 (quadrant B), trusts that were below average usually remained less productive in 2013/14 (quadrant C). However, only four trusts that were more productive than average in 2012/13 were less productive than average in 2013/14 (quadrant D); nine trusts that were less productive than average in 2012/13 became more productive than average in 2013/14 (quadrant A).

Figure 17: Variation in productivity among mental health trusts in 2012/13 and 2013/14



4.4 Technical efficiency of NHS hospitals

Many factors can affect the cost of providing health care – productivity is one but others are also important. Therefore we extended our productivity analysis and considered the technical efficiency of hospitals. Following a similar approach used by Deloitte for NHS England and Monitor,[20] we measured efficiency from 2009/10 to 2013/14.

In this analysis, we examine the drivers of the total cost of acute care from 2009/10 to 2013/14, and seek to isolate the contribution of efficiency to cost. When analysing panel data sets such as individual hospital cost over time, the most common statistical estimation models are either fixed effects or random effects models. In our analysis we follow the approach used by Deloitte in their work for Monitor and NHS England and employ a random effects model. A random effects model allows us to estimate the effect of time in-variate explanatory variables, and this is of interest in the work on efficiency. We control for differences in both the inputs (which drive differences in the total costs of acute care) and the outputs and quality of care delivered. We confine our analysis to the cost and outputs of acute care. This is the activity associated with elective and non-elective inpatients' acute care, day cases and accident and emergency services, distinguished by the Healthcare Resource Group (HRG) from NHS reference costs. Costs are deflated using the GDP deflator and the MFF, and activity is measured as a cost weighted activity index.

Drivers of costs in the acute sector

Our random effects model aims to examine providers' efficiency and explain variation in total acute care costs between providers. Variations in the cost of providing acute care by different trusts can be attributed to the characteristics of the provider itself, such as its size, type of service provided, the demographic characteristics of the patients it services and the quality of service provided.

We examine the relationship between the real terms, total cost of acute care in these hospitals, deflated by the MFF, and a number of factors related to each provider's characteristics and its external environment (see table 5). Only those factors that were statistically significant at a 95% confidence level were included in the model. The main purpose of this model was to control for factors affecting costs, to isolate and estimate the effect of differences in providers' efficiency.

Table 5: Factors tested in the analysis of hospitals' efficiency

Factor	Data used
Geographic location	Dummy variables (1 for trusts located in strategic health authority; 0 otherwise) for each strategic health authority
Case-mix adjusted activity	Activity weighted based on national average HGR unit cost
Size/type of trusts	Dummy variables (1 for small, medium, large, specialist or teaching; 0 otherwise) for each acute trust type
Gender	Proportion of total admissions for female patients from Hospital Episode Statistics[24]
Age	Proportion of finished consultant episodes for patients aged under 14[24]
	Proportion of finished consultant episodes for patients aged over 65[24]
Emergency admissions	Proportion of total admissions for emergency care[24]
Skill mix	Administration staff as a proportion of total staff numbers
	Medical and dental staff as a proportion of total staff numbers
	Nursing, midwifery and health visiting staff as a proportion of total staff numbers
	Health care assistants and other support staff as a proportion of total staff numbers
Percentage of temporary staff	Temporary staff as a proportion of total staff numbers
PFI	PFI finance cost as a proportion of total operating costs
Staff satisfaction	Proportion of NHS staff who agree or strongly agree with the following statement: 'I would recommend my organisation as a place to work' (NHS Staff Survey)
	Proportion of staff who agree/strongly agree with the following statement: 'If a friend or relative needed treatment, I would be happy with the standard of care provided by this organisation' (NHS Staff Survey)
Proxy of quality of elective care	Health gains from hip replacement, Patient Reported Outcomes Measures (PROMs)
Disease prevalence	14 QOF indicators weighted at provider level (prevalence of stroke, hypertension, diabetes, COPD, epilepsy, hyperthyroid, cancer, mental health, heart failure, dementia, chronic kidney disease, arterial disease, learning disability, cardiovascular disease)

Results

Our analysis shows that, after accounting for the significant explanatory variables, acute trusts' efficiency increased at an average of 0.4% per year from 2009/10 to 2013/14. Table 6 shows the effect of the statistically significant variables on the logarithm of total acute cost.

Table 6: Estimation results of random effects model on logarithm of total acute cost, 2009/10 to 2013/14

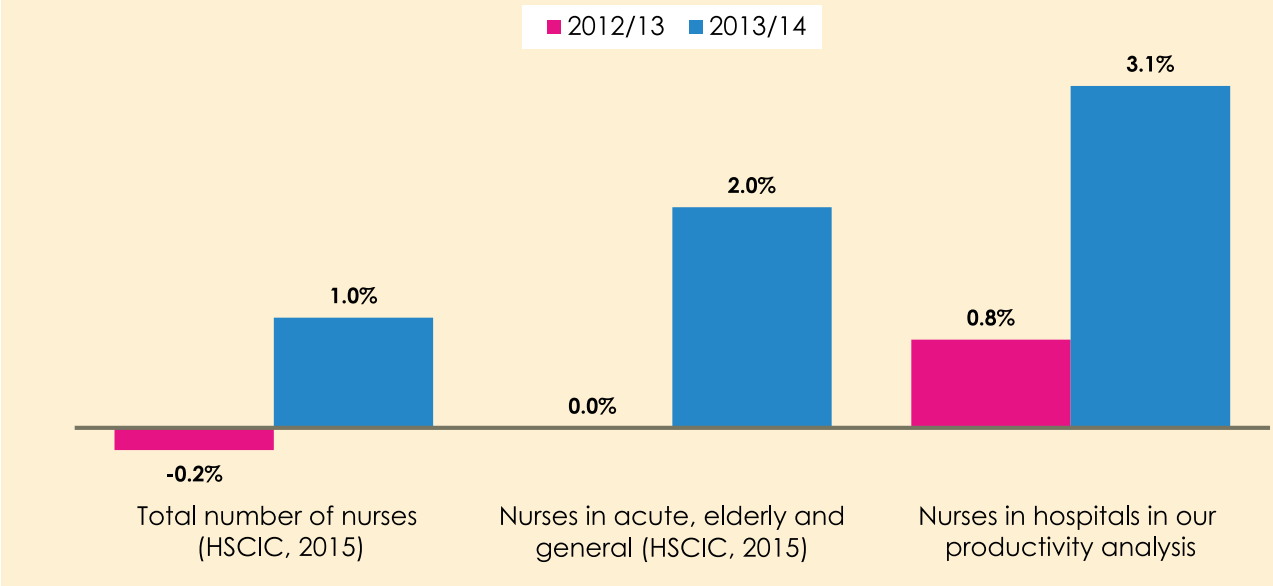
Variable name	Coefficient estimate
Intercept	16.8181
Time (measure of annual efficiency improvement)	**-0.00373**
Log of case mix activity	0.8851
Percentage of female admissions	-0.02309
Percentage of patients aged over 75	-0.01079
Proportion of staff who are medical or dental staff	0.1652
Percentage of staff who are health care assistants and other support staff	0.5559
Emergency admissions as a proportion of total admissions	-0.00635
Percentage of staff who are qualified nurses	1.0471
Staff survey friends and family question	-0.3304
London	0.04928
South West	-0.04301
Yorkshire and the Humber	-0.02964
East Midlands	0.03687
West Midlands	0.02934
East of England	-0.00995
South East	0.0343
South Central	0.0376
Large acute trusts	0.07199
Medium acute trusts	0.03233
Acute teaching hospitals	0.1588

5. Discussion

NHS spending in England has been protected from the full effects of the government's austerity and, over the current parliament, spending will have grown by an average of 0.9% a year in real terms. Despite this, it is clear that the service is under significant strain and the finances of NHS hospitals have deteriorated very rapidly.

The reasons for this are very clear from our analysis. Hospital operating costs have been growing at a faster rate than their income. The key driver of rising operating costs is staff costs and, in particular, the rapid rise in spending on temporary staff. One outcome of Sir Robert Francis's report on the scandal of poor care standards at Mid Staffordshire[25] has been a sharp rise in the number of nurses employed in hospitals. This has increased the unit cost of providing an episode of care. As figure 18 shows, the increased number of nurses has been greatest in acute hospitals.

Figure 18: Changes in NHS nurse numbers, 2012/13 and 2013/14



The increase in temporary staff may also reflect some wider issues in the health service labour market. The government's policy of pay restraint has held down average earnings for permanent employees, but the challenges some parts of the country face in recruiting and retaining staff cast doubt on how long this policy can be sustained. The NHS staff survey also shows that in many parts of the NHS morale is falling and stress is increasing. According to the 2014 survey results, 38% of staff suffered work-related stress in last 12 months.[26]

The rise in the unit cost of delivering acute care may also explain why we find that crude productivity in hospitals fell sharply in 2013/14. Our measure of productivity does not measure the quality of care, so we were not able to assess whether the additional staff costs have improved quality, nor whether this has been cost-effective. Such evidence is urgently needed to inform the development of staffing guidance from bodies such as NICE.

The efficiency and productivity performance of the NHS is clearly essential to its sustainability. Looking to the next parliament, NHS England analysed the funding pressures facing the NHS over the next five years (2015/16 to 2020/21).[15] They estimate that these pressures will be around £30bn higher, in real terms, by the end of the decade. These pressures result from the impact of a growing and ageing population, rising expectations of care, new technologies and increasing input costs. Looking beyond the next parliament, pressures on the health budget are projected to rise further, with funding pressures growing to around £100bn in real terms by 2030/31.[16]

The amount of additional funding the NHS will require for the next five years is hugely dependent on its rate of productivity growth. NHS England have estimated the additional funding requirement above inflation under three scenarios for productivity. These are shown in table 7.

Table 7: NHS England estimates of funding pressures facing the NHS in England by the end of the decade*

Productivity growth assumption	Funding requirement in 2020/21 above inflation
0.8% a year	£21bn
1.5% a year	£16bn
2-3% a year	£8bn

Beyond this decade, productivity growth will continue to have a substantial impact on the funding required to sustain the NHS. If the health service maintains annual productivity growth at the trend rate, funding would need to rise by around 2.9% a year. This is above the expected rate of economic growth of 2.3% a year.[16] If NHS productivity grows at the same rate as that for the whole economy (2.2%), health spending would need to increase in line with GDP.

* NHS England's projections of total spending are in cash terms, allowing them to explore the impact of cost pressures (such as pay) separately to assumptions for GDP deflators. The budget for NHS England is then assumed to rise with inflation.

NHS England argue that by implementing the service redesign set out in the *Five year forward view,* the NHS could deliver productivity improvements in the range of 2–3% a year and thereby reduce the additional funding requirement to £8bn in 2020/21, over and above inflation.

Our analysis of the efficiency and productivity performance of the NHS over recent years suggests that this will be a very substantial challenge. Looking at our measure of efficiency we find that, between 2009/10 and 2013/14, the average annual growth in efficiency for acute care was 0.4% – much below the 2–3% required by the *Five year forward view*. Our output/input analysis of crude productivity finds that, although the hospitals delivered productivity improvements in the early years of the current parliament, productivity performance is very volatile year on year and seems to have fallen back in 2012/13 and 2013/14. What our analysis certainly suggests is that the conclusion in the *Five year forward view* is correct: the NHS can't rely on driving improvements in the efficiency and productivity of acute hospitals as the main way of delivering overall system efficiency. Rather, the NHS needs to look more widely at the allocative efficiency of care across the system and at the scope to moderate pressures on the system from improved population health.

This analysis is our first attempt to explore mental health trusts' crude productivity with the new clusters. Results should be treated with caution and further analysis will be critical. However, the results do point to growing productivity.

If the NHS is to deliver productivity improvements of 2–3% a year for the next five years, it will need to make rapid progress on the new models of care. But even with a very effective implementation plan, such changes cannot be expected to deliver significant savings until towards the end of the decade. In the next few years the system will also focus on so-called catch up savings. The Deloitte study for Monitor and NHS England estimated that if the average hospital could improve its efficiency to the level of the 90th percentile provider, 5.0–5.6% of savings could be realised.[20] Narrowing variations is a consistent theme of health policy. However, while it is relatively easy to identify the opportunity, our analysis confirms that the NHS – like most health care systems – has struggled to make progress on tackling variation in productivity. It suggests that there has been very little narrowing of the productivity range across NHS hospitals over the last five years.

Delivering productivity growth of 2-3% a year to 2020/21 would represent an unprecedented level of health service productivity improvement for such a long period. If NHS productivity matched the estimate of the whole-economy trend rate of productivity growth (2.2% a year), public spending on health as a share of GDP could remain broadly constant and meet projected pressures. However, there is no evidence that productivity at this rate could be sustained in the medium term. Health care provision is relatively labour intensive and it is therefore likely that productivity growth will be slower in this sector than in the economy as a whole. Over the medium term, wages in the health sector would still need to rise in line with those in the whole economy. This would lead to what is known as '*Baumol's cost disease*' – where the cost of health services rise relative to other sectors of the economy that are less human labour intensive.[27]

6. Conclusion

Despite the current challenges in the NHS and the ever-rising pressures, NHS England argue in the *Five year forward view* that the NHS model is not inherently unsustainable. The reason for this conclusion lies in the potential for productivity improvement. As Paul Krugman observed in 1994, '*productivity isn't everything, but in the long run it is almost everything*'.[28] Krugman made this observation in relation to the economy as a whole, but his observation is also relevant to the future of the health service.

The rate of future productivity growth across the NHS will be a crucial factor in determining whether it is economically sustainable. Our analysis suggests that, over the last five years, NHS acute care has become more efficient and productive – although early gains seem to have been partially offset by a reduction in performance over the last two years. However, we find that the rate of improvement is significantly below the rate needed to bridge the funding gap. Moreover, we find that productivity – based on a relatively crude measure – fell in 2012/13 and 2013/14.

There is scope for further productivity gain, and the NHS should strive to improve efficiency and eliminate waste. However, unlocking that potential will almost certainly require a very different approach and focus for politicians and policy makers over the next five years. They will need to focus much less on individual organisations' performance, and look more at the health system holistically.

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About the authors

Sarah Lafond

Sarah Lafond joined the Health Foundation in August 2014 as an Economics Analyst.

Sarah joined The Health Foundation from the Nuffield Trust where she conducted financial analysis of NHS funding. Previously, Sarah worked at the Health Analytical Services of the Scottish Government where she worked on a number of health and social care projects and publications such as the integration of health and social care project and the new social care survey.

Sarah has a master's degree in ecological economics from University of Edinburgh. Her MSc dissertation was on the government cost of occupational cancer in Great Britain where she conducted a cost and benefits analysis of implementing a health policy to prevent occupational cancer. She graduated from McGill University in Canada with a degree in international development.

Anita Charlesworth

Before joining the Health Foundation in May 2014, Anita was Chief Economist at the Nuffield Trust for four years where she led the Trust's work on health care financing and market mechanisms.

Anita was Chief Analyst and Chief Scientific Advisor at the Department of Culture, Media and Sport from 2007 to 2010 and, prior to this, she was Director of Public Spending at the Treasury from 1998-2007, where she led the team working with Sir Derek Wanless on his reform of NHS funding in 2002. Anita has a Masters in Health Economics from York University and has worked as an Economic Advisor in the Department of Health and for SmithKline Beecham pharmaceuticals in the UK and USA.

Anita is Vice-Chair of the Whittington Hospital NHS Trust and a Trustee of Tommy's, the baby charity.

Adam Roberts

Adam Roberts joined the Health Foundation in July 2014 as Senior Economics Fellow, exploring past, present and future trends for health care funding in the UK.

Before joining the Health Foundation, Adam was a Senior Research Analyst at the Nuffield Trust where he worked on projects including the project funding gap facing the NHS in England and Wales, allocation of national resources to GP practices, lifetime cost for social care, travel distances for emergency care, and trends community prescribing.

Prior to his time at the Nuffield Trust, Adam was responsible for the production of risk estimates of NHS organisations for the Care Quality Commission (and the former Healthcare Commission) to support the programme of targeted inspections. These estimates were generated by applying cutting edge methods to all relevant and available data sources, both quantitative and qualitative, to identify areas of possible concern for the commission to follow-up.

Adam graduated from Keele University in 2004 where he achieved a First Class Dual Honours Degree in Statistics and Economics.

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90 Long Acre
London WC2E 9RA

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