Review of High Cost Area Supplements
A REPORT PREPARED FOR THE NHS STAFF COUNCIL

September 2014
# Review of High Cost Area Supplements

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Executive Summary</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Summary conclusions</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Central hypothesis</td>
<td>3</td>
</tr>
<tr>
<td>2 Introduction</td>
<td>21</td>
</tr>
<tr>
<td>3 Comparator models of geographic pay</td>
<td>25</td>
</tr>
<tr>
<td>4 Literature review</td>
<td>33</td>
</tr>
<tr>
<td>5 Quantitative analysis</td>
<td>36</td>
</tr>
<tr>
<td>5.2 Do some Trusts find it harder than others to recruit and retain staff?</td>
<td>37</td>
</tr>
<tr>
<td>5.3 Where are NHS pay rates relatively lower?</td>
<td>48</td>
</tr>
<tr>
<td>5.4 The impact of the wage gap on recruitment and retention</td>
<td>60</td>
</tr>
<tr>
<td>5.5 Limitations of the analysis</td>
<td>87</td>
</tr>
<tr>
<td>6 Conclusions and future work</td>
<td>91</td>
</tr>
</tbody>
</table>

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Review of High Cost Area Supplements

Figure 1. Structure of analytical approach 4
Figure 2. Percentage of satisfied staff with level of pay by HCAS zone 9
Figure 3. Cumulative adverts per FTE by HCAS zone 9
Figure 4. Private-public wage gap 11
Figure 5. Scatterplot of pay gap against the stability index – Acute and Specialist Teaching Trusts 15
Figure 6. High Cost Area Supplement zones 26
Figure 7. Stylised comparison of private and public pay 34
Figure 8. Structure of analytical approach 37
Figure 9. Agency costs as a share of total staff costs by HCAS zones 39
Figure 10. Share of FTEs in each pay band by HCAS zones – nurses 41
Figure 11. Share of FTEs in each pay band by HCAS zones – central functions 41
Figure 12. Percentage of satisfied staff with level of pay by HCAS zone 44
Figure 13. Cumulative adverts per FTE by HCAS zone 45
Figure 14. Number of adverts and number of applications per advert by England regions 46
Figure 15. Leaving rates by HCAS zone – nurses 47
Figure 16. Joining rates by HCAS zone – nurses 47
Figure 17. Composition of the “private sector comparator group” 50
Figure 18. “Private sector comparator group” average wage distribution 52
Figure 19. “Private sector comparator group” average wage distribution – map 53
Figure 20. NHS nurses average wage distribution 54
Figure 21. NHS nurses average wage distribution – map 55
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 22.</td>
<td>Private-public wage gap</td>
<td>56</td>
</tr>
<tr>
<td>Figure 23.</td>
<td>Private-public wage gap – map</td>
<td>57</td>
</tr>
<tr>
<td>Figure 24.</td>
<td>Private-public wage gap – focus on South of England – map</td>
<td>59</td>
</tr>
<tr>
<td>Figure 25.</td>
<td>Logic model for determining recommendation</td>
<td>60</td>
</tr>
<tr>
<td>Figure 26.</td>
<td>Scatterplot of pay gap against agency spend, as a percentage of total staffing costs</td>
<td>64</td>
</tr>
<tr>
<td>Figure 27.</td>
<td>Scatterplot of pay gap against other staff costs, as a percentage of total staffing costs</td>
<td>65</td>
</tr>
<tr>
<td>Figure 28.</td>
<td>Scatterplot of pay gap against bank total earnings, as a percentage of all assignments total earnings – nurses and midwives</td>
<td>66</td>
</tr>
<tr>
<td>Figure 29.</td>
<td>Scatterplot of pay gap against Full Time Equivalent employees with RRPs as a percentage of total FTEs</td>
<td>68</td>
</tr>
<tr>
<td>Figure 30.</td>
<td>Scatterplot of pay gap against average pay band – nurses</td>
<td>70</td>
</tr>
<tr>
<td>Figure 31.</td>
<td>Scatterplot of pay gap against average pay point – nurses</td>
<td>71</td>
</tr>
<tr>
<td>Figure 32.</td>
<td>Scatterplot of pay gap against agreement to five questions on support</td>
<td>73</td>
</tr>
<tr>
<td>Figure 33.</td>
<td>Scatterplot of pay gap against number of adverts per FTE</td>
<td>75</td>
</tr>
<tr>
<td>Figure 34.</td>
<td>Scatterplot of pay gap against number of applications per advert</td>
<td>76</td>
</tr>
<tr>
<td>Figure 35.</td>
<td>Scatterplot of pay gap against the stability index</td>
<td>77</td>
</tr>
<tr>
<td>Figure 36.</td>
<td>Correlation matrix for the measures of recruitment and retention analysed</td>
<td>78</td>
</tr>
<tr>
<td>Figure 37.</td>
<td>Scatterplot of pay gap against index of 10 outcome variables</td>
<td>81</td>
</tr>
<tr>
<td>Figure 38.</td>
<td>Scatterplot of pay gap against index of 4 outcome variables</td>
<td>82</td>
</tr>
<tr>
<td>Figure 39.</td>
<td>Scatterplot of factor index against pay gap</td>
<td>83</td>
</tr>
<tr>
<td>Figure 40.</td>
<td>Scatterplot of quartile index against pay gap</td>
<td>84</td>
</tr>
</tbody>
</table>
**Figure 41.** Scatterplot of pay gap against the stability index – Acute and Specialist Teaching Trusts  
85

**Figure 42.** Scatterplot of pay gap against other staff costs, as a percentage of total staffing costs – Large and Medium Acute Trusts  
86

**Table 1.** HCAS payment rates  
5

**Table 2.** Pay bands used in a selection of private large national employers  
6

**Table 3.** Average pay of nursing and similar-paying occupations in London  
7

**Table 4.** Univariate (correlation) analysis – summary of results  
13

**Table 5.** Impacts of pay gap on recruitment and retention index  
16

**Table 6.** High Cost Area Supplement structure  
27

**Table 7.** Effect of caps and collars to the HCAS structure  
27

**Table 8.** Pay bands used in a selection of large private national employers  
29

**Table 9.** Average pay of nursing and similar-paying occupations in London  
30

**Table 10.** Average pay of nursing and similar-paying occupations in Rest of England  
31

**Table 11.** RRP payment as percentage of total payments by HCAS zones  
40

**Table 12.** Proportion of nurses at top point within pay band  
42

**Table 13.** Regression analysis of average pay point by HCAS zone – nurses  
43

**Table 14.** NHS Trusts facing the most pressure from the private sector  
58

**Table 15.** Univariate (correlation) analysis – summary of results  
62

**Table 16.** Summary of results of the correlation between the pay gap and agency spend measures  
65

**Tables & Figures**
Table 17. Summary of results of the correlation between the pay gap and bank usage measures

Table 18. Summary of results of the correlation between the pay gap and RRP measures

Table 19. Summary of results of the correlation between the pay gap and potential informal recruitment measures

Table 20. Summary of results of the correlation between the pay gap and staff satisfaction measures

Table 21. Summary of results of the correlation between the pay gap and vacancy measures

Table 22. Summary of results of the correlation between the pay gap and churn measures

Table 23. Impacts of pay gap on recruitment and retention index

Table 24. Relationship of recruitment and retention indices with pay gap for specific Trust types
Executive Summary

Frontier Economics was commissioned by the NHS Staff Council to review the existing system of High Cost Area Supplements (HCAS) for payment of NHS staff in England. This is a technical review, intended to specifically address the NHS Pay Review Body’s call for further evidence on this topic.

Our main findings are shown in the box below.

Summary conclusions

This report considers geographic pay variations within the NHS in England, under the High Cost Area Supplements (HCAS) system. We have not considered the absolute level of pay within the NHS. Our quantitative analysis focuses on testing whether the current HCAS system leads to recruitment and retention problems for some Trusts. We focus on nursing staff, partly due to data availability, and because these represent the largest group of staff within Agenda for Change. We find that:

1. There is **no strong evidence** that Trusts in areas with lower relative pay – after the application of current HCAS payments – consistently experience higher staff turnover, more vacancies or use of agency staff. Variation in recruitment and retention is wide and not well explained by local wage differentials.

2. There is **some evidence** that Trusts experience a more general impact of relative pay on recruitment and retention. This relationship is more apparent when considering a combination of recruitment and retention measures. The impact may occur through different channels for different providers, and local responses to these problems vary widely between Trusts.

Based on these findings, and taking all of our analysis into account:

3. There is no strong evidence to suggest that local recruitment and retention issues could be systematically improved by refinement to the current HCAS system. To the extent that pay is an important driver, greater use of local flexibility may be preferable to greater complexity of the centralised system. Therefore we **do not recommend any changes to the current HCAS system**.

These conclusions are based on our technical review of the best available data. Further work could be done to improve the quality and coverage of this data, and this would allow deeper analysis. We have not undertaken a wider qualitative analysis on the operation and effectiveness of the HCAS system, or of the overall approach to compensation which extends beyond direct remuneration.

The rest of this Executive Summary provides quite a detailed overview of our approach and findings. It is a relatively complete account of our analysis for a
non-specialist audience. We discuss the detailed analysis for a more specialist audience in the main report.

We have used Trust-specific data on pay and recruitment and retention. To preserve confidentiality it has been necessary to present anonymised or less granular results in some parts of this report. However, all analysis was undertaken using the most detailed available data, and we have noted throughout this report wherever it has not been possible to present the full results.

1.1.1 Background

In his Autumn Statement 2011, the Chancellor of the Exchequer noted that public sector pay does not vary as much, across the country, as pay in the private sector. The Chancellor suggested that this can have damaging consequences for pay and performance in both public and private sector markets.¹

The Government therefore asked Independent Pay Review Bodies to consider how public sector pay could be made more responsive to local labour markets, by considering the role of “market-facing pay”.

The NHS Pay Review Body investigated these issues, and reported that their analysis did not provide “firm evidence” for greater market-facing pay. However, they did call for a fundamental review of the High Cost Area Supplements component of Agenda for Change, to determine whether any changes should be made to the system.

The Pay Review Body recommended that this review should consider a range of issues including the purpose and configuration of HCAS; the number of HCAS zones; funding arrangements; any further HCAS flexibility to be available to respond to changing labour markets; and boundary issues. They invited evidence from interested parties in advance of their 2015 pay review.

1.1.2 Scope

This work is intended to specifically address the Pay Review Body’s call for further evidence. Frontier were asked to assess the existing evidence and provide new analysis. Following the approach adopted by the Review Body, we formed our view of the “success” of the current HCAS system based on the extent to which it allows NHS organisations to recruit and retain good quality staff.

The scope for this work included:

- assessing the appropriate number and location of HCAS “zones”;
- assessing the appropriate size and structure of the HCAS payments;

¹ HM Treasury (2011), Autumn Statement 2011, Cm 8231, Paragraph 1.110
Executive Summary

- recommending any necessary changes to the HCAS system; and
- suggesting options for how any proposed changes could be implemented.

A number of factors were also discussed at the start of the work, but were determined to be out of scope for this work. The most significant factors are listed below.

- **Absolute pay levels.** This report has only considered relative pay i.e. the amount that pay (within and outside the NHS) varies from one geographical area to another. We have not attempted any assessment of whether NHS pay is more generally “too low” or “too high”.

- **Non-pay elements of remuneration.** This report has not considered other elements of the NHS staff “package”. We do not attempt to address the relative merits of pay or non-pay factors in determining recruitment and retention.

- **Remuneration of non-Agenda for Change staff.** Our analysis focused on HCAS, and therefore only applies to NHS staff who are paid under the Agenda for Change structure.

- **Full evaluation of any proposed changes to HCAS.** This work did not attempt a full evaluation of any changes to HCAS. Any such reforms might require significant stakeholder engagement and planning. These were both beyond the scope of this work.

1.1.3 **Approach**

This report brings together previous work and new analysis, to provide an evidence base on the impact of the current HCAS system. Our analytical approach has been based on testing a central hypothesis, based on the scope of work identified above.

Central hypothesis

In locations where NHS pay rates are “low” relative to other local employers, Trusts will find it more difficult to recruit and retain staff.

To test this hypothesis, we started with a review of previous literature. We then considered the regional pay models of other national employers. We analysed the variation in NHS pay compared with the variation observed in the private sector. We also held a small number of discussions with Trusts about how they recruit and retain staff, and their perceptions of HCAS.
This project involved new quantitative research, which we carried out in three main stages. These are outlined in Figure 1 and described below.

**Figure 1. Structure of analytical approach**

Stage 1 was to consider the variation in recruitment and retention experienced by Trusts. This allowed us to identify whether “there is a problem to fix” i.e. that some Trusts find it more difficult to recruit and retain. It also allowed us to identify further hypotheses about whether particular areas (or HCAS zones) are more problematic. This analysis was based on using a number of metrics for recruitment and retention, including:

- agency spend;
- Recruitment and Retention Premia;
- potential informal recruitment measures (i.e. mix of staff used to deliver services);
- staff satisfaction;
- vacancies, and
- churn.

Stage 2 was to look at where NHS pay is relatively higher and where it is relatively lower, compared with alternative employment. We constructed a “wage gap” measure, to identify the relative attractiveness of NHS pay in different areas.

Stage 3 was to analyse whether the variation in relative pay is related to the ability of Trusts to recruit and retain staff i.e. to test the central hypothesis. We
used a number of quantitative techniques, including simple univariate (correlation) analysis and more sophisticated multivariate (regression) analysis.

Our analysis focused on nursing staff, primarily because of the availability of robust data for this group (described more below). It is worth noting that any changes to the HCAS system would (at least as it is currently structured) apply to all staff covered under Agenda for Change. The analysis in this report may not read across directly to other staff groups. However we note that if changes to HCAS are not considered appropriate for nursing staff, as the largest group of staff within Agenda for the Change, it would seem unlikely that they could be justified for all staff.

1.2.1 Findings

Comparator models of geographic pay

The HCAS system includes four “zones”: inner London, outer London, Fringe, and rest of England. HCAS specifies, for each zone, a percentage uplift in salary which is then capped or collared within a certain range. This is set out in Table 1.

<table>
<thead>
<tr>
<th>Zone</th>
<th>% of salary</th>
<th>Min</th>
<th>Max</th>
<th>Band 3</th>
<th>Band 5</th>
<th>Band 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner</td>
<td>20%</td>
<td>£4,076</td>
<td>£6,279</td>
<td>£4,076</td>
<td>£4,960</td>
<td>£6,279</td>
</tr>
<tr>
<td>Outer</td>
<td>15%</td>
<td>£3,448</td>
<td>£4,395</td>
<td>£3,448</td>
<td>£3,720</td>
<td>£4,395</td>
</tr>
<tr>
<td>Fringe</td>
<td>5%</td>
<td>£942</td>
<td>£1,632</td>
<td>£942</td>
<td>£1,240</td>
<td>£1,632</td>
</tr>
</tbody>
</table>

Source: NHS Careers, rates from April 2014, pay bands refer to points 10, 20 and 30 respectively

We note that the effect of the caps and collars within HCAS bands is to pay larger percentage uplifts (to London-based staff) to those on lower incomes. We did not find sufficient evidence to determine whether this is justified by greater recruitment and retention issues for lower-paid staff. Whether this structure is appropriate is in part a policy decision – discussed more in section 3.1.1 – which was beyond the scope of this report.

We compared this model of geographic variation with the models used by other national employers. Although the range of companies and occupations are not necessarily comparable or equivalent to the NHS, these organisations are similar in terms of having centralised systems of wage bargaining between employees and employers.
Our results are shown in Table 2. This shows that most large private national employers in our sample take a similar approach to geographic pay variation as HCAS, both in terms of the amount of variation, and in terms of the structure of bands used.

Table 2. Pay bands used in a selection of private large national employers

<table>
<thead>
<tr>
<th>Employer</th>
<th>Inner of single London Allowance</th>
<th>Outer London</th>
<th>Fringe London</th>
<th>Other South East</th>
<th>Other hot spot?</th>
<th>Number of bands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationwide Building Society</td>
<td>£4,550</td>
<td>£3,150</td>
<td>£2,000</td>
<td></td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Allianz</td>
<td>£4,008</td>
<td>£2,004</td>
<td>£1,260</td>
<td></td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>Co-operative Banking Group</td>
<td>£4,000</td>
<td>£2,500</td>
<td>£1,000</td>
<td></td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Aviva</td>
<td>£3,710</td>
<td>£1,725</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>National Australia Group</td>
<td>£3,595</td>
<td>£2,311</td>
<td>£1,438</td>
<td>£770</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>Santander UK</td>
<td>£3,500</td>
<td>£2,000</td>
<td>£1,000</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Chiltern Railways</td>
<td>£2,587</td>
<td>£1,192</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>BOC Manual Cylinder Fillers</td>
<td>£2,115</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>London Midland</td>
<td>£2,035</td>
<td>£913</td>
<td>£433</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Balfour Rail Plant</td>
<td>£1,935</td>
<td>£892</td>
<td>£423</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Tesco</td>
<td>£1,917</td>
<td>£1,291</td>
<td>£1,291</td>
<td>£854</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Makro</td>
<td>£1,433</td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Labour Research Department (2014)

We also considered geographic variation in pay for different occupations. We identify occupations with similar pay levels to nursing (as this is the most convenient group of NHS staff to identify in the data) then assess the amount of regional pay variation.

While these occupations may be very different from nursing, and have different sets of individuals working in them, as the pay levels are similar, the extent of geographic pay variation may provide a useful benchmark.

Comparator occupations are identified using 2011 Annual Survey of Hours and Earnings data cut by region and by SOC code. First we identify ten occupations that pay similarly to nursing in London, by ranking occupations by median gross hourly pay and taking the 5 occupations with higher and lower wages.
Our findings are presented in **Table 3**. This suggests that geographic pay variation for nurses is lower than it is for the comparator occupations. Whereas nurses earn around 12% less outside the capital (£15.62 compared with £17.77, per hour), other occupations – which earn the same amount in London – earn around 27% less outside London. This is one piece of evidence which might suggest that the current HCAS system does not result in sufficient geographic pay variation.

### Table 3. Average pay of nursing and similar-paying occupations in London

<table>
<thead>
<tr>
<th>Hourly wage per region</th>
<th>Nurses</th>
<th>Average of ten similar-paying jobs in London</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>London</strong></td>
<td>£17.77</td>
<td>£17.74</td>
</tr>
<tr>
<td><strong>South East</strong></td>
<td>£16.09</td>
<td>£14.24</td>
</tr>
<tr>
<td><strong>Rest of England</strong></td>
<td>£15.62</td>
<td>£12.96</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of ASHE 2011 (ONS) data

**Previous literature**

There is a small body of academic literature which considers the difference between public and private pay, and its impact. This literature suggests two main findings.

First, private sector pay varies more than public sector pay across England. The private sector is more responsive to variations in the cost of living and attractiveness of different areas. Consequently in “high cost” areas, such as London and the South East, public sector pay is relatively low when compared with the private sector.  

Second, in areas where public sector is “low”, this has the potential to negatively affect NHS Trusts, through:

- recruitment and retention difficulties; and
- the quality and productivity of the Trusts.

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Analysis of variation in recruitment and retention

Stage 1 of our quantitative analysis was to consider the variation in recruitment and retention experienced by Trusts.

Our analysis shows that Trusts in Fringe HCAS areas (i.e. outskirts of London) are the ones facing greater difficulties in recruitment and retention. They tend to have higher agency spend, lower staff satisfaction, and more vacancies.

Figure 2 depicts the percentage of staff claiming to be satisfied with the level of pay received, broken down by HCAS areas. A Trust with satisfied staff will have fewer problems in recruiting new employees and retaining the existing ones. All three London areas show lower levels of satisfaction than the rest of England, with employees of Trusts in Fringe being the least satisfied. Note how this question refers to the general level of pay, including HCAS payments. This might therefore be seen as a further indicator that Trusts in Fringe might be those facing the higher difficulties in recruitment and retention.

Figure 3 shows that Trusts in Fringe areas seem to consistently have the highest adverts-to-FTEs ratios. A higher ratio indicates more competition in the labour market for each vacancy available. Fringe Trusts typically have 0.1-0.2 more adverts per FTE, than other Trusts. Given the average number of FTEs is about 3,350, this implies an average of about 1,000 adverts (per year) for Trusts in the Fringe HCAS area and about 750 for Trusts in the rest of England. This might indicate that Trusts in the Fringe area have more difficulty in recruitment and retention.

We also found relatively clear evidence that Recruitment and Retention Premia (RRP) are not currently fulfilling their intended purpose. For a number of reasons, they are not (very often) being used to respond to local labour market pressures. Spending on RRP currently accounts for around 0.1-0.2% of Trusts’ total pay costs. Further consideration of how the RRP system operates, and whether this could be improved, may provide Trusts with valuable local flexibility.

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Executive Summary
Figure 2. Percentage of satisfied staff with level of pay by HCAS zone

Source: Frontier analysis of data from NHS Staff Satisfaction Survey

Figure 3. Cumulative adverts per FTE by HCAS zone

Source: Frontier analysis of data from NHS Jobs
The recruitment and retention issues faced by Trusts located in the Fringe HCAS zone could have a number of causes. Relative private-public pay in the area might be one factor. Others could include non-pay elements of the staff “package”, working conditions, Trust-specific quality of management, local quality of living, and type of Trust and activities undertaken. The analysis discussed later tries to control for some of these other factors and isolate the impact of relative pay.

Analysis of where NHS pay is relatively “low”

Stage 2 of our analysis was to look at where NHS pay is relatively higher and where it is relatively lower compared with alternative employment.

We defined a group of private sector occupations which are comparable to NHS nursing (again using nurses only because they are the most readily identifiable group in the data). Our comparator group was defined by those jobs which nurses are most likely to come from when moving into the NHS (or go to when leaving). These are the occupations which are most likely to apply competitive pressure to NHS Trusts in the local labour market.

We identified the occupations with at least 1% of the workforce holding a nurse qualification, and also adjusted for the female/male composition and average qualification level. We find that average wages in the private comparator group span from £11.50 per hour to £15.50 per hour.

We then compared the average pay of public sector nurses with the average pay of our private comparator group, in different local areas throughout England.

Public sector nurses consistently earn more than our comparator group, throughout England. This reflects the way the comparator group is selected i.e. qualified nurses tend to be paid most when employed as nurses, rather than other occupations (which may or may not place a value on their qualification). This analysis is not an assessment of the general level of NHS pay.

More importantly, the average “gap” between public sector pay and the private comparator varies across the country. In locations where private sector pay is relatively high – and therefore public sector pay is relatively low – we expect that Trusts will face greater pressure from private sector employers.

The private-public wage gap we estimated is shown in Figure 4. Being on the left-hand side of the graph indicates that the public average wage in the area is substantially above the private one. Trusts on the right-hand side pay a similar average wage to their nurses to the private comparator group. This indicates that the more we move to the left of the graph, the less pressure Trusts face from the private market.
Executive Summary

**Figure 4. Private-public wage gap**

Source: Frontier analysis of Annual Survey of Hours and Earnings data (ONS) for 2011-13

Note: individual Trust names have been removed to preserve confidentiality

**Figure 4** shows that the private-public wage gap within the three “London” HCAS zones is quite evenly distributed e.g. some of the areas which fall in the dark blue “Outer” zone have a higher gap but others a much lower gap. This suggests that the current HCAS zones are not systematically under- or over-renumerating NHS employees relative to the private sector.

The main result of our analysis is that the majority of the Trusts which seem to face a higher pressure from the private sector are located in the South of England.

This analysis implies that – if our central hypothesis is correct – recruitment and retention is likely to be harder in the South of England.

**Impact of private-public wage gap on recruitment and retention**

Stage 3 of our analysis was to consider whether the variation in relative pay is related to the ability of Trusts to recruit and retain staff i.e. to test the central hypothesis. We used a number of quantitative techniques, including simple univariate (correlation) analysis and more sophisticated multivariate (regression) analysis.

The analysis we have carried out suggests no strong evidence that areas with lower relative pay systematically experience greater recruitment and retention problems.

**Table 4** summarises the results from the univariate analysis when looking at all Trusts in England together. It shows:

- the variables used;
the expected relationship with the private-public wage gap, i.e. if the wage gap is smaller (less negative) the Trust faces more pressure from the private market and it will have more difficulty in recruitment and retention. This would imply a higher agency spend (positive) and a less satisfied workforce (negative);

• the relationship found in the data, which may or may not reflect expectations; and

• a measure of how well the wage gap describes the total variation in the analysed variable (technically, the R-squared).

The way to interpret this table row by row is therefore as follows. Taking for example the first row (agency spend):

• we use two variables as measures of agency spend, “agency spend as % of total staffing costs” and “other staff costs as % of total staffing costs”;

• we expect that the stronger (weaker) the private sector competition in the area, the more (less) Trusts will have to rely on agency staff (therefore the plus sign in the expected relationship column);

• we find that a £1 increase in nurses’ pay (which, keeping everything else constant would make the private sector competition in the area weaker) is associated with a reduction in agency spend by 0.06%, and a reduction in other-staff costs by 0.2%;

• we find that neither of these numbers is statistically significant. This means we cannot confidently say they are different from zero. This information can be inferred by the fact that the two numbers in the “correlation coefficient” column do not have a small star next to them;

• we find that the wage gap does not explain well the total variation in the agency spend variables. This can be inferred by the very low values (0.05% and 0.21%) in the “percentage of variation explained” column.

The same reasoning can be applied to each row.
Table 4. Univariate (correlation) analysis – summary of results

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to…</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agency spend</strong></td>
<td>(1) agency spend as % of total staffing costs</td>
<td>+</td>
<td>+ 0.06%</td>
<td>0.05%</td>
</tr>
<tr>
<td></td>
<td>(2) other-staff costs as % of total staffing costs</td>
<td>+</td>
<td>+ 0.2%</td>
<td>0.21%</td>
</tr>
<tr>
<td><strong>Bank usage</strong></td>
<td>Bank total earnings as % of all assignments tot earnings (nurses)</td>
<td>+</td>
<td>+ 0.01%</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>RRP</strong></td>
<td>WTE with RRP as % of total WTE</td>
<td>+</td>
<td>+ 0.7%*</td>
<td>1.64%</td>
</tr>
<tr>
<td><strong>Potential Informal recruitment measures</strong></td>
<td>(1) average pay band (nurses)</td>
<td>+</td>
<td>- 0.007</td>
<td>0.16%</td>
</tr>
<tr>
<td></td>
<td>(2) average pay point (nurses)</td>
<td>+</td>
<td>- 0.08</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Staff satisfaction</strong></td>
<td>Summary of five questions on support felt by staff, as % of agreeing staff</td>
<td>-</td>
<td>- 0.4%*</td>
<td>0.91%</td>
</tr>
<tr>
<td><strong>Vacancies</strong></td>
<td>(1) number of adverts per FTE position (nurses)</td>
<td>+</td>
<td>- 0.006</td>
<td>0.14%</td>
</tr>
<tr>
<td></td>
<td>(2) number of applications per advert (nurses)</td>
<td>-</td>
<td>+ 0.83**</td>
<td>1.4%</td>
</tr>
<tr>
<td><strong>Churn</strong></td>
<td>Stability of workforce</td>
<td>-</td>
<td>- 0.7%***</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

From these results it is hard to conclude that the private-public wage gap is an important driver of recruitment and retention. In fact:
A few of the variables analysed do not show the expected direction in their relationship with the private-public wage gap.

In the cases in which the relationship is of the expected sign, it is rarely statistically different from zero. This means that we cannot confidently say that there is a relationship.

Of those statistically significant, churn (i.e. staff turnover) is the measure which shows the best correlation with the wage-gap. However even in this case the effect is modest: a £1 increase in nurses’ hourly pay, equivalent to a 6% pay rise (which, keeping everything else constant would lower the pressure Trusts face from the private labour market) is associated with an increase in stability of the workforce by 0.7%.

One possible explanation for the poor correlation between the selected measures of recruitment and retention and the private-public wage gap is the fact that we have been using the sample including all NHS Trusts in England together. However Acute Specialist and Teaching Trusts (ASTTs), Small Acute Trusts (SMAst), Large and Medium Acute Trusts (LMATs), and Other Trusts (OTH) may differ amongst them and use different leavers to recruit and retain staff.

When focusing on specific Trust types, a few correlations seem stronger. For example, as Figure 5 shows, the stability index – measuring the churn of staff Trusts experience – for ASTTs is slightly more strongly negatively correlated with the private-public wage gap. In this case, a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 5) is associated with an increase in the stability index by 1%. This result is significant at the 1% level.
These results are not found consistently across the spectrum of variables and for the different Trusts’ groups.

To test these relationships further, we also looked at a number of multivariate analyses.

We constructed several “composite” measures of recruitment and retention, which combine the variables considered above into a single metric. This allows us to test the hypothesis that the private-public pay gap affects recruitment and retention outcomes generally, but the channel of impact can vary by provider. For some providers, recruitment and retention difficulty will manifest itself in greater churn, whereas others will respond through increasing agency usage or use of RRP.

Four alternative indices have been used:

- **Standardized index (10 variables).** This uses each of the 10 variables: agency spend; other staff costs; bank total earnings; WTE with RRP as % of total WTE; average pay band; average pay point; summary of five questions on support felt by staff; adverts per FTE position; applications per advert;
and stability of workforce. The variables are each standardised (mean = 0, standard deviation = 1) and then added together.

- **Standardized index (4 variables).** As above, but restricted to 4 variables: stability, satisfaction measure, agency spend, advertisements per FTE. These variables are intended to capture distinct aspects of the recruitment and retention outcome, without duplicating each other.

- **Factor analysis.** This is a technique used to explain a number of observed correlated variables with a smaller number of unobserved variables (‘factors’). Rather than using arbitrary weightings, they are derived empirically, reflecting their overall correlation in the data.

- **Quartile score index.** This approach assigns, for each variable, a score from 1-4 to a provider depending on which quartile they appear in. This approach reduces the impact of outliers.

The coefficients, statistical significance and R-squared are shown in Table 5 below. Using this approach we find greater evidence that relative pay leads to an impact on recruitment and retention. Each of the indices has a statistically significant relationship with the private-public pay gap in the direction hypothesized. That is, we find that in locations where pay in the NHS is lower relative to the comparator occupations, providers experience greater difficulty recruiting and retaining staff.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Coefficient</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index of 10 variables</td>
<td>0.47*</td>
<td>.01</td>
</tr>
<tr>
<td>Index of 4 variables</td>
<td>0.31***</td>
<td>.02</td>
</tr>
<tr>
<td>Factor index</td>
<td>0.17***</td>
<td>.03</td>
</tr>
<tr>
<td>Quartile index</td>
<td>0.60***</td>
<td>.05</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from Trust Financial Returns and Monitor, ESR, NHS Staff Satisfaction Survey, NHS Jobs and ASHE (ONS)

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

The impacts are more statistically significant and are somewhat larger than when estimated in the univariate regressions. This suggests that there is some ‘waterbedding’ occurring i.e. overall impacts occurring, but through different channels for different providers. For example, one Trust has a high rate of churn (17.5%), but a lower than average usage of agency staff (3.7%). Meanwhile, a
different Trust has lower than average churn (7.8%), but high usage of agency staff (7.2%). Although these providers both appear to find recruitment and retention difficult, they perform very differently on the different metrics. However, it should be noted that these impacts are not large; a change in the pay gap will not produce an appreciably large change in outcomes.

This analysis suggests two important messages:

- Pay is only one driver of recruitment and retention outcomes. Many other factors are also likely to be important.

- The variation in recruitment and retention experienced at a local level is very wide. The role of any centralised system of pay is likely to be limited in the extent to which it can address local recruitment and retention issues.

These findings together imply that changes to the centralised system of HCAS payments would be a relatively ineffective and inefficient way of addressing any localised recruitment and retention problems.

**Limitations of the analysis**

Three main limitations are worth noting with respect to the analysis performed.

- The analysis focuses on nurses. The main reason for this is data availability. Ideally, more detailed data would be collected on other professions so that it would be possible to test equally robustly whether these impacts are true for other professions, or whether relative pay has a different effect for them.

- The apparent discrepancy of our results with those mentioned in the literature review is resolved when looking closer. For example, the coefficient Ma et al (2008)\(^5\) find is between 0.019 and 0.030 – i.e. an increase by one unit of their derived Standardised Spatial Wage Differential would increase nurses’ vacancies by 0.019-0.030 units. The magnitude of this result is modest, and on a similar scale to our results. There are also several differences in approach which we discuss in the main report.

- Some of the results may be less robust than others due to the quality of data sources. For example,

  - some Trusts may not use all the data sources we looked at (e.g. not all use the NHS Jobs site, at least not for all vacancies);

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Executive Summary

- some inconsistency may occur in how data is compiled (e.g. examples of some NHS Jobs adverts listing 1 full time equivalent employee required, while others recording “35”, most likely referring to the hours per week required); and

- some Trusts may simply record their data differently from others (e.g. interpreting the definition of “Agency staff” and “Other non-permanently employed staff” slightly differently from each other).

These data issues suggest that there could be significant value in creating a more robust and reliable set of data looking at NHS vacancies. At a minimum, enforcing consistent standards in how NHS Jobs data is recorded would allow a more confident assessment of the recruitment and retention issues faced by NHS Trusts.

1.2.2 Conclusions and next steps

Based on the analysis we have undertaken, we have reached three main findings:

1. There is no strong evidence that Trusts in areas with lower relative pay – after the application of current HCAS payments – consistently experience higher staff turnover, more vacancies or use of agency staff. Variation in recruitment and retention is wide and not well explained by local wage differentials.

2. There is some evidence that Trusts experience a more general impact of relative pay on recruitment and retention. This relationship is more apparent when considering a combination of recruitment and retention measures. The impact may occur through different channels for different providers, and local responses to these problems vary widely between Trusts.

We note that there is significant variation in recruitment and retention experienced by NHS providers. Very little of this variation can be explained by the gap between public and private pay. This implies that non-pay factors – which were beyond the scope of this work – are likely to play a significant role in determining NHS recruitment and retention.

Based on the above findings, and taking all of our analysis into account:

3. There is no strong evidence to suggest that local recruitment and retention issues could be systematically improved by refinement to the current HCAS system. To the extent that pay (rather than non-pay factors) is an important driver, greater use of local flexibility may be preferable to greater complexity of the centralised system. Therefore we do not recommend any changes to the current HCAS system.

These findings and the limitations posed by data and time for this work suggest where future analysis and evidence could make a valuable contribution to future discussion about pay. In particular it would be useful to:
gather more systematic evidence about the use of RRP, including any constraints that might exist in its use to address local recruitment and retention issues;

collect evidence that would allow a better understanding of whether the conclusions in this report extend to professions outside nursing (where data limitations constrained what could be done for this report); and

develop the evidence base about the use and effectiveness of non-pay elements of compensation, and their future role.

Following up on these areas would allow the NHS Staff Council to engage with future discussions about HCAS and compensation more widely, armed with the evidence it needs.
2 Introduction

Most NHS employees in England are paid according to national pay scales. The current remuneration structure was introduced as part of Agenda for Change, in 2006. This includes a system of High Cost Area Supplements; this means that staff employed in particular locations are paid more than staff – of an equivalent grade and experience – in other areas.

Frontier Economics was appointed by the NHS Staff Council to review the existing system of High Cost Area Supplements (HCAS) for payment of NHS staff in England.

2.1.1 Background

In his Autumn Statement 2011, the Chancellor of the Exchequer noted that public sector pay does not vary as much, across the country, as pay in the private sector:

“… while private sector pay is set in accordance with local labour markets, public sector pay is usually set on a national basis. As a result, in many areas, public sector pay does not reflect local labour market conditions.”

The Chancellor went on to suggest that this difference can have damaging consequences. In particular:

“Such differences… can adversely affect private sector businesses which have to compete with higher public sector wages. It also leads to unfair variations in public sector service quality and limits the number of jobs that the public sector can support.”

The Government therefore asked Independent Pay Review Bodies to consider how public sector pay could be made more responsive to local labour markets by considering the role of “market-facing pay”.

The NHS Pay Review Body investigated these issues, and in December 2012 published its findings. The Review Body expressed its general support for market-facing pay, specifically to support recruitment and retention.

“We support market-facing pay for Agenda for Change (AfC) staff to support recruitment and retention of good quality staff…”

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6 For more information about the Agenda for Change pay structure within the NHS in England, see http://www.nhsemployers.org/agendaforchange
7 HM Treasury (2011), Autumn Statement 2011, Cm 8231
8 HM Treasury (2011), Paragraph 1.109
9 HM Treasury (2011), Paragraph 1.110
10 NHS Pay Review Body (2012), Market-Facing Pay: How Agenda for Change pay can be made more appropriate to local labour markets, Cm 8501
The Review Body reported that their analysis did not provide “firm evidence” for greater market-facing pay at that time. However, they did call for a fundamental review of the High Cost Area Supplements component of Agenda for Change, to determine whether any changes should be made to the system. The Review Body recommended that:

“The review should focus on:

- the purpose of HCAS, how it should be configured, how any new HCAS zones might interact with existing local RRP or other arrangements, and appropriate review mechanisms;
- Funding arrangements including use of the staff index of the Market Forces Factor (sMFF) and how employers use current additional sMFF funding;
- Enabling any further HCAS flexibility to be available to respond to changing labour markets; and
- Boundary issues, including for the Devolved Administrations if appropriate.”

They invited evidence from interested parties in advance of their 2015 pay review.

2.1.2 Scope

The NHS Staff Council commissioned Frontier Economics to investigate the existing system of High Cost Area Supplements (HCAS) for payment of NHS staff in England. This work is intended to specifically address the Pay Review Body’s call for further evidence. In that regard, this work was commissioned as a technical review in response to the technical analysis that the Office of Manpower Economics (OME) set out above. It may be appropriate to gather wider evidence to support discussions with the many stakeholders involved in pay issues. That wider evidence was not part of this study, although it does inform where it might be useful to collect such evidence.

Following the approach adopted by the Review Body for its analysis, we formed our view of the “success” of the current HCAS system based on the extent to which it allows NHS organisations to recruit and retain good quality staff.

The scope for this work was to:

- assess the appropriate number and location of HCAS “zones”;
- assess the appropriate size and structure of the HCAS payments;
- recommend any necessary changes to the HCAS system; and

11 NHS Pay Review Body (2012), Summary of Key Conclusions
12 NHS Pay Review Body (2012), Paragraph 12

Introduction
suggest options for how any proposed changes could be implemented.

A number of factors were also discussed at the start of the work, but were
determined to be out of scope for this work. The most significant factors are
listed below.

- **Absolute pay levels.** This report has only considered relative pay i.e. the
  amount that pay (within and outside the NHS) varies from one geographical
  area to another. We have not attempted any assessment of whether NHS
  pay is more generally “too low” or “too high”.

- **Non-pay elements of remuneration.** This report has not considered
  other elements of the NHS staff “package”. We do not attempt to address
  the relative merits of pay or non-pay factors in determining recruitment and
  retention.

- **Remuneration of non-Agenda for Change staff.** Our analysis focused on
  HCAS, and therefore only applies to NHS staff who are paid under the
  Agenda for Change structure.

- **Full evaluation of any proposed changes to HCAS.** This work did not
  attempt a full evaluation of any changes to HCAS. Any such reforms might
  require significant stakeholder engagement and planning. These were both
  beyond the scope of this work.

To be clear, the scope of this work was to assess whether the current structure of
HCAS has led to difficulties in recruiting and retaining staff. To the extent that
such difficulties are evident, we were to make recommendations as to how the
HCAS system could be changed to improve recruitment and retention.

### 2.1.3 Approach and sources of evidence

This report brings together previous work and new analysis, to provide an
evidence base on the impact of the current HCAS system. Our analytical
approach has been based on testing a central hypothesis, based on the scope of
work identified above.

**Central hypothesis:** In locations where NHS pay rates are “low” relative
to other local employers, Trusts will find it more difficult to recruit and
retain staff.

To test this hypothesis we used a combination of qualitative and quantitative
evidence.

**Qualitative evidence**

As part of this project we gathered evidence from:
previous academic literature on public sector wage variation;

publicly-available information about regional pay models used by other national employers; and

discussions with a small number of Trusts about how they recruit and retain staff, and their perceptions of HCAS.

Quantitative evidence

This project involved new quantitative analysis. This was based on data gathered from:

- the Electronic Staff Record;
- the NHS Jobs website;
- the Health and Social Care Information Centre;
- the NHS Staff Survey; and
- the Annual Survey of Hours and Earnings.

Access to data was provided by NHS Employers, the Department of Health and National Statistics.

2.1.4 Structure of this report

The rest of this report is structured as follows:

- Chapter 3 outlines the current HCAS model, compares it with those of other national employers and also with the variation in regional pay of other occupations;
- Chapter 4 presents a review of previous literature related to this topic;
- Chapter 5 describes our analytical approach, and the findings of our quantitative analysis; and
- Chapter 6 concludes.
3 Comparator models of geographic pay

This section examines patterns of geographic pay variation between different types of organisations and over different occupations. Whilst these organisations or occupations are not necessarily directly comparable to the NHS, these comparisons may indicate at a high level whether the extent of geographic pay variation provided by HCAS appears to be high or low.

Firstly, we consider different organisations’ approach to geographic pay. We begin by describing the current HCAS system and then compare how geographic pay variation is treated by other large national employers. Overall we find that most large national employers take a similar approach to geographic pay variation as HCAS, both in terms of the amount of variation, and in terms of the structure of bands used.

Secondly, we consider geographic variation in pay for different occupations. We identify occupations with similar pay levels to nursing then assess the amount of regional pay variation. This analysis suggests that geographic pay variation for nurses is lower than it is for the comparator occupations. The implication of this would be that HCAS might not give sufficient geographic pay variation in at least some occupations.

3.1.1 Approaches to geographic pay

In a competitive labour market, pay will be at a level at which supply and demand are equal. For single-site private employers, local labour market conditions will determine the wages they pay. If these conditions vary between different areas, there will be geographic variation in pay levels.

The situation becomes more complex with multi-site employers. The concept of “market-facing pay” is that local pay should reflect local labour market conditions, which would suggest that pay should be adjusted on a site-by-site basis. However, there may be administrative or operational costs that make such local variation of pay less attractive.

For large national employers, a whole spectrum of approaches to geographic pay is available. At one extreme is uniform national pay; although simple to operate, this will not address labour shortages in areas where the market is tight. At the other extreme, full local tailoring of pay may avoid labour shortages in tight labour markets, but may be excessively costly to implement and may have other adverse consequences (e.g. on staff morale, staff movements within the organisation). Between these extremes are systems with pay bands. Pay band
structures are chosen to trade off complexity against the ability to reach appropriate wages in different local areas.\textsuperscript{13
}

\textit{The HCAS system}

HCAS has four zones: inner London, outer London, Fringe, and rest of England. These are shown in Figure 6 below.

\textbf{Figure 6.} High Cost Area Supplement zones

HCAS specifies for each zone a percentage uplift in salary, which is then capped or collared within a certain range. The current structure of payments is shown in

\textsuperscript{13} A related question is whether any local adjustments to pay are absolute lump sums (e.g. +£2000), or are proportional to the level of salary (e.g. +10\% of basic salary). In most organisations, geographic pay variation appears to come through lump sum supplements, rather than proportional supplements. Which approach is appropriate depends on whether tightness in the local labour market changes further up the pay scale. However, with it is not possible to reach conclusions on this with the existing data.

\textbf{Comparator models of geographic pay}
Table 6 below. For example, in Outer London the High Cost Area Supplement is set at 15%, with a minimum payment (‘collar’) of £3,448, and a maximum payment (‘cap’) of £4,395.

Table 6. High Cost Area Supplement structure

<table>
<thead>
<tr>
<th>Zone</th>
<th>% of salary</th>
<th>Min</th>
<th>Max</th>
<th>Band 3</th>
<th>Band 5</th>
<th>Band 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner</td>
<td>20%</td>
<td>£4,076</td>
<td>£6,279</td>
<td>£4,076</td>
<td>£4,960</td>
<td>£6,279</td>
</tr>
<tr>
<td>Outer</td>
<td>15%</td>
<td>£3,448</td>
<td>£4,395</td>
<td>£3,448</td>
<td>£3,720</td>
<td>£4,395</td>
</tr>
<tr>
<td>Fringe</td>
<td>5%</td>
<td>£942</td>
<td>£1,632</td>
<td>£942</td>
<td>£1,240</td>
<td>£1,632</td>
</tr>
</tbody>
</table>

Source: NHS Careers, rates from April 2014, pay bands refer to points 10, 20 and 30 respectively

Due to the caps and collars, employees on different pay bands will enjoy different percentage uplifts in salary. For example, if an employee on Band 3 in inner London with basic salary of £18,285 had a 20% uplift, this would represent an increase of £3,657. But the minimum supplement is £4,076, so this employee actually receives is a 22% uplift. Likewise, if a band 7 employee with basic salary of £35,536 had a 20% uplift, this would represent an increase of £7,107. But the cap of £6,279 means the supplement is only 18% for this employee.

The proportions of employees affected by caps and collars are shown in Table 7. For Inner London, only 43.5% of employees are in pay bands at which the supplement is exactly 20% of base salary. 32.5% are in higher bands at which the cap is binding, so that the supplement is less than 20% of base salary. And 24% of employees are lower bands at which the collar applies; in these cases the cash supplement exceeds 20% of base salary. Over all Inner London employees the supplement represents 18.4% of base salary, not the 20% headline rate. A similar story applies to Outer London and Fringe. However, in the case of Outer London, only a small proportion (22.5%) is in bands at which the headline rate applies.

Table 7. Effect of caps and collars to the HCAS structure

<table>
<thead>
<tr>
<th>Zone</th>
<th>Proportion of employees</th>
<th>Weighted average supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Above cap</td>
<td>Headline rate</td>
</tr>
<tr>
<td>Inner</td>
<td>32.5%</td>
<td>43.5%</td>
</tr>
<tr>
<td>Outer</td>
<td>33.6%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Fringe</td>
<td>21.5%</td>
<td>48.8%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of ESR data
As can be seen, the caps and collars affect a majority of employees within the HCAS zones. The HCAS system can therefore be thought of as a hybrid of a pure cash supplement and a proportional supplement system.

We note that the effect of the caps and collars within HCAS bands is to pay larger percentage uplifts (to London-based staff) to those on lower incomes.

If the role of HCAS is purely to ensure all NHS employers are able to recruit and retain good quality staff, then it is not clear that the caps and collars within HCAS are necessary. This would imply that to retain more highly-paid staff, the HCAS uplifts for London-based employees don’t need to be as large as those for lower-paid staff. We did not find sufficient evidence to determine whether this is justified by greater recruitment and retention issues for lower-paid staff.

However, the caps and collars might nevertheless be desirable:

- on grounds of fairness or equity; or
- if HCAS payments are considered compensation for higher cost of living, and these additional costs are fixed, rather than proportionate to an individual’s income; or
- to ensure overall affordability of the HCAS system.

The appropriate model is therefore a policy decision, which was beyond the scope of this report.

**Approaches in other large national employers**

Other large national employers will face similar challenges to the NHS when deciding how to approach geographical variation in pay. They will need to strike a balance between fine-tuning pay to the correct level in local areas, and maintaining a system that is straightforward and simple to use.

Data on pay arrangements at large private national employers are available from the Labour Research Department. The supplements in different locations are shown in Table 8. Although the range of companies and occupations are not necessarily comparable or equivalent to the NHS, these organisations are similar in terms of having centralised systems of wage bargaining between employees and employers.

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14 The LRD is an independent organisation that provides data on pay to trade unions. The data are available at: [http://www.lrdpublications.org.uk/publications.php?pub=WR&iss=1667&id=id136938](http://www.lrdpublications.org.uk/publications.php?pub=WR&iss=1667&id=id136938)
### Table 8. Pay bands used in a selection of large private national employers

<table>
<thead>
<tr>
<th>Employer</th>
<th>Inner or single London Allowance</th>
<th>Outer London</th>
<th>Fringe London</th>
<th>Other South East</th>
<th>Other hot spot?</th>
<th>Number of bands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationwide Building Society</td>
<td>£4,550</td>
<td>£3,150</td>
<td>£2,000</td>
<td></td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Allianz</td>
<td>£4,008</td>
<td>£2,004</td>
<td>£1,260</td>
<td></td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>Co-operative Banking Group</td>
<td>£4,000</td>
<td>£2,500</td>
<td>£1,000</td>
<td></td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Aviva</td>
<td>£3,710</td>
<td>£1,725</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>National Australia Group</td>
<td>£3,595</td>
<td>£2,311</td>
<td>£1,438</td>
<td>£770</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>Santander UK</td>
<td>£3,500</td>
<td>£2,000</td>
<td>£1,000</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Chiltern Railways</td>
<td>£2,587</td>
<td>£1,192</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>BOC Manual Cylinder Fillers</td>
<td>£2,115</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>London Midland</td>
<td>£2,035</td>
<td>£913</td>
<td>£433</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Balfour Beatty Rail Plant</td>
<td>£1,935</td>
<td>£892</td>
<td>£423</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Tesco</td>
<td>£1,917</td>
<td>£1,291</td>
<td>£1,291</td>
<td>£854</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Makro</td>
<td>£1,433</td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Labour Research Department (2014)

All of these companies have a London allowance, with many having bands for Outer London, Fringe, or South East. Many of them also use ‘hot spots’ on an ad hoc basis to address problems in specific areas where recruitment difficulties have been experienced. Hot spots tend to be specific locations in the South or South East; typical hot spots might include Southampton, Bristol, Oxford or Cambridge, although many other locations appear.

Of these employers, between 2 and 6 pay regions are used, with 4 or 5 being most common. The supplements are of a relatively similar magnitude to HCAS. Overall, this would suggest that the HCAS system is similar to the approach taken by a range of other large national employers. It does not appear unusual. Although the approach taken by other organisations may not be appropriate for the NHS, both the structure and magnitude of HCAS is consistent with other employers’ approaches to geographic pay variation. Also, this analysis suggests that other big national employers are wary of overly detailed central systems.
Comparator occupations

An alternative to assessing the geographical pay variation of potential comparator employers is to assess pay variation within specific occupations. Lower pay variation (within occupation) for the NHS compared to other occupations may suggest the amount of variation in the NHS is insufficient to enable some providers to recruit and retain staff.

Our analysis focuses on nurses because this occupation works predominantly in the NHS, and is the largest single staff group covered under Agenda for Change. That allows us to conduct the analysis on a large sample and be more certain of our findings. Given the data, we have not been able to establish whether the results for nurses can be generalised across other NHS professions. Further data analysis could be undertaken in order to allow the issue to be assessed for other professions.

The most direct way to identify potential comparator occupations is to identify those that pay similar amounts as nursing. While these occupations may be very different from nursing, and have different sets of individuals working in them, as the pay levels are similar, the extent of geographic pay variation may provide a useful benchmark.

Comparator occupations are identified using 2011 Annual Survey of Hours and Earnings data cut by region and by SOC code. First we identify occupations that pay similarly to nursing in London, by ranking occupations by median gross hourly pay and taking the 5 occupations with higher and lower wages. This is set out in Table 9.

Table 9. Average pay of nursing and similar-paying occupations in London

<table>
<thead>
<tr>
<th>Hourly wage per region</th>
<th>Nurses</th>
<th>Average of ten similar-paying jobs in London</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>£17.77</td>
<td>£17.74</td>
</tr>
<tr>
<td>South East</td>
<td>£16.09</td>
<td>£14.24</td>
</tr>
<tr>
<td>Rest of England</td>
<td>£15.62</td>
<td>£12.96</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of ASHE 2011 (ONS) data

The ten jobs yielding the most similar hourly wage to nurses in London yield on average 20% lower wages in the rest of England. For example, a nurse in London earns the same as an insurance clerk, whereas in the rest of England nurses earn on average 35% more than insurance clerks. This would suggest that regional wage differentials for nursing are lower than would be expected, which could indicate that HCAS has insufficient geographic variation.
This analysis is repeated, this time identifying similar-paying occupations for the rest of England. The ten jobs yielding the most similar hourly wage to nurses in the rest of England, yield on average 12% higher wages in the London. A nurse in Yorkshire earns the same as an engineering professional, whereas in London nurses earn on average 12% less than engineering professionals.  

<table>
<thead>
<tr>
<th>Hourly wage per region</th>
<th>Nurses</th>
<th>Average of ten most similar-paying jobs in Rest of England</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>£17.77</td>
<td>£20.19</td>
</tr>
<tr>
<td>South East</td>
<td>£16.09</td>
<td>£18.49</td>
</tr>
<tr>
<td>Rest of England</td>
<td>£15.62</td>
<td>£15.98</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of ASHE 2011 data (ONS)

This analysis suggests that there is more geographic pay variation in occupations with similar pay scales to nurses than there is for nursing itself. One possible explanation for these patterns is that there is greater flexibility in setting wages at the local level for these comparator professions, hence the larger geographic pay differentials.

The fact that these occupations pay similar amounts to nursing does not mean that they are necessarily good comparators. The individuals working in these occupations are not necessarily the same individuals who work (or could potentially work) in nursing. And those occupations may be higher or lower in terms of job evaluation terms than nurses. As a result, these occupations do not necessarily provide much indication of the local gap between the pay of nurses working in the NHS, and the pay they would receive if working in other occupations.

15 Occupations paying similar to nursing in London: Pensions and insurance clerks and assistants; Public relations professionals; Residential, day and domiciliary care managers and proprietors; Other drivers and transport operatives n.e.c.; Sales, marketing and related associate professionals; Probation officers; Other managers and proprietors; Managers and proprietors in health and care services; Construction and building trades supervisors; Legal associate professionals

Occupations paying similar to nursing in Rest of England: Business and related research professionals; Veterinarians; Natural and social science professionals; Welfare professionals; Financial and accounting technicians; Occupational therapists; Therapy professionals; Management consultants and business analysts; Environmental health professionals; Engineering professionals n.e.c.;
4 Literature review

This section summarises the available academic literature about the variation between public and private sector pay, and its impact. It is structured in two parts:

- First we summarise the existing evidence about geographic pay variation between the private and the public sector. This suggests that the private sector is shown to be more responsive to variations in the cost of living and attractiveness of different areas than the public sector.\(^{16}\)

- Then we look at the existing literature focusing on the potentially negative effect that this variation has on both “recruitment and retention” and “quality and productivity” of NHS Trusts.\(^{17}\)

4.1.1 Geographic pay variation differs between the private and the public sector

The private labour market responds to geographical variations in the cost of living and attractiveness of different areas by adjusting the level of pay. This results in considerable geographic variation in salary in the private sector. This phenomenon is much less present in the public sector in general, where many staff are paid according to national pay scales.

The Department of Health (2012) stylises the situation with the help of the graph illustrated in Figure 7.

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Areas in which the cost of living is low and/or are attractive places to live are depicted in the left-side of the graph. In such areas the public sector pay exceeds the private sector. Moving to the right-side of the graph, however, we can see how the public sector may have some measures in place to respond to the different conditions – namely HCAS zones for the NHS – but sometimes those measures are not as responsive as the private sector.

Elliott et al (2006) analyse more specifically the situation for nurses. Their empirical results confirm the stylised Figure 7, with the private sector group exhibiting greater variation than that for NHS nurses. To get to this result they derive a Standardised Spatial Wage Differential (SSWD) Gap. This is done in two steps. First, SSWDs are derived for both private and public sector staff using econometric analysis. This identifies the geographical variation in earnings, controlling for other factors which may vary between locations. Second, the SSWD Gap is constructed by subtracting the SSWD for the NHS from the SSWD for the private sector, showing the difference in pay at each location.

4.1.2 This variation may have a modest effect on both “recruitment and retention” and “quality and productivity” of NHS Trusts

Geographical pay variation between the private and the public sector may be a concern if it could have negative effects on the ability to hire and retain the right people. The existing literature focused on two possible effects:

- the impact on recruitment and retention, and

Literature review

Figure 7. Stylised comparison of private and public pay

Source: Department of Health (2012)
the impact on quality and productivity for NHS Trusts.

Crawford et al (2013) provided evidence on positive short-run elasticity of NHS nurses' labour supply, especially in the London region.\(^{18}\) This means that if nurses have strong employment options outside the NHS (the right-hand side of Figure 7) they will respond by supplying less labour to the NHS. This in turn could make it harder for Trusts to recruit and retain staff. This is reflected in the proportion of trained nurses actually working as NHS nurses, which is significantly higher the further the region is from London. On average just under 70% of trained NHS nurses work as such, with the percentage for London, the South East, the East and the East Midlands being 7-8% lower than the rest of the country.

Crawford et al (2013) also show how, in the London region, a 10% increase in the relative pay of NHS nurses could result in an increase in supply by 7%. These results vary substantially across England. Outside the London region, they find that a 10% increase in the relative pay of NHS nurses would result in an increase in supply by less than 1%.

Ma et al (2008) directly explore the relation between SSWD Gaps and NHS recruitment and retention. They find a positive and significant relationship between the wage gap and nursing vacancies. This goes in the direction of confirming that the larger the gap in an area (i.e. the higher private sector compensation relative to the NHS), the harder it will be for Trusts to fill vacancies. The magnitude of their result is however modest. Their coefficient is between 0.019 and 0.030 i.e. an increase by one unit of their derived Standardised Spatial Wage Differential would increase nurses’ vacancies by 0.019-0.030 units.

The impact geographic pay differentials have on quality and productivity is explored by Propper et al (2010). They show that hospitals in more competitive labour markets – those facing higher non-NHS comparator wages – show worse outcomes in terms of quality and productivity. In particular, they show that a 10% increase in outside wages is associated with an increase in death rates between 4-7%. Moreover, they show that this effect is “convex”, meaning that the negative effect in the high-cost areas is stronger than the positive effect in low-cost areas, generating an aggregate negative effect.

\(^{18}\) Crawford R., Disney R., Emmerson C. (2013), *The short run elasticity of National Health Service nurses' labour supply in Great Britain*, report to Nuffield Trust, mimeo
5 Quantitative analysis

Figure 8 below summarises the quantitative analytical approach we have pursued to test our central hypothesis: in locations where NHS pay rates are “low” relative to other local employers, Trusts will find it more difficult to recruit and retain staff. We have tested this hypothesis in three steps.

Stage 1
First we investigate whether some Trusts find it harder than others to recruit and retain staff. At this stage we do not investigate the reason behind these differences. This step is useful to identify locations in which Trusts may face greater difficulties.

Stage 2
As a second step we investigate whether some Trusts face stronger pressure from the private sector than others, given their specific geographical area. We approached this question by deriving a private-public wage gap, using Annual Survey of Hours and Earnings (ASHE) panel data.\(^{19}\)

Stage 3
Lastly, to test our central hypothesis, we combined the data measuring the difficulty to recruit and retain staff with our private-public wage gap data. We conducted two main types of analysis:

- univariate (correlation) analysis; and
- multivariate (regression) analysis.

A detailed description of each of these three steps follows.

Note that in performing our analysis we have concentrated our attention on nurses. The main reason behind this focus is data availability. The private-public wage gap uses data from employees in a specific role for relevant geographic units (in our case nurses and their comparator group at the NUT3 level\(^{20}\)). Sample sizes would not be big enough to allow us to perform the same analysis for other groups within Agenda for Change.

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5.2 Do some Trusts find it harder than others to recruit and retain staff?

The first step is to investigate whether some Trusts find it harder than others to recruit and retain staff. This may be for a variety of reasons, of which pay is just one. Later in our analysis we assess whether pay can explain these variations.

We considered the following factors related to recruitment and retention:

- agency spend;
- Recruitment and Retention Premia;
- potential informal recruitment measures (i.e. mix of staff used to deliver services);
- staff satisfaction;
- vacancies, and
- churn.

As the detailed analysis below shows, Trusts in the Fringe HCAS area (i.e. outskirts of London) face the greatest issues in recruitment and retention. These Trusts tend to have higher RRP payments, more vacancies, a higher churn and lower staff satisfaction. This could have a number of causes. Relative private-
public pay in the area might be one factor. Other factors could include non-pay elements of the staff “package”, working conditions, Trust-specific quality of management, local quality of living and type of Trust.

5.2.1 Agency spend

NHS Trusts use agency staff for a number of reasons. The NHS Employers website states: “Employers have used agency staff in a range of situations as a way to quickly fill difficult gaps and to ensure that services continue to be delivered”.21

Although the use of agency staff could be partly explained by unforeseeable demand shocks, a Trust showing a higher use of agency staff might be one which faces more difficulty in recruitment and retention.

Figure 9 below represents the level of agency staff usage of each Trust in England, grouped by their HCAS zone. Some Trusts spend virtually nothing on agency staff, while others face agency costs as high as 10% of total staff costs. When looking at the potential regional differences, London Trusts appear to make a greater use of agency staff than the rest of England. This is indicated by the higher median and quartile bars for the Inner, Outer and Fringe areas. Following the same reasoning, Trusts in inner London seem to be the ones facing most difficulties based on this metric.

This variation may have multiple causes. It might be that:

- Trusts in inner London use more agency staff because they face more competition for staff; or
- they face a less predictable workload which requires more short-term corrections; or
- NHS pay (including the HCAS payment) is relatively less attractive.

5.2.2 Recruitment and Retention Premia

In theory, Recruitment and Retention Premia (RRP) are designed to give more flexibility to Trusts, acknowledging that some might face more difficulties than others in recruiting and retaining staff. Its usage should therefore be, in principle, a very good indication of the local labour market conditions faced by a Trust.

In practice, as Table 11 shows, RRP usage is very small. This low usage may have at least three causes. First, as the Pay Review Body has noted, RRP were in many cases introduced with Agenda for Change as a way of protecting the pay of some categories of staff at pre-Agenda for Change levels. Second, the structure of RRP requires that when a premium is assigned it is assigned to the job, not the person filling the specific vacancy. This creates disincentives to use it because it will oblige Trusts to keep paying the extra premium to any new recruit for that

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22 “Our analysis shows that the usage of local RRP is rare when legacy payments (pre-AfC Cost of Living Supplements) are excluded”. Page 11, “NHS Pay Review Body – Market-Facing Pay – How Agenda for Change pay can be made more appropriate to local labour markets”
position; and it can create disparities between employees in otherwise similar roles. Thirdly, our discussions with stakeholders suggested that the process for applying for RRP can seem more burdensome than alternative options (i.e. non-pay incentives).

One interpretation of the RRP data is that, albeit being very seldom used everywhere, there is a slightly higher presence in the Fringe area: 0.17% of total staff pay in the Fringe is assigned through RRP, compared with around 0.1% in the other HCAS areas.

**Table 11. RRP payment as percentage of total payments by HCAS zones**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Total pay (£m)</th>
<th>Basic pay (£m)</th>
<th>RRP (£m)</th>
<th>HCAS payment (£m)</th>
<th>RRP as % of total</th>
<th>HCAS as % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest of England</td>
<td>18,924</td>
<td>18,868</td>
<td>19</td>
<td>37</td>
<td>0.10%</td>
<td>0.19%</td>
</tr>
<tr>
<td>Inner London</td>
<td>2,513</td>
<td>2,107</td>
<td>2</td>
<td>404</td>
<td>0.09%</td>
<td>16.09%</td>
</tr>
<tr>
<td>Outer London</td>
<td>1,673</td>
<td>1,443</td>
<td>2</td>
<td>227</td>
<td>0.13%</td>
<td>13.58%</td>
</tr>
<tr>
<td>Fringe</td>
<td>896</td>
<td>849</td>
<td>2</td>
<td>46</td>
<td>0.17%</td>
<td>5.11%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from ESR

It is relatively clear from this evidence that RRP are not currently fulfilling their intended purpose. They are not (very often) being used to respond to local labour market pressures. Further consideration of how the RRP system operates, and whether this could be improved, may provide Trusts with valuable local flexibility.

### 5.2.3 Potential informal recruitment measures

If workers in particular areas are on higher pay bands, this might indicate “grade drift” (placing people in higher pay bands than their role requires) is being used to attract or retain them. Figure 10 and Figure 11 tell us that 60% of Inner London nurses are on band 6 or higher, compared to 51% in the rest of England; while 64% of Inner London central functions staff nurses are on band 5 or higher, compared to 47% in the rest of England.

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23 Although there are many other potential explanations, e.g. workforce mix, specialisms

Quantitative analysis
Figure 10. Share of FTEs in each pay band by HCAS zones – nurses

Source: Frontier analysis of data from ESR

Figure 11. Share of FTEs in each pay band by HCAS zones – central functions

Source: Frontier analysis of data from ESR
Note that results can be rather different if we focus on pay points within each band, rather than the bands themselves. In some cases we observe a clustering towards the top pay point in each pay band. In **Table 12** below we show, for nurses, the proportion of staff that is at the top point in their pay band. For example, 57% of Band 7 nurses in Rest of England are at the top pay point, compared to 44% in Inner London. This has an offsetting effect: the average pay point for nurses in Inner London is 25.5, compared to 25.3 in Rest of England, which is only a minimal difference. One possible explanation for the difference between the results of pay band and pay point analyses is the higher churn of staff in London. This higher churn does not allow people to progress to the higher pay point within their band.

**Table 12. Proportion of nurses at top point within pay band**

<table>
<thead>
<tr>
<th>Band</th>
<th>Rest of England</th>
<th>Inner London</th>
<th>Outer London</th>
<th>Fringe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band 5</td>
<td>51.8%</td>
<td>35.8%</td>
<td>42.3%</td>
<td>41.2%</td>
</tr>
<tr>
<td>Band 6</td>
<td>50.2%</td>
<td>31.8%</td>
<td>36.9%</td>
<td>35.9%</td>
</tr>
<tr>
<td>Band 7</td>
<td>57.1%</td>
<td>43.8%</td>
<td>49.6%</td>
<td>48.1%</td>
</tr>
<tr>
<td>Band 8a</td>
<td>63.6%</td>
<td>59.0%</td>
<td>59.7%</td>
<td>56.3%</td>
</tr>
<tr>
<td>Band 8b</td>
<td>76.5%</td>
<td>60.9%</td>
<td>64.9%</td>
<td>86.7%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of ESR data

There are many factors that affect the grade mix of providers: they carry out a different mix of activities, involving different specialisms and different demands on staff. By controlling for the provider type we can account for some of these differences. Regression analysis was performed to identify the difference in grade mix relative to Rest of England for different provider types. For example, for nurses in Rest of England the average pay point across Trusts is 25.46 (shown by the base case row). The average pay point in Fringe is 24.9 (=25.46-0.56), and this difference is significant at the 5% level. For specialist, teaching or other provider types there is no statistically significant difference in pay point for the HCAS zones. For large/ medium, Inner London has pay point 0.6 higher, and this is significant at the 1% level.

These results are fairly sensitive to the specification used (e.g. whether or not weights are used, staff group analysed, inclusion of outliers). These results do not suggest a strong role for grade drift as a tool for recruitment and retention, but further work would have to fully account for activity mix in order to conclude more firmly.
Table 13. Regression analysis of average pay point by HCAS zone – nurses

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Large / Medium</th>
<th>Specialist / Teaching</th>
<th>Small</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner</td>
<td>0.534</td>
<td>0.567***</td>
<td>0.141</td>
<td>0.867***</td>
<td>1.008</td>
</tr>
<tr>
<td>Outer</td>
<td>0.142</td>
<td>0.135</td>
<td>0.727</td>
<td>0.480*</td>
<td>-0.10</td>
</tr>
<tr>
<td>Fringe</td>
<td>-0.56**</td>
<td>-0.55***</td>
<td>0</td>
<td>-0.54**</td>
<td>0.029</td>
</tr>
<tr>
<td>Constant (base case = ROE)</td>
<td>25.46***</td>
<td>24.91***</td>
<td>24.97***</td>
<td>25.11***</td>
<td>26.32***</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of ESR data

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

5.2.4 Staff satisfaction

A Trust with satisfied staff will have fewer problems in recruiting new employees and retaining existing staff. We therefore analysed responses to some questions on satisfaction from NHS staff surveys.

Figure 12 depicts the percentage of staff claiming to be satisfied with the level of pay received, broken down by HCAS areas. All three London areas show lower levels of satisfaction than the rest of England, with employees of Trusts in Fringe being the least satisfied.

Note how this question refers to the general level of pay, including HCAS payments. This might therefore be seen as a further indicator that Trusts in Fringe might be those facing higher difficulties in recruitment and retention.
5.2.5 Vacancies

If a Trust has more difficulty in recruitment and retention, we would expect it to have more vacancies. We can get a sense of the vacancy level a Trust faces by looking at:

- the number of adverts per full-time equivalent, which adjusts for the total size of the organisation; and
- the number of applications per advert, for which a higher number indicates more competition in the labour market for each vacancy available.

Figure 13 below shows that Trusts in Fringe areas seem to consistently have the highest adverts-to-FTEs ratios. Each line of the graph maps all the Trusts within that specific zone ranked with respect to their advert per FTE ratio. So, for example, the Trust in Fringe with the lowest advert per FTE ratio (0.19) is the first beige rhombus on the left, the second beige rhombus denotes the Trust in Fringe with the second-lowest advert per FTE ratio (0.22) and so on. The Fringe (beige) line is consistently above the others, these Trusts typically have 0.1-0.2 more adverts per FTE, than other Trusts. Given the average number of FTEs is about 3,350, this implies an average of about 1,000 adverts (per year) for Trusts.

Quantitative analysis
in the Fringe HCAS area and about 750 for Trusts in the rest of England. This might indicate that Trusts in the Fringe area have more difficulty in recruitment and retention.

**Figure 13.** Cumulative adverts per FTE by HCAS zone

![Cumulative adverts per FTE by HCAS zone](image)

Source: Frontier analysis of data from NHS Jobs

Similarly, **Figure 14** below looks at overall number of adverts and applications per advert. Here, the South East Cost – with just above 20 applications per adverts – looks like it might be one of the harder areas in which recruiting and retaining staff.
5.2.6 Churn

Staff turnover, or churn, might be a good indicator, especially when considering retention. Figure 15 and Figure 16 show leaving and joining rates respectively. Within each HCAS zone there is considerable variation in turnover rates. This means that, for example, London providers can have turnover similar to that seen in many parts of Rest of England. However turnover is higher on average in London zones, and some providers in the Rest of England have very low turnover, at levels that would be unusual in London. Focusing on London, turnover rates appear particularly high in Fringe, and are fairly low in Outer. Note that all our analysis on turnover data is at annual level.

Source: Frontier analysis of data from NHS Jobs
**Figure 15.** Leaving rates by HCAS zone – nurses

![Leaving rates by HCAS zone – nurses](image)

Source: Frontier analysis of data from ESR

**Figure 16.** Joining rates by HCAS zone – nurses

![Joining rates by HCAS zone – nurses](image)

Source: Frontier analysis of data from ESR
5.3 Where are NHS pay rates relatively lower?

In this section we derive a private-public wage gap. It is intended to be a measure of the pressure faced by NHS Trusts from the private sector, in their specific geographical area. The building blocks of this index are:

- the average wage for the private group for each geographical unit; and
- the average wage for the group of nurses working in the NHS for each geographical unit.

The main result of this analysis is that the Trusts which seem to face a higher pressure from the private sector are located in the South of England, but not in the London area. Here we describe the steps that lead to this conclusion.

5.3.1 Private sector average wage

We define a private sector group comparable to NHS nurses. Choosing the right comparator group determines how we interpret our results. Specifically, we want to select jobs that nurses are likely to go to or come from, as it is the employers offering these jobs which are likely to compete for NHS staff.\(^{24, 25}\)

We constructed our private comparator group using the following approach.

**Step 1**

Using the Labour Force Survey, we identified the occupations\(^ {26}\) where at least 1% of the workforce holds a nursing qualification. This test allows us to only select occupations which the market itself defines as possible alternatives for qualified nurses and responds to our goal of selecting jobs nurses are likely to go to or come from.

**Step 2**

Of those occupations passing the first step, we chose the twenty which are most comparable to NHS nurses on the grounds of:

- % of workforce holding a nursing qualification;
- female/male workforce composition;

---

\(^{24}\) Note that taking the general average wage for the private sector would in fact yield a distorted comparison: it would not control for the different workforce composition in different areas of the country.

\(^{25}\) Our comparator group is used to measure the extent of labour market pressure which exists today. We therefore consider only jobs which current trained nurses might otherwise be doing. We do not consider the full spectrum of occupations which untrained individuals (i.e. future nurses) might enter, as these jobs are not “competing” with the NHS for trained nurses.

\(^{26}\) Occupations are analysed at the 3-digit SOC (Standard Occupation Classification) level.
average qualification level; and

hourly pay.

These variables have been chosen as they provide objective criteria on which to compare occupations. The female/male and average qualification level terms have been included to capture underlying individual characteristics. The nursing qualification term identifies occupations with significant number employees that could potentially work in nursing in the NHS. The pay term captures both the premium attached to individuals working in different occupations, as well as any compensation. We would expect substitution between nursing and other occupations to occur mainly at similar pay levels, as workers in lower-paid occupations may have less skill to work in nursing, and those in higher-paid occupations may be reluctant to work at lower wages.

These four parameters allow us to rank the occupations with respect to their “similarity” to NHS nurses, and also to assign to each of them a “similarity score”. Weights for the index are created by multiplying the similarity score with the number of private sector employees in the occupation. So, there may be an occupation that is very similar to nursing, but which has very few private sector employees. This will reduce the weight given to that occupation, as it would represent only a small proportion of private sector comparator employment. The list of occupations used, and their respective weights, is presented in Figure 17. Although many of the occupations below would appear to be predominantly public sector, the LFS does record a certain level of private sector employment in them.

---

27 Private sector is defined using the public variable in the LFS.
Figure 17. Composition of the “private sector comparator group”

<table>
<thead>
<tr>
<th>Occupations used to construct the “private sector comparator group”</th>
<th>Weight for average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare And Related Personal Services</td>
<td>20.3%</td>
</tr>
<tr>
<td>Health Associate Professionals</td>
<td>15.7%</td>
</tr>
<tr>
<td>Sales And Related Associate Professionals</td>
<td>12.5%</td>
</tr>
<tr>
<td>Teaching Professionals</td>
<td>10.1%</td>
</tr>
<tr>
<td>Childcare And Related Personal Services</td>
<td>9.2%</td>
</tr>
<tr>
<td>Administrative Occupations: Government And Related Organisations</td>
<td>5.3%</td>
</tr>
<tr>
<td>Health Professionals</td>
<td>4.9%</td>
</tr>
<tr>
<td>Social Welfare Associate Professionals</td>
<td>3.9%</td>
</tr>
<tr>
<td>Health Associate Professionals</td>
<td>3.0%</td>
</tr>
<tr>
<td>Health And Social Services Managers</td>
<td>2.8%</td>
</tr>
<tr>
<td>Therapists</td>
<td>2.5%</td>
</tr>
<tr>
<td>Managers And Proprietors In Hospitality And Leisure Services</td>
<td>2.4%</td>
</tr>
<tr>
<td>Public Service Professionals</td>
<td>1.6%</td>
</tr>
<tr>
<td>Animal Care Services</td>
<td>1.3%</td>
</tr>
<tr>
<td>Science Professionals</td>
<td>1.3%</td>
</tr>
<tr>
<td>Health And Social Services Managers</td>
<td>1.2%</td>
</tr>
<tr>
<td>Engineering Professionals</td>
<td>0.8%</td>
</tr>
<tr>
<td>Housekeeping Occupations</td>
<td>0.5%</td>
</tr>
<tr>
<td>Functional Managers</td>
<td>0.4%</td>
</tr>
<tr>
<td>Managers In Farming, Horticulture, Forestry And Fishing</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of Labour Force Survey (LFS) data

Unsurprisingly, “healthcare and related personal services” professionals make the top of the list. This means that they are the most comparable group to public nurses given the criteria we selected. They therefore receive the highest “similarity score”. On the other hand, although “managers in farming, horticulture, forestry and fishing” qualify for having at least 1% of the workforce holding a nurse qualification, they are not as similar to nurses. They therefore only get a 0.2% weight in the average.

The similarity score was derived by:

- Standardizing each variable over the range of occupations, so that it has mean of 0 and standard deviation of 1. For example, percentage of workers who are female has a mean of 41% and standard deviation of 27%. Nursing has 90% of workers who are female, so it is 1.8 standard deviations above the mean.

- For each variable, measuring the absolute difference (denoted σ) between the standardised score for the occupation and the standardised score. For example, Teaching has 68% of workers who are female, and is +1.0 standard deviations above the mean. So, in relation to percentage female, the
The difference between nurses and probation officers is 0.8 standard deviations (1.81 – 1.0).

- The difference measures $\sigma$ are transformed into a similarity weight $\Phi$ using the functional form:

$$\Phi = \left(\frac{20 - \sigma_{\text{female}} - \sigma_{\text{pay}} - \sigma_{\text{qual}} - \sigma_{\text{nursequal}}}{20}\right)^2$$

Nursing has $\Phi = 1$ and is 100% similar to itself. The maximum amount of dissimilarity observed in each variable is around 4 standard deviations, and the most dissimilar occupation – aircraft maintenance – has $\Phi = 0$.

By using the squaring term, we guarantee that very little weight is placed on dissimilar occupations. Although alternative approaches will change how much dissimilarity is weighted, they do not have much impact on the final results.

- The similarity weight is then multiplied by the number of private sector employees in the occupation, and divided by the total across occupations to construct index weights. This is because we want the index to reflect the overall composition of the workforce, rather than niche occupations. Sales and related personal services might not be as similar to nursing as therapist occupations are, but there are many more individuals working privately in this area, so it should carry more weight in characterising the outside options available to nurses.

**Step 3**

Lastly, we used these occupations and their corresponding similarity score to create the private comparator group average wage. We used Annual Survey of Hours and Earnings (ASHE) microdata, which includes individuals’ hourly earnings, occupation, employer type, and geography at NUTS3 level. For each NUTS3, average earnings for each comparator occupation were calculated, and a weighted average formed using the LFS weights (set out in in **Figure 17**). Where no such data for an individual occupation was available in a NUTS3 unit, average pay for that occupation within the wider NUTS2 was used. The NUTS3 geography was chosen as it has reasonable sizes (mean of 159 individuals, median of 103), whilst being relatively disaggregated geographically.

We then measured public nurses’ pay in each NUTS3 unit. Here there were problems with small sample sizes, with around half of all NUTS3 units having fewer than 50 public nurses in the ASHE data. Where this was the case, averages for the wider NUTS2 unit were used. This was a pragmatic approach to balance sample sizes with the level of geographic disaggregation.
The result of this exercise is a value representing the private comparator group average wage for each geographical unit. We then assigned the corresponding value to each NHS Trust in England, and the result is displayed in Figure 18. Average wages span from £11.50 per hour to £15.50 per hour.

**Figure 18.** “Private sector comparator group” average wage distribution

![Graph showing private sector comparator group average wage distribution](image)

Source: Frontier analysis of Annual Survey of Hours and Earnings data (ONS) for 2011-13

Note: individual Trust names have been removed to preserve confidentiality

As expected, pay per hour in London tends to be higher. i.e. London areas are found on the right hand side of the graph. This confirms that Trusts located in London are surrounded by a private sector paying higher wages than in the Rest of England. However, note that the picture is not clearly split up showing all the “Rest of England” areas to the left of the picture, and then in sequence Fringe, Outer and Inner areas. The map represented in Figure 19 confirms this result. This suggests the simple division “London-Rest of England” might not be sufficient.
5.3.2 NHS nurses’ average wage

We derived NHS nurses’ average wage for each local area from the ASHE dataset. We then assigned the corresponding value to each NHS Trust in

Quantitative analysis
England\textsuperscript{28}, and the result is displayed in Figure 20. Note that the measure of pay we use from the ASHE dataset is “gross hourly pay”. This will already include any HCAS, RRP, and overtime payments.

**Figure 20. NHS nurses average wage distribution**

Average wages for public nurses span from £14.50 per hour to almost £20 per hour.

As expected, Trusts in Inner and Outer London – which benefit from a 20\% and 15\% HCAS respectively – are at the right-hand side of the graph. Interestingly, however, they are not followed by Fringe areas – which appear further left in the graph, with lower average wages. This is confirmed by the map in Figure 21. The darkest areas – representing the highest average NHS wages – are those in London, however outside the capital the pattern of higher and lower average wages is more mixed.

---

\textsuperscript{28} Note that the geographical unit used for both the private and the public average wages is the NUTS3 level. The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system defined by Eurostat, with the level 3 representing “small regions for specific diagnoses”. England is divided into 99 NUTS3 geographic units. Our measures of average wages are in few cases scaled up to the NUTS2 average. This is because – given the small size of such regions and the relatively low population density in some of them – we had a few regions with less than fifty observations for the relevant group analysed. Note that scaling up to the wider region average address both the data confidentiality and the sensitivity to outliers issues.
Figure 21. NHS nurses average wage distribution – map

Source: Frontier analysis of Annual Survey of Hours and Earnings data (ONS) for 2011-13

Note: our analysis has been performed at NUTS3 level, indicated by the boundaries of the geographic regions. However, in order to preserve anonymity of Trusts, the results in this map are presented at a more aggregate level. All values have been calculated as an average of at least 5 Trusts, and cannot be attributed to any individual Trust. Note that the following non-bordering NUTS3 regions have been aggregated together into one group: Bournemouth and Poole, Isle of Wight, Portsmouth, Southampton and Hampshire County Council.

5.3.3 The private-public wage gap

Subtracting the average pay of public nurses from the average of the private comparator group we obtain the private-public wage gap, shown in Figure 22. Being on the left-hand side of the graph indicates that the public average wage in the area is substantially above the private wage. Trusts on the right-hand side of the chart pay a similar average wage to the private comparator group. This
indicates that the more we move to the left of the graph, the less pressure Trusts face from the private market.

**Figure 22. Private-public wage gap**

![Graph showing private-public wage gap](image)

Source: Frontier analysis of Annual Survey of Hours and Earnings data (ONS) for 2011-13

Note: Individual Trust names have been removed to preserve confidentiality

One interesting point to notice is that public nurses earn consistently above their private comparators throughout England. This result is a function of the private comparator group used. We note that there is possibly a selection effect taking place: a high proportion of the comparator group is trained as a nurse; therefore it seems logical that nursing might be their best option. Nevertheless, this exercise allows us to see the difference of such a gap in different local labour markets. Note however that it is not intended as a more general assessment of nurses’ pay.

**Figure 23** also shows that the private-public wage gap within the three “London” HCAS zones is quite evenly distributed e.g. some of the areas which fall in the dark blue “Outer” zone have a higher gap but others a much lower gap. This suggests that the current HCAS zones are not systematically under- or over-remunerating NHS employees relative to the private sector.

This index highlights the areas in which NHS Trusts face higher (and lower) competition from the private labour market. This same index is used to create the map in **Figure 23**. Note how London does not face the highest competition from the private labour market.
Figure 23. Private-public wage gap – map

Source: Frontier analysis of Annual Survey of Hours and Earnings data (ONS) for 2011-13

Note: our analysis has been performed at NUTS3 level, indicated by the boundaries of the geographic regions. However, in order to preserve anonymity of Trusts, the results in this map are presented at a more aggregate level. All values have been calculated as an average of at least 5 Trusts, and cannot be attributed to any individual Trust. Note that the following non-bordering NUTS3 regions have been aggregated together into one group: Bournemouth and Poole, Isle of Wight, Portsmouth, Southampton and Hampshire County Council.

The 15 Trusts facing the most pressure – i.e. the highest relative private sector wages – are listed in Table 14.
Table 14. NHS Trusts facing the most pressure from the private sector

<table>
<thead>
<tr>
<th>Trusts with the highest (less negative) private-public wage gap</th>
<th>Strategic Health Authority of reference</th>
<th>Size of gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Trust A</td>
<td>South West SHA</td>
<td>-£ 1.47</td>
</tr>
<tr>
<td>2 Trust B</td>
<td>South West SHA</td>
<td>-£ 1.47</td>
</tr>
<tr>
<td>3 Trust C</td>
<td>South West SHA</td>
<td>-£ 1.47</td>
</tr>
<tr>
<td>4 Trust D</td>
<td>South Central SHA</td>
<td>-£ 1.72</td>
</tr>
<tr>
<td>5 Trust E</td>
<td>South Central SHA</td>
<td>-£ 1.72</td>
</tr>
<tr>
<td>6 Trust F</td>
<td>South Central SHA</td>
<td>-£ 1.73</td>
</tr>
<tr>
<td>7 Trust G</td>
<td>South East Coast SHA</td>
<td>-£ 2.18</td>
</tr>
<tr>
<td>8 Trust H</td>
<td>South East Coast SHA</td>
<td>-£ 2.18</td>
</tr>
<tr>
<td>9 Trust I</td>
<td>South West SHA</td>
<td>-£ 2.32</td>
</tr>
<tr>
<td>10 Trust J</td>
<td>South West SHA</td>
<td>-£ 2.32</td>
</tr>
<tr>
<td>11 Trust K</td>
<td>South West SHA</td>
<td>-£ 2.32</td>
</tr>
<tr>
<td>12 Trust L</td>
<td>South West SHA</td>
<td>-£ 2.32</td>
</tr>
<tr>
<td>13 Trust M</td>
<td>East of England SHA</td>
<td>-£ 2.36</td>
</tr>
<tr>
<td>14 Trust N</td>
<td>Yorkshire and the Humber SHA</td>
<td>-£ 2.41</td>
</tr>
<tr>
<td>15 Trust O</td>
<td>Yorkshire and the Humber SHA</td>
<td>-£ 2.41</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of Annual Survey of Hours and Earnings data (ONS) for 2011-13

Note: individual Trust names have been removed to preserve confidentiality

Note that the top thirteen are all in the South of England, but not in the London area. To better illustrate this point, Figure 24 presents a close-up of the previous map, focusing on the south of England.
Figure 24. Private-public wage gap – focus on South of England – map

Source: Frontier analysis of Annual Survey of Hours and Earnings data (ONS) for 2011-13

Note: our analysis has been performed at NUTS3 level, indicated by the boundaries of the geographic regions. However, in order to preserve anonymity of Trusts, the results in this map are presented at a more aggregate level. All values have been calculated as an average of at least 5 Trusts, and cannot be attributed to any individual Trust. Note that the following non-bordering NUTS3 regions have been aggregated together into one group: Bournemouth and Poole, Isle of Wight, Portsmouth, Southampton and Hampshire County Council.

The aim of this part of the analysis was to create the private-public wage gap, a measure of the pressure Trusts face from the surrounding private labour market. In the next section we test whether this gap influences the ability of Trusts to recruit and retain staff.
5.4 The impact of the wage gap on recruitment and retention

In the previous section we constructed the private-public wage gap. This index allows us to measure the pressure faced by each Trust in England from the private labour market in which it operates. We then use this index to test whether there are grounds for proposed changes to the HCAS system.

The logic system we used to structure our thinking is depicted in Figure 25. The first thing to check is whether the private-public wage gap impacts the ability of Trusts to recruit and retain staff. Where the difference in local pay does not have an impact, this would then imply that no intervention (to modify HCAS) is required. On the other hand, finding an impact would require us to check whether it has a systematic geographic pattern. If so, then there would be scope for an improvement of the HCAS model. On the other hand, if no systematic geographic pattern is present, than there may be scope for intervention, but HCAS would not be the appropriate lever.

To measure this impact we have analysed the following factors which may be related to recruitment and retention:

**Quantitative analysis**
The analyses we have carried out suggests no strong evidence that areas with lower relative pay systematically experience greater recruitment and retention problems.

This finding is based on two main types of analysis: univariate (correlation) analysis and multivariate (regression) analysis. Both are explained in detail here below.

### 5.4.1 Univariate (correlation) analysis

The correlation between the private-public wage gap and recruitment and retention variables gives an indication of whether relative pay is an important driver in the Trusts’ ability to be an attractive place at which to work.

**Table 15** summarises the results found when looking at all Trusts in England together. It shows:

- the variables used;
- the expected relationship with the private-public wage gap, i.e. if the wage gap is higher (less negative) the Trust faces more pressure from the private market and it will have more difficulty in recruitment and retention. This would imply a higher agency spend (positive) and a less satisfied workforce (negative);
- the relationship found in the data, which may or may not reflect expectations; and
- the proportion of variation explained (R-squared), i.e. a measure of how well the wage gap describes the total variation in the analysed variable.

- agency spend;
- bank usage;
- Recruitment and Retention Premia;
- potential informal recruitment measures (i.e. mix of staff used to deliver services);
- staff satisfaction;
- vacancies, and
- churn.
Table 15. Univariate (correlation) analysis – summary of results

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to…</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agency spend</strong></td>
<td>(1) agency spend as % of total staffing costs</td>
<td>+</td>
<td>+ 0.06%</td>
<td>0.05%</td>
</tr>
<tr>
<td></td>
<td>(2) other-staff costs as % of total staffing costs</td>
<td>+</td>
<td>+ 0.2%</td>
<td>0.21%</td>
</tr>
<tr>
<td><strong>Bank usage</strong></td>
<td>Bank total earnings as % of all assignments to total earnings (nurses)</td>
<td>+</td>
<td>+ 0.01%</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>RRP</strong></td>
<td>WTE with RRP as % of total WTE</td>
<td>+</td>
<td>+ 0.7%*</td>
<td>1.64%</td>
</tr>
<tr>
<td><strong>Potential informal recruitment measures</strong></td>
<td>(1) average pay band (nurses)</td>
<td>+</td>
<td>- 0.007</td>
<td>0.16%</td>
</tr>
<tr>
<td></td>
<td>(2) average pay point (nurses)</td>
<td>+</td>
<td>- 0.08</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Staff satisfaction</strong></td>
<td>Summary of five questions on support felt by staff, as % of agreeing staff</td>
<td>-</td>
<td>- 0.4%*</td>
<td>0.91%</td>
</tr>
<tr>
<td><strong>Vacancies</strong></td>
<td>(1) number of adverts per FTE position (nurses)</td>
<td>+</td>
<td>- 0.006</td>
<td>0.14%</td>
</tr>
<tr>
<td></td>
<td>(2) number of applications per advert (nurses)</td>
<td>-</td>
<td>+ 0.83**</td>
<td>1.4%</td>
</tr>
<tr>
<td><strong>Churn</strong></td>
<td>Stability of workforce</td>
<td>-</td>
<td>- 0.7%***</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

From these results it is hard to conclude that the private-public wage gap is an important driver of recruitment and retention. In fact:

Quantitative analysis
A few of the variables analysed do not show the expected direction in their relationship with the private-public wage gap.

In the cases in which the relationship is of the expected sign, it is rarely statistically different from zero. This means that we cannot confidently say that there is a relationship at all.

Of those statistically significant, turnover is the measure which shows the best correlation with the wage gap. However even in this case the effect is modest: a £1 increase in nurses’ pay, equivalent to a 6% pay rise (which, keeping everything else constant would lower the pressure Trusts face by the private market) is associated with an increase in stability of the workforce by 0.7%.

A detailed analysis of the correlation between each recruitment and retention measure and the private-public wage gap is presented below.

**Agency spend**

Assuming the private-public wage gap is an important driver of recruitment and retention, we would expect a positive relationship with the use of agency staff. In general we expect that the stronger the private sector competition in the area, the more Trusts will have to rely on agency staff. However, **Figure 26** and **Figure 27** below show that such correlation is very weak and not statistically significant different from zero.

This is true using two different measures of agency spend:

- “agency spend” as a percentage of total staffing costs. This analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in **Figure 26**) is associated with a reduction in agency spend by 0.06%. However note that this result is statistically insignificant.

- “other staff cost” as a percentage of total staffing costs. This analysis suggests that a £1 increase in nurses’ pay is associated with a reduction in agency spend by 0.2%. However note that this result is statistically insignificant.

**Table 16** summarises these results.
Figure 26. Scatterplot of pay gap against agency spend, as a percentage of total staffing costs

Source: Frontier analysis of data from Trust Financial Returns, Monitor and Annual Survey of Hours and Earnings data (ONS) for 2011-13
Table 16. Summary of results of the correlation between the pay gap and agency spend measures

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to…</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) agency spend as % of total staffing costs</td>
<td>+</td>
<td>+ 0.06%</td>
<td>0.05%</td>
<td></td>
</tr>
<tr>
<td>(2) other-staff costs as % of total staffing costs</td>
<td>+</td>
<td>+ 0.2%</td>
<td>0.21%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from Trust Financial Returns, Monitor and Annual Survey of Hours and Earnings data (ONS) for 2011-13
Bank usage

Assuming the private-public wage gap is an important driver of recruitment and retention, we would expect a positive relationship with the use of bank staff. In general we expect that the stronger the private sector competition in the area, the more Trusts will have to rely on bank staff. However, similarly to the use of agency staff, Figure 28 below, shows that such correlation is very weak and not statistically significant different from zero. In this case we could conclude that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 28) is associated with a reduction in bank usage by 0.01%. However note that this result is also statistically insignificant.

Table 17 summarises these results.

Figure 28. Scatterplot of pay gap against bank total earnings, as a percentage of all assignments total earnings – nurses and midwives

Source: Frontier analysis of data from Trust Financial Returns, Monitor and Annual Survey of Hours and Earnings data (ONS) for 2011-13
Recruitment and Retention Premia

Assuming the private-public wage gap is an important driver of recruitment and retention, we would expect a positive relationship with the use of RRP. In general we expect that the stronger the private sector competition in the area, the more Trusts will have to use RRP. However, Figure 29 shows that such correlation is very weak. A £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 29) is associated with a reduction in RRP usage by 0.07%. This result is statistically significant at the 10% level. Table 18 summarises these results.

Table 17. Summary of results of the correlation between the pay gap and bank usage measures

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to...</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank usage</td>
<td>Bank total earnings as % of all assignments tot earnings (nurses)</td>
<td>+</td>
<td>+ 0.01%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from Trust Financial Returns and Monitor and Annual Survey of Hours and Earnings data (ONS) for 2011-13

Quantitative analysis
Figure 29. Scatterplot of pay gap against Full Time Equivalent employees with RRPs as a percentage of total FTEs

![Scatterplot of pay gap against Full Time Equivalent employees with RRPs as a percentage of total FTEs](image)

Source: Frontier analysis of data from ESR and Annual Survey of Hours and Earnings data (ONS) for 2011-13

Table 18. Summary of results of the correlation between the pay gap and RRP measures

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to...</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRP</td>
<td>WTE with RRP as % of total WTE</td>
<td>+</td>
<td>+ 0.7%*</td>
<td>1.64%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from ESR and Annual Survey of Hours and Earnings data (ONS) for 2011-13

**Potential informal recruitment measures**

Assuming the private-public wage gap is an important driver of recruitment and retention, we would expect a positive relationship with the use of informal

Quantitative analysis
recruitment procedures (grade mix). In general we expect that the stronger the private sector competition in the area, the more Trusts will need to adjust upwards the grades attached to jobs. However, Figure 30 and Figure 31 show that such correlation is very weak, not statistically significant different from zero, and going in the opposite to the expected direction.

This is consistently true using two different measures of potential informal recruitment measures:

- “average pay point for nurses”. This analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 30) is associated with an increase in the average pay point by 0.007%. However note that this result is statistically insignificant.

- “average pay band for nurses”. This analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 31) is associated with an increase in average pay band by 0.08. However note that this result is statistically insignificant.

Table 19 summarises these results.
Figure 30. Scatterplot of pay gap against average pay band – nurses

Source: Frontier analysis of data from ESR and Annual Survey of Hours and Earnings data (ONS) for 2011-13
Figure 31. Scatterplot of pay gap against average pay point – nurses

Source: Frontier analysis of data from ESR and Annual Survey of Hours and Earnings data (ONS) for 2011-13

Table 19. Summary of results of the correlation between the pay gap and potential informal recruitment measures

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to…</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential informal recruitment measures</td>
<td>(1) average pay band (nurses)</td>
<td>+</td>
<td>- 0.007</td>
<td>0.16%</td>
</tr>
<tr>
<td></td>
<td>(2) average pay point (nurses)</td>
<td>+</td>
<td>- 0.08</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from ESR and Annual Survey of Hours and Earnings data (ONS) for 2011-13
**Staff satisfaction**

Assuming the private-public wage gap is an important driver of recruitment and retention, we would expect a negative relationship with staff satisfaction. In general we expect that the stronger the private sector competition in the area, the fewer employees will be satisfied with their occupation. However, Figure 32 shows that such correlation is very weak. Our analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 32) is associated with an increase in the satisfaction measure by 0.4%. This result is significant at the 10% level. **Table 20** below summarises these results.
Figure 32. Scatterplot of pay gap against agreement to five questions on support

Table 20. Summary of results of the correlation between the pay gap and staff satisfaction measures

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to...</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff satisfaction</td>
<td>Summary of five questions on support felt by staff, as % of agreeing staff</td>
<td>- 0.4%*</td>
<td>0.91%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from NHS Staff Satisfaction Survey and Annual Survey of Hours and Earnings data (ONS) for 2011-13
Vacancies

Assuming the private–public wage gap is an important driver of recruitment and retention, we would expect a positive relationship with the number of adverts per full time equivalent employee and a negative relationship with the number of applications per advert. In general we expect that the stronger the private sector competition in the area, the more Trusts will have to advertise for open positions and the less people will apply for those positions. However, Figure 33 and Figure 34 show that such correlation is very weak, not statistically significant different from zero, and going in the opposite direction of expectations. As mentioned, we analysed two variables:

- “number of adverts per full time equivalent”. This analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 33) is associated with an increase in the number of adverts by 0.006. However note that this result is statistically insignificant.

- “number of applications per advert”. This analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 34) is associated with a decrease in the number of applications per advert by 0.83. However note that this result is statistically insignificant.

Table 21 summarises these results.
Figure 33. Scatterplot of pay gap against number of adverts per FTE

Source: Frontier analysis of data from NHS Jobs and Annual Survey of Hours and Earnings data (ONS) for 2011-13
**Figure 34.** Scatterplot of pay gap against number of applications per advert

![Scatterplot of pay gap against number of applications per advert](image)

Source: Frontier analysis of data from NHS Jobs and Annual Survey of Hours and Earnings data (ONS) for 2011-13

**Table 21.** Summary of results of the correlation between the pay gap and vacancy measures

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to...</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacancies</td>
<td>(1) number of adverts per FTE position (nurses)</td>
<td>+</td>
<td>- 0.006</td>
<td>0.14%</td>
</tr>
<tr>
<td></td>
<td>(2) number of applications per advert (nurses)</td>
<td>-</td>
<td>+ 0.83**</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from NHS Jobs and Annual Survey of Hours and Earnings data (ONS) for 2011-13

**Quantitative analysis**
**Churn**

Assuming the private-public wage gap is an important driver of recruitment and retention, we would expect a negative relationship with the stability of the workforce (higher churn). In general we expect that the stronger the private sector competition in the area, the more Trusts will face lower stability of their workforce. Figure 35 below shows that such correlation is confirmed in the data, however it is small. In fact, our analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 35) is associated with an increase in the stability index by 0.7%. This result is significant at the 1% level. Table 22 summarises these results.

**Figure 35. Scatterplot of pay gap against the stability index**

Source: Frontier analysis of data from ESR and Annual Survey of Hours and Earnings data (ONS) for 2011-13
Table 22. Summary of results of the correlation between the pay gap and churn measures

<table>
<thead>
<tr>
<th>Recruitment and retention measure</th>
<th>Variable analysed</th>
<th>Expected relationship</th>
<th>£1 decrease in public sector pay leads to…</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Churn</td>
<td>Stability of workforce</td>
<td>-</td>
<td>- 0.7%***</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from ESR and Annual Survey of Hours and Earnings data (ONS) for 2011-13

5.4.2 Multivariate analysis

The correlations between the different indicators are fairly weak. Trusts with high churn do not have particularly high usage of agency staff, RRP usage or low satisfaction. This can be seen in the correlation matrix below, Figure 36.

Figure 36. Correlation matrix for the measures of recruitment and retention analysed

<table>
<thead>
<tr>
<th></th>
<th>Agency</th>
<th>Other staff</th>
<th>Bank</th>
<th>RRP</th>
<th>Avg pay band</th>
<th>Avg pay point</th>
<th>Ads / WTE</th>
<th>Apps / WTE</th>
<th>Stability</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other staff</td>
<td>0.38</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank</td>
<td>0.18</td>
<td>0.19</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRP</td>
<td>0.17</td>
<td>0.13</td>
<td>0.15</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg pay band</td>
<td>0.22</td>
<td>0.19</td>
<td>0.22</td>
<td>0.02</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg pay point</td>
<td>0.03</td>
<td>-0.06</td>
<td>0.08</td>
<td>-0.01</td>
<td>0.83</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ads / WTE</td>
<td>0.06</td>
<td>0.14</td>
<td>0.13</td>
<td>-0.03</td>
<td>0.15</td>
<td>0.05</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apps / WTE</td>
<td>0</td>
<td>-0.07</td>
<td>-0.05</td>
<td>-0.08</td>
<td>-0.14</td>
<td>-0.07</td>
<td>-0.4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stability</td>
<td>-0.26</td>
<td>-0.14</td>
<td>-0.17</td>
<td>-0.17</td>
<td>-0.49</td>
<td>-0.44</td>
<td>-0.08</td>
<td>0.03</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>0.1</td>
<td>-0.06</td>
<td>0.09</td>
<td>-0.11</td>
<td>-0.07</td>
<td>-0.17</td>
<td>0.03</td>
<td>0.11</td>
<td>0.26</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from Trust Financial Returns and Monitor, ESR, NHS Staff Satisfaction Survey, NHS Jobs, and Annual Survey of Hours and Earnings data (ONS) for 2011-13

This lack of correlation means that one variable captures little information about the other indicators. This makes it difficult to characterise “having recruitment and retention problems”, as this actually refers to a very wide range of different outcomes. As a result, looking at one indicator in isolation may be problematic, as we may be ignoring a diverse set of potential responses to recruitment and retention difficulties.

The relationships between many of the variables analysed and the private-public pay gap are relatively weak. Overall, there is little impact on any one variable, and the pay gap explains only a very small proportion of the variation. However, this

Quantitative analysis
could be because different providers might respond to a pay gap in different ways: some providers might use RRP, some might increase use of agency staff, whilst others may experience greater churn. This sort of heterogeneous response might understate the extent of any relationship between the pay gap and overall recruitment and retention outcomes. In this section, we explore how an overall measure of recruitment and retention outcomes can be derived, and if the relationship with the pay gap is stronger than suggested by univariate analysis.

**Forming a recruitment and retention index**

The simplest way to integrate these different response variables is to standardise them with mean of 0 and standard deviation of 1, give them equal weightings and add them up. Some variables are naturally grouped. For example, variables covering agency use, other staff costs and bank use were all analysed, although they all overlap to an extent in what they measure. How many of these get included in the index will affect the overall weights. Using this approach, it is important to give the variables the correct sign so that ‘good’ variables (e.g. stability, satisfaction) enter positively, whilst the ‘bad’ variables (e.g. vacancies, agency usage) enter negatively.

Such an index will measure the overall recruitment and retention outcome over a number of different dimensions. The hypothesis being tested is that the private-public pay gap affects recruitment and retention outcomes generally, but the channel of impact can vary by provider. For some providers, recruitment and retention difficulty will manifest itself in greater churn, whereas others will respond through increasing agency usage or use of RRP.

Four alternative indices have been used:

- **Standardized index (10 variables).** This uses each of the 10 variables: agency spend; other staff costs; bank total earnings; WTE with RRP as % of total WTE; average pay band; average pay point; summary of five questions on support felt by staff; adverts per FTE position; applications per advert; and stability of workforce. The variables are each standardised (mean = 0, standard deviation = 1) and summed.

- **Standardized index (4 variables).** As above, but restricted to 4 variables: stability, satisfaction measure, agency spend, advertisements per FTE. These variables are intended to capture distinct aspects of the recruitment and retention outcome, without duplicating each other.

- **Factor analysis.** This is a technique used to explain a number of observed correlated variables with a smaller number of unobserved variables (‘factors’). Rather than using arbitrary weightings, they are derived empirically, reflecting their overall correlation in the data.
Quantitative analysis

- **Quartile score index.** This approach assigns, for each variable, a score from 1-4 to a provider depending on which quartile they appear in. This approach reduces the impact of outliers.

**Results**

The coefficients, statistical significance and R-squared are shown in Table 23 below. Each of the indices has a statistically significant relationship with the private-public pay gap in the direction hypothesized. That is, we find that in locations where pay in the NHS is lower relative to the comparator occupations, providers experience greater difficulty recruiting and retaining staff.

**Table 23. Impacts of pay gap on recruitment and retention index**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Coefficient</th>
<th>% of variation explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index of 10 variables</td>
<td>0.47*</td>
<td>1.4%</td>
</tr>
<tr>
<td>Index of 4 variables</td>
<td>0.31***</td>
<td>2.1%</td>
</tr>
<tr>
<td>Factor index</td>
<td>0.17***</td>
<td>3.2%</td>
</tr>
<tr>
<td>Quartile index</td>
<td>0.60***</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from Trust Financial Returns and Monitor, ESR, NHS Staff Satisfaction Survey, NHS Jobs and ASHE (ONS)

Using this approach we find greater evidence that relative pay leads to an impact on recruitment and retention. Specifically, the impacts are more statistically significant and are somewhat larger than when estimated in the univariate regressions. This suggests that there is some ‘waterbedding’ occurring i.e. overall impacts occurring, but through different channels for different providers. However, it should be noted that these impacts are not large; a change in the pay gap will not produce an appreciably large change in outcomes.

This analysis suggests two important messages:

- Pay is only one driver of recruitment and retention outcomes. Many other factors are also likely to be important.

- The variation in recruitment and retention experienced at a local level is very wide. The role of any centralised system of pay is likely to be limited in the extent to which it can address local recruitment and retention issues.

These findings together imply that changes to the centralised system of HCAS payments would be a relatively ineffective and inefficient way of addressing any localised recruitment and retention problems.
**Index of 10 variables**

This index incorporates the 10 variables analysed earlier. The relationship of this index to the pay gap is shown in Figure 37. A £1 increase in nurses’ pay relative to the comparator group is associated with a 0.47 point increase in the index, i.e. an increase of 0.47 standard deviations from across the 10 variables. Such an increase might come about through: +2.9% pts stability, +1.8% pts satisfaction, -2.4% pts use of RRP, -1.2% pts use of agency, -2.8% points use of bank, 0.5 reduction in pay point, etc… or some combination of these impacts.

**Figure 37. Scatterplot of pay gap against index of 10 outcome variables**

![Scatterplot of pay gap against index of 10 outcome variables](image)

Source: Frontier analysis of data from Trust Financial Returns and Monitor, ESR, NHS Staff Satisfaction Survey, NHS Jobs and ASHE (ONS)

**Index of 4 variables**

Arguably, some of the 10 variables used above overlap considerably, so that there is duplication giving some undue weight. So, next we take a selection of variables that cover different aspects of the recruitment and retention outcome. The index of 4 incorporates agency use, vacancies advertised, satisfaction and stability, equally weighted. The relationship of this index to the pay gap is shown in Figure 38. A £1 increase in nurses’ pay relative to comparators is associated with an increase of 0.3 standard deviations from across the 4 variables. This could
come through 1.9% point reduction in churn, 0.12 fewer adverts per FTE, a 0.8% reduction in agency spend.

**Figure 38. Scatterplot of pay gap against index of 4 outcome variables**

![Scatterplot of pay gap against index of 4 outcome variables](image)

Source: Frontier analysis of data from Trust Financial Returns and Monitor, ESR, NHS Staff Satisfaction Survey, NHS Jobs and ASHE (ONS)

**Factor index**

Factor analysis can be used to explain a number of correlated observed variables with a smaller number of unobserved factors. For example, there might be some underlying property of recruitment and retention outcome that is then manifested through the various indicators we observe. We find a significant relationship between the factor index and the pay gap. The relationship of the factor index with the pay gap is shown in **Figure 39**. A £1 increase in nurses’ pay relative to the comparator group is associated with a 0.18 standard deviation change in the index.
The appropriateness of this technique depends on how easily these variables can reduce down into a single measure. In this case we find the variables to be fairly unrelated, so that it is not meaningful to derive a single recruitment and retention measure empirically.

**Quartile index**

For each variable, this approach assigns a score of 1-4 depending in which quartile a provider appears in. The following 4 variables are considered: agency spend, stability, satisfaction, and adverts per WTE. The scores for each variable are added together, so the overall score could range from 4 to 16. The relationship of the quartile index with the pay gap is shown in **Figure 40**. An increase in score of 1 point means a provider moves up one quartile in one of the variables. A £1 increase in nurses’ pay relative to comparator changes the quartile index by 0.59.
5.4.3 Focusing on specific types of Trusts

One possible explanation for the poor correlation between the selected measures of recruitment and retention and the private-public wage gap is the fact that we have been using the sample including all NHS Trusts in England together. However it is possible that the impact differs across types of Trust, and that they respond differently to recruitment and retention difficulties. We considered separately: Acute Specialist and Teaching Trusts (ASTTs), Small Acute Trusts (SMAs), Large and Medium Acute Trusts (LMATs), and Other Trusts (OTH).

When focusing on specific Trust types, a few correlations seem stronger. For example, as Figure 41 shows, the stability index – measuring the churn of staff Trusts experience – for ASTTs is slightly more negatively correlated with the private-public wage gap. In this case, a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 41) is associated with an increase in the stability index by 1%. This result is significant at the 1% level.
Similarly, Figure 42 shows how agency spend and the private-public wage gap are more strongly correlated when focusing on LMATs. In fact here our analysis suggests that a £1 increase in nurses’ pay (which, keeping everything else constant would move us one unit to the left in Figure 42) is associated with a reduction in the agency spend by 0.5%.

However these results are not confirmed consistently across the spectrum of variables and for the different Trusts’ groups.
**Figure 42.** Scatterplot of pay gap against other staff costs, as a percentage of total staffing costs – Large and Medium Acute Trusts

The relationship between the various recruitment and retention indices and the pay gap was analysed for different types of Trust. This is shown in Table 24.
Table 24. Relationship of recruitment and retention indices with pay gap for specific Trust types

<table>
<thead>
<tr>
<th>Trust type</th>
<th>Index of 10</th>
<th></th>
<th></th>
<th>Factor index</th>
<th></th>
<th>Quartile index</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff</td>
<td>$R^2$</td>
<td>Coeff</td>
<td>$R^2$</td>
<td>Coeff</td>
<td>$R^2$</td>
<td>Coeff</td>
</tr>
<tr>
<td>Large / medium</td>
<td>0.83**</td>
<td>0.06</td>
<td>0.27</td>
<td>0.03</td>
<td>0.18**</td>
<td>0.07</td>
<td>0.7**</td>
</tr>
<tr>
<td>Specialist / teaching</td>
<td>1.07**</td>
<td>0.07</td>
<td>0.26</td>
<td>0.03</td>
<td>0.37*</td>
<td>0.13</td>
<td>0.67</td>
</tr>
<tr>
<td>Small</td>
<td>-0.47</td>
<td>0.02</td>
<td>0.1</td>
<td>0.00</td>
<td>-0.03</td>
<td>0.00</td>
<td>-0.02</td>
</tr>
<tr>
<td>Other</td>
<td>0.54</td>
<td>0.02</td>
<td>0.5**</td>
<td>0.04</td>
<td>0.3***</td>
<td>0.14</td>
<td>0.76***</td>
</tr>
</tbody>
</table>

Source: Frontier analysis of data from Trust Financial Returns and Monitor, ESR, NHS Staff Satisfaction Survey, NHS Jobs and ASHE (ONS)

In general, we see that relationships are strong and significant for large and medium acute and other Trusts, and insignificant or negative for small acute Trusts. The results are sensitive to which index is used. The low R-squared indicates that only a small amount of variation in recruitment and retention outcomes is explained by pay; the rest will be due to non-pay or institutional factors. Note that by cutting the sample into smaller groups, there is greater scope for outliers to affect the results.

5.5 Limitations of the analysis

Three main limitations are worth noting with respect to the analysis performed.

First, the analysis focuses on nurses. The main reason for this is data availability. A key element of our analysis is the private-public wage gap. To construct this index we retrieved average wages of nurses and their comparator group for each geographical area. In order for our analysis to be precise, we used the NUT3 geographical division, which divides England in 99 regions. Sample sizes within each region would not be big enough to allow us to repeat the same analysis for other groups within Agenda for Change. However we also note that nurses represent the largest group of staff within Agenda for Change. If changes to HCAS are not considered appropriate for nursing staff, it would seem unlikely that they could be justified for all staff.

Second, at face value our results appear at odds with those mentioned in the literature review – especially with the literature by Elliott R. and Ma A. (2007, 2008, 2010). Ma et al (2008) find a positive and significant relationship between the wage gap and nursing vacancies. However, the coefficient they find is between 0.019 and 0.030 – i.e. an increase by one unit of their derived Standardised Spatial Wage Differential would increase nurses’ vacancies by 0.019-0.030 units. The magnitude of this result is modest, and on a similar scale to our results. Two additional points are worth mentioning when comparing our analysis to this body of literature:

- To measure difficulties in recruitment and retention we looked at a range of different variables; from agency spend to staff satisfaction, from vacancies to churn, from RRP usage to potential informal recruitment measures. This approach allowed us to paint an overall picture and capture the wide set of effects which could take place. Ma et al (2008) only looked at vacancy data. Our approach is intended to capture a wider range of effects than those investigated by Ma et al.

- To create the private-public wage gap we considered a narrow comparator group to nurses. We wanted to select jobs nurses are likely to go to or come from as comparator to NHS nurses. On the other hand, Ma et al (2008) used wider comparator groups – economy wide, SOC2 (professional occupations) and SOC3 (associate professional and technical occupations). Our approach is more tailored to the actual decisions that nurses are likely to make.

Third, any empirical analysis relies on the quality of the data underlying it. We used two main data sources: ASHE and data from NHS Trusts. First note that the timing and sampling of these data sources may not perfectly align. Then, note that the NHS data relies directly on each Trust filling in the data for their organisation. In light of that it is worth noting that:

- Some Trusts may not use all of the data sources we looked at. For example, the vacancy data we have comes from the portal NHS Jobs. Although we know the vast majority of Trusts publishes all their vacancies on the portal, we are not confident in saying that the sample is fully comprehensive.

- There may be some inconsistency in how Trusts compile the data. A few examples of this are:
  - Compilation mistakes. We are confident that the vast majority of Trusts interprets the “vacancy form” consistently but some mistakes might have occurred, i.e. instead of signing up 1 full time equivalent employee required, filling in “35” in reference of the hours per week required.
Different choices in using the technology producing the data. Different Trusts make different choices in using the NHS Jobs portal. Some organisations will choose to post more adverts with a shorter length. While others might use more generic nurse job adverts and keep them running almost constantly rather than repeatedly advertising specific roles. These two choices would imply a higher and a lower adverts per FTE ratio respectively.

- Some Trusts may record their data differently from others. For example, some Trusts may interpret the definition of “Agency staff” and “Other non-permanently employed staff” slightly differently from each other.

- Some data might be distorted by organisational restructurings. Starter and Leaver NHS rates may be significantly artificially distorted by events such as mergers, demergers, and redundancies.

These data issues suggest that there could be significant value in creating a more robust and reliable set of data looking at NHS vacancies. At a minimum, enforcing consistent standards in how NHS Jobs data is recorded would allow a more confident assessment of the recruitment and retention issues faced by NHS Trusts.
6 Conclusions and future work

Based on the analysis we have undertaken, we have reached three main findings:

1. There is **no strong evidence** that Trusts in areas with lower relative pay – after the application of current HCAS payments – consistently experience higher staff turnover, more vacancies or use of agency staff. Variation in recruitment and retention is wide and not well explained by local wage differentials.

2. There is **some evidence** that Trusts experience a more general impact of relative pay on recruitment and retention. This relationship is more apparent when considering a combination of recruitment and retention measures. The impact may occur through different channels for different providers, and local responses to these problems vary widely between Trusts.

We note that there is significant variation in recruitment and retention experienced by NHS providers. Very little of this variation can be explained by the gap between public and private pay. This implies that non-pay factors – which were beyond the scope of this work – are likely to play a significant role in determining NHS recruitment and retention.

Based on the above findings, and taking all of our analysis into account:

3. There is no strong evidence to suggest that local recruitment and retention issues could be systematically improved by refinement to the current HCAS system. To the extent that pay (rather than non-pay factors) is an important driver, greater use of local flexibility may be preferable to greater complexity of the centralised system. Therefore we **do not recommend any changes to the current HCAS system**.

These findings and the limitations posed by data and time for this work suggest where future analysis and evidence could make a valuable contribution to future discussion about pay. In particular it would be useful to:

- gather more systematic evidence about the use of RRP, including any constraints that might exist in its use to address local recruitment and retention issues;
- collect evidence that would allow a better understanding of **whether the conclusions in this report extend to professions** outside nursing (where data limitations constrained what could be done for this report); and
- develop of the evidence base about the use and effectiveness of non-pay elements of compensation, and their future role.

Following up on these areas would allow the NHS Staff Council to engage with future discussions about HCAS and compensation more widely, armed with the evidence it needs.
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