Market forces factor review and proposed updates

Supporting documents

Supporting document A: Health Economics Research Unit, University of Aberdeen *The staff market forces factor component of the resource allocation weighted capitation formula: new estimates 2013-2015*

Supporting document B: The King's Fund. *Unavoidable costs: Approaches in other sectors and view of NHS Finance Directors*

Supporting document C: Frontier Economics. *Review of the market forces factor*

Please note: The views expressed in these reports are those of the independent research teams. They do not necessarily reflect the views of NHS Improvement and NHS England.

The research presented here was commissioned by NHS Improvement and NHS England to inform a review of the market forces factor. While the research makes a number of recommendations, it is for NHS Improvement and NHS England to determine which to adopt, or to consider additional options.

Please see the document *Market forces factor review and proposed updates* for details of the proposed changes to the MFF following this review.

Supporting document A

The staff market forces factor component of the resource allocation weighted capitation formula: new estimates 2013-2015

Health Economics Research Unit, University of Aberdeen

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HERU

HEALTH ECONOMICS RESEARCH UNIT

Promoting Excellence in Health Economics

Final Report to NHS Improvement and NHS England

THE STAFF MARKET FORCES FACTOR COMPONENT OF THE RESOURCE ALLOCATION WEIGHTED CAPITATION FORMULA: NEW ESTIMATES 2013-2015

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Acknowledgements

CONTENTS

SUMMARY

Part A

- New values for the Staff MFF are estimated using the latest and most robust earnings data available for Great Britain. They are detailed in this report.

- The new values are estimated using the current method; the General Labour Market method.

- The earnings data comes from the Annual Survey of Hours and Earnings (ASHE) produced by the Office for National Statistics. The latest available is for the three years 2013 -2015.

- The General Labour Market method:

    o Uses data on private sector earnings from ASHE and weights the observations using the ASHE population weights
    o Pools the observations over three years
    o Uses the new Clinical Commissioning Group (CCG) geography
    o Includes part-timers
    o Includes City of London employees
    o Includes an adjustment for job responsibility

    At the final stage it involves Smoothing and Interpolation

    o Smoothing the raw MFFs using a method that takes into account distance from all CCGs
    o Interpolating to reflect the location of the provider site

- Data for the period 2013 - 2015 include provisional 2015 data and may therefore be subject to amendments.

- The Staff MFFs are found by estimating Standardised Spatial Wage Differentials (SSWDs). SSWDs reveal what employers in different areas of England need to pay to attract and retain employees to work in that area. They are found by controlling for the many factors – the industries and occupations in which employees work, their age, gender and experience – that we know explain differences in pay between employees in different areas.

- The precision with which the SSWDs are estimated will depend on the sample numbers in ASHE while the CCG geography used to define the different areas can result in sharp

discontinuities between SSWDs in adjoining areas. The method of Smoothing is employed to address these two problems. Smoothing reduces differences in the Staff MFF between CCG areas.

- Interpolation then attributes the smoothed SSWDs to the Hospital Trusts sites

Part B
- Compares the new values for the Staff MFF to the values when the MFF was last estimated
- Reports the changes in Staff MFF values attributed to Hospital Trusts

Part C
- Uses Local Authority District geography which exists within ASHE for the period 2007-2009 to 2013-15 to compare changes in the patterns of SSWDs over this period.
- Reports those LADs with the largest changes in the Staff MFF

Part D
- Compares the changes in the Staff MFF that result from the current estimates with the changes that resulted the last time the Staff MFF was estimated

Part E
- Provides overall conclusions

PART A

NEW VALUES FOR THE STAFF MFF

1: INTRODUCTION

A Weighted Capitation Formula is used to determine target shares of available resources required to provide healthcare services between health geographies based on the relative healthcare needs of the population in the area served by each Trust. Within this formula the Market Forces Factor (MFF) compensates for unavoidable geographical differences in the cost of providing these healthcare services.

The MFF is used in both revenue allocations and Payment by Results (PbR) to compensate for unavoidable differences faced by NHS organisations in the costs of commissioning or providing healthcare throughout England. The MFF is used to:

- o   weight population shares within the weighted capitation formula;
- o   calculate the reference costs index;
- o   calculate the national tariff and provider specific tariffs; and
- o   reimburse providers for their unavoidable costs.

The MFF comprises four elements, Staff costs are by far the largest single element. The Staff MFF is the focus of the research reported here. Under PbR the MFF is paid directly to Trusts in respect of the activity they carry out. The MFF, therefore, has a direct impact on NHS Trusts' income.

HERU has undertaken previous research into the Staff MFF using the General Labour Market (GLM) method. The earlier research recommended a new method for calculating the MFF and was published as HERU report *Review of the Market Forces Factor Following the Introduction of Payments by Results (2005): Exploring the General Labour Market Method* (HERU, 2006). Subsequently the method was used to generate a set of Staff MFFs using data for the period 2004 – 2006. This analysis was reported in May 2007 as a Technical Appendix to the above report. These reports were published in 2008 as *Resource Allocation Research Paper No. 32* by Department of Health. The new method was adopted in almost all respects by the Advisory Committee on Resource Allocation (ACRA), see Section 5 of the *Report of the Advisory Committee on Resource Allocation*, Department of Health., December 2008.

A further update was produced by HERU using ASHE data from 2007-9 along with additional methodology considerations in a Report to ACRA titled *The Staff Market Forces Factor Component of the Resource Allocation Weighted Capitation Formula: new Estimates: Phase 1 (May 2010)* and Report to the Department of Health *The Staff Market Forces Factor Component of the Resource Allocation Weighted Capitation Formula: Refinements to the Method: Phase II (November 2010).* The research has also been reported and peer reviewed in *The Role Of The Staff MFF In Distributing NHS Funding: Taking Account Of Differences In Local Labour Market Conditions,* Robert Elliott Ada Ma, Matt Sutton, Diane Skatun, Nigel Rice, Stephen Morris and Alex McConnachie, *Health Economics*,19, 532-548, 2010.

HERU have been commissioned by NHS Improvement and NHS England to provide new Staff MFFs for CCGs and hospital trusts based on the latest data available from ONS and using the GLM approach. Part A reports the updated values of the Staff MFF. The new values are generated using data for the period 2013 - 2015.

2: THE CURRENT METHOD

The current method of calculating the Staff MFF uses the GLM approach. The final report on the GLM approach can be found in *Review of the Market Forces Factor Following the Introduction of Payment by Results (2005): Exploring the General Labour Market Method* (HERU, 2006). Following HERU's review of the GLM approach, ACRA recommended a series of data updates and formula changes, see Section 5 of the *Report of the Advisory Committee on Resource Allocation*, Department of Health, December 2008. These are set out below:

Data updates
- o Use data on the earnings of employees in the private sector recorded in ASHE and weight using the ASHE population weights
- o Pool the observations over three years
- o Use the new CCG (formerly PCT) geography

Formula Changes
- o Include part-timers
- o Include City of London employees
- o Include a job responsibility adjustment
- o Exclude doctors

Smoothing and Interpolation

- o Smooth the raw Staff MFFs using a method that takes into account distance from all CCGs
- o Interpolate to derive a Staff MFF for each provider site

Smoothing is achieved using an exponential distance decay function and precision weights, and values are attributed to Trusts using the same distance function and weights for labour market size. The precise form of the function was agreed after further discussion within ACRA.

The procedure required to produce values for the Staff MFF involves the following steps:
1. Pool the private sector observations using the last three years data available from the ASHE;
2. Estimate Standardised Spatial Wage Differentials (SSWDs);
3. Generate an adjustment, for higher responsibility from an ancillary equation using data from the Labour Force Survey;
4. Smooth the SSWDs and the higher responsibility adjustment, combine them and calculate the smoothed MFFs;
5. Attribute the smoothed MFF values to Trusts through interpolation.

The MFFs can be updated annually by repeating the above procedure, adding in the most recent year from ASHE and dropping the earliest year. The frequency with which the adjustment for higher responsibility is re-estimated is for discussion. Steps 2 to 5 above are described in more detail below.

Estimating SSWDs. The equation for generating the SSWDs can be written as:

$$\ln w_{ij} = x'\beta + v_j + \varepsilon_{ij} \qquad (1)$$

Where the dependent variable is the natural log of hourly wages, calculated by dividing the gross pay in the reference period by the sum of basic and overtime hours worked during the reference period (of individual i in area j). The sample is restricted to employees working in the private sector, aged 16 to 70, with no loss of pay[1] during the reference period. The latest three years of ASHE data are pooled, part-timers and City of London employees are included in the sample and population weights are applied in the estimation process.

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[1] The loss of pay marker in ASHE is used to ensure that the earnings used within the sample have not been affected by any absence. This aligns with the current methodology as reported in the relevant documentation cited above.

The explanatory variables as denoted by vector x' in equation (1) are gender, age, age-squared/100, and dummy variables for years, industries, occupations, and part-timers. The vector v denotes the geographical identifiers. The geographical identifiers provide the SSWDs, these are the coefficients on v, which in turn are used to generate the Staff MFFs. The Staff MFFs are found by taking the exponent of the estimated coefficients on the geographical identifiers. These are then 'effects coded' so that the figures are expressed as percentage values relative to the average in Britain, which is indexed at 100.

The industry dummies are specified using the first two digits of the Standard Industrial Classification 2007 (SIC 2007), which creates 88 industrial categories. The occupation dummies are specified using the first three digits of the Standard Occupational Classification 2010 (SOC 2010). This creates 90 occupational categories.

Though the purpose is to estimate the SSWDs for England, the earnings of employees working in Scotland and Wales are included in the estimation as the added observations improve the accuracy of the estimated coefficients on the variables used in the standardisation. The SSWDs for Scotland and Wales are also used in the smoothing process and are particularly important for English areas that are located on the Scottish and Welsh borders. For the purposes of this report, we only present the values for England.

Adjustment for Higher Responsibility. SSWDs are adjusted to account for the additional responsibility that is a feature of jobs in some areas of the country. Jobs in company headquarters are likely to have higher responsibility, and are likely concentrated in particular metropolitan areas of the country. This higher responsibility will result in higher wages for these jobs and in higher average wages in these areas but this is not controlled for in the initial estimation of the SSWDs because ASHE does not contain data to identify sufficiently job responsibility. An ancillary equation is therefore estimated using the Labour Force Survey (LFS) to estimate the impact of higher job responsibility. The adjustment is made at Government Office Region (GOR) level.

Smoothing Adjusted MFF values. The SSWDs which are the basis for the Staff MFF could be attributed directly to each Trust and CCG based solely on the geographical area in which they are located. However, there are three potential problems with this approach:

(i) The raw SSWDs are estimated from sample data and the level of precision of these estimates will depend upon sample numbers and varies across areas.

(ii) There may be sharp discontinuities between the SSWDs in adjoining areas reflecting the geography used to define the SSWDs rather than actual spatial wage variation.

(iii) There will be spatial variation in the value of SSWDs within as well as between areas, which the data do not allow us to distinguish.

Smoothing offers a solution to (i) and (ii), attribution or interpolation a solution to (iii).

The method employed to smooth average SSWDs across geographical areas is as follows. For any single area the smoothed SSWD is a function of its own SSWD and a weighted average of the SSWDs of all other areas. Other areas' SSWDs are weighted to reflect the influence they are judged to have on the index area.[2] As each area's SSWD affects the SSWDs in all other areas and vice versa, the weights are specified using a weight matrix. The weights depend on a number of parameters that control the degree of smoothing applied across areas (via a distance decay function), and the precision of the estimated SSWDs. We employ a *moving average* smoother:

$$S(SSWD_i) = \sum_{j=1}^{n} w_{ij} SSWD_j \qquad (2)$$

where $S(SSWD_i)$ represents the smoothed SSWD for the index area i. $SSWD_j$ is the raw standardised spatial wage differential for the *j-th* area and w_{ij} represents its corresponding weight in the calculation of $S(SSWD_i)$. Note that i is contained within j $(i \in j)$ so that an area's own raw SSWD contributes to the smoothed SSWD for that area. Accordingly, in general, all *n* areas contribute to the smoothed *SSWD* for area *i*. The weight, w_{ij}, attached to a specific area, will depend on the precision of the estimated raw SSWD and the distance of an area from the index area (area *i*).

The distances between areas are proxied by the distances between the centroids of the areas. The centroid of an area is the geometric centre or in this application the average location of private sector employees in the area. The distance decay function is assumed to be the inverse of the exponential of distance and accordingly areas at a greater distance from the index areas being smoothed are afforded less weight than areas close to the index area.

We further specify a smoothing parameter (c) that dampens the influence of distance in the distance decay function. The current method of calculating the MFF applies a smoothing parameter of c=0.1

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[2] The index area is the area undergoing smoothing.

and we continue to use this value. Weights are re-scaled such that the sum across all areas is unity $\left(\sum_{j=1}^{n} w_{ij} = 1 \quad \forall i \right)$, and the resulting smoothed values applied to the centroids. The form of this smoothing was defined in our previous reports and agreed by ACRA see for instance *Review of the Market Forces Factor Following the Introduction of Payments by Results (2005): Exploring the General Labour Market Method, Appendices to Final Report* (HERU, 2006).

Attributing the Smoothed SSWDS to Trusts. Attribution of an SSWD, and its resulting MFF, to a Trust *location* is based on interpolation. Interpolation follows a similar methodology to that used in smoothing. For smoothing the weights are calculated by the distances between the centroid of the index area and the centroids of all other areas. Centroids are based on the 'average' employer. For interpolation, it is the distance from each Trust's location to the centroids of all areas along with weights for labour market size. The precise form of the weighting function was defined after discussion with DH and was agreed by ACRA.

Geography

In the report, *Review of the Market Forces Factor Following the Introduction of Payment by Results (2005): Exploring the General Labour Market Method* (HERU, 2006) HERU recommended that Local Authority Districts (LADs) should be the geography underpinning the MFF. That report employed statistical analysis to distinguish between LADs, PCTs and Travel to Work Areas as the geography for the Staff MFF. LADs were identified to be the geography that best described the pattern of wages across local labour markets. An additional advantage of LAD geography over PCT geography was that there are a much greater number of geographical areas at LAD level than there are at PCT. This has an impact on the number and size of cliff-edges in the resulting analysis. We also argued that LAD geography tended to be more stable over time. ACRA recommended PCT geography to be used as it was the administrative unit that aligned directly with the health geography at the time.

Since the last MFF update, PCTs are no longer recorded in the ASHE dataset or employed in the NHS. NHS Improvement and NHS England have therefore requested the base unit of geography to be the clinical commissioning groups (CCGs) that replaced PCTs as the main health administrative geography in England.

3: RAW STAFF MFF

Summary statistics for the 'raw', or unsmoothed, Staff MFFs (sMFF) for the period 2013-2015 estimated by applying equation (1) above, using CCG geography and before the application of the

higher responsibility adjustment, are reported in Table 1 below. The full set is reported in the Technical Appendix, Table A1, column 1.

Table 1

Summary Statistics for the 'Raw' Staff MFFs for CCGs

	GLM 2013-2015 CCG
Mean	101.16
SD	8.80
Number of geographical areas (England)	209
10th Percentile	93.35
50th Percentile	98.58
90th Percentile	111.85
90-10 Percentile	18.50
Minimum	90.59
Maximum	144.15

4: THE IMPORTANCE OF STANDARDISATION

The method of constructing SSWDs controls for differences between areas in their industrial and occupational structure. Industry dummy variables capture (control for) any systematic differences in earnings between areas which can be attributed to differences in the industrial structure of areas. A set of occupational dummies also control for differences in earnings between areas that can be attributed to differences in the occupational structure of employment in different areas. Age and sex dummies similarly control for differences in these elements across areas that might otherwise impact on earnings. In order to compare the effect of these controls, or "standardising" elements of the SSWDs, we consider how the control variables explain variation in spatial wages by introducing the controls, sequentially.

Table 2 reveals the effects of standardising for the control variables. Column (1) reports 'Staff MFFs' which have been generated by taking the exponent of the coefficient on v_j, the geographical identifier, in the estimating equation, $\ln w_{ij} = v_j + \varepsilon_{ij}$, where this equation contains no additional controls. The MFFs reported in columns (2) to (4) have been generated by equations taking the form of (1) above which have progressively introduced a greater number of controls.

Table 2

The Effects of Standardisation, Staff MFFs for 2013 - 2015 (CCGs)

	(1)	(2)	(3)	(4)
	No control variables*	Age-Sex dummies added	Occupation dummies and part-timer dummy added	Full Set of Control Variables: Industry dummies added
Mean	103.28	103.06	101.15	101.16
SD	18.62	17.78	9.32	8.80
10th Percentile	89.08	88.69	92.84	93.35
50th Percentile	98.16	98.54	98.59	98.58
90th Percentile	124.45	125.69	112.21	111.85
90-10 Percentile	35.37	37.00	19.37	18.50
Minimum	76.40	79.70	89.63	90.59
Maximum	219.27	211.76	150.43	144.15
Adj. R^2	0.120	0.301	0.608	0.632

* Only year dummies are included

Introducing progressively more controls reduces the maximum values, increases the minimum values and reduces dispersion. It reveals that differences in the gender, occupational and industrial composition of the workforce together with the incidence of part-time working explain much of the spatial variation in wages. This is expected as the control variables explain variation in spatial wages. Among these controls, introducing the set of occupation dummies has the largest effect.

5: SMOOTHING AND INTERPOLATION: THE NEW STAFF MFF VALUES

While Tables 1 and 2 report summary statistics for the raw, or unsmoothed, MFFs, and the impact of the controls that are used to produce the raw MFFs it is the smoothed values of the raw sMFF (once they have been adjusted for Higher Responsibility) that constitute the Staff MFF. Table 3 presents the summary statistics of the smoothed sMFF for the period 2013-2015 by CCG, Column 1 reports the sMFF that is generated from the initial standardising regression (1). These are the raw, unadjusted and unsmoothed values already reported in Table 1. Column 2 reports the sMFF that are adjusted for Higher Responsibility using the auxiliary LFS regression[3]. These values remain unsmoothed. Column

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[3] There were 4 CCGs for which there was not a 1:1 mapping to a GOR, A weighted average of GOR values was assigned in these cases based on weighted population statistics created using ASHE data.

3 presents the summary statistics of the sMFF once smoothing has been applied to the Higher Responsibility adjusted sMFF.

Table 3
Summary Statistics for Estimated Staff MFFs for CCGs: 2013-2015

	(1)	(2)	(3)
	GLM 2013-2015	GLM 2013-2015 Adjusted for Higher responsibility	Smoothed (c=0.1)
Mean	101.16	100.84	102.13
SD	8.80	8.18	7.91
Number of geographical areas (England)	209	209	209
10th Percentile	93.35	93.50	95.33
50th Percentile	98.58	98.53	98.49
90th Percentile	111.85	111.68	114.89
90-10 Percentile	18.50	18.18	19.56
Minimum	90.59	90.54	91.50
Maximum	144.15	140.67	121.52

Adjusting for Higher Responsibility reduces the dispersion of the unsmoothed sMFF: the maximum value reduces, and both the SD and the 90-10 percentile range fall slightly. These small changes are as expected. The Higher Responsibility adjustments are calculated at the GOR level of geography resulting in a set of nine different adjustments which are then applied to the raw sMFF values. These adjustments have a small range with most very close to unity and are reported in the Technical Appendix Table B1. The full set of Higher Responsibility adjusted sMFF for CCGs is reported in the technical appendix, Table A1, column 2.

Smoothing the sMFF figures makes a more substantial difference to the raw results. There is now a large reduction in the maximum, while the SD falls slightly and the minimum increases slightly. Smoothing reduces the high sMFF values that are a feature of the City of London and some surrounding areas. The smoothed sMFF is a weighted average of all other sMFFs, and therefore it is expected that the process will 'smooth out' the extreme values. The full set of smoothed sMFF, along with their upper and lower confidence intervals are reported in the technical appendix, Table A1, column 3, 4 and 5.

At the final step the smoothed sMFFs are then interpolated to both Trust HQ and Trust sites using the full postcode in order to ensure that the smoothed sMFFs are allocated to the actual location of the provider site within the CCG area. The interpolated sMFF based on CCG geography are presented in the Technical Appendix, Tables A3 and A4. Column 1 in Table A3 reports the values for Trust HQs and Column 1 in Table A4 reports the values for Trust Sites. A full set of smoothed sMFF interpolated to postcode sectors has also been estimated. This means that an interpolated sMFF at the level of postcode sector can be allocated to a new Trust site if it is located in an area which does not have an interpolated value assigned to an existing hospital trust site. These values are not presented within this report.

6: CONCLUSIONS

The sMFF that currently compensates for unavoidable geographical differences in the cost of providing healthcare services was generated using data for 2007 – 2009. In this first Part of our report, Part A, we have detailed the current method and reported a new set of values for the sMFF for 2013-2015 using that method and using the current CCG geography. We have reported 'raw' sMFFs, revealed the importance of standardisation and reported smoothed sMFFs for CCGs. In a Technical Appendix to this report we have reported the full set of these smoothed sMFFs for CCGs and then reported the values when they have been interpolated to both Trust HQ and Trust sites. Finally we have generated the full set of sMFFs interpolated to postcode sectors to ensure that sMFFs can be allocated to any new Trust site.

1: INTRODUCTION

The second stage of the research compares the new with the previous values for the sMFF and investigates how the SSWDs have changed over the period since the sMFF was last estimated. When the SSWDs were last estimated using ASHE data for 2007-2009 and reported in *The Staff Market Forces Factor Component of the Resource Allocation Weighted Capitation Formula: new estimates: Phase 1(May 2010)* they used PCT geography. These are now compared the sMFF values estimated for 2013-2015 using CCG geography as reported in section A.

2: NEW AND PREVIOUS VALUES COMPARED

Table 4 presents the descriptive statistics of the new raw Staff MFFs generated for 2013-2015 using the CCG base geography alongside those produced for 2007-2009. We noted above that the previous estimates used PCT geography while the current estimates use CCG.

Table 4

Summary Statistics for New and Previous Values of the raw Staff MFFs[*]

	(1)	(2)
	GLM 2007 - 2009 PCT	GLM 2013-2015 CCG
Mean	102.11	101.16
SD	10.56	8.80
Number of geographical areas (England)	152	209
10th Percentile	92.90	93.35
50th Percentile	99.13	98.58
90th Percentile	114.98	111.85
90-10 Percentile	22.08	18.50
Minimum	89.80	90.59
Maximum	149.14	144.15

* sMFFs are unsmoothed and unadjusted

On the face of it there has been a narrowing in the dispersion of the 'raw' Staff SSWDs; the difference between the 90th and 10th Percentile has reduced and the Standard Deviation is smaller. The smaller

spread in the new estimates might not perhaps be expected with the smaller geographical areas that are covered by CCGs. There are 209 CCG areas compared to the previous 152 PCT areas. However because the underlying geographies are different, comparisons of the results are problematic. Just how much of the difference between the two sets of figures is due to changes in the dispersion of Staff MFFs over time and how much is due to the change in geography is not distinguished. At this stage it is therefore premature to attribute any significance to the observed differences in the means SDs and values at the percentiles. Furthermore both sets of MFFs are unsmoothed and no higher responsibility adjustments have been applied.

The raw values reported above are of course the result of standardisation. A comparison of the effects of standardisation of the raw Staff MFFs values when calculated for CCGs in 2013-2015 with those calculated using PCT geography for 2007-2009, reveals that the effects are very similar for the two geographies, see Table 5 below. As each new control is introduced the adjusted R^2 increases. In both cases the most substantial change occurs when the occupation and part-time dummies are introduced.

Table 5

Comparison of New and Previous Values Standardised

	PCTs for 2007-2009				CCGs for 2013-2015			
	No* control variables	Age-Sex dummies added	Occupation dummies and part-timer dummy added	Full Set of Control Variables: Industry dummies added	No* control variables	Age-Sex dummies added	Occupation dummies and part-timer dummy added	Full Set of Control Variables: Industry dummies added
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean	105.00	104.68	102.23	102.11	103.28	103.06	101.15	101.16
SD	21.57	20.24	11.27	10.56	18.62	17.78	9.32	8.80
CV	20.54	19.33	11.03	10.34				
10th Percentile	88.23	88.70	92.68	92.90	89.08	88.69	92.84	93.35
50th Percentile	100.58	100.49	99.16	99.13	98.16	98.54	98.59	98.58
90th Percentile	124.38	124.83	114.55	114.98	124.45	125.69	112.21	111.85
90-10 Percentile	36.15	36.13	21.87	22.08	35.37	37.00	19.37	18.50
Minimum	75.12	80.77	88.08	89.80	76.40	79.70	89.63	90.59
Maximum	228.82	219.07	156.11	149.14	219.27	211.76	150.43	144.15
Adj. R^2	0.122	0.316	0.619	0.637	0.120	0.301	0.608	0.632

* Only year dummies are included

The sMFF values are then adjusted for Higher Responsibility and smoothed. Table 6 presents the descriptive statistics of these new adjusted and smoothed Staff MFFs generated for 2013-2015 using the CCG base geography alongside those produced for 2007-2009 using the PCT geography.

Table 6

Table 6

Summary Statistics for New and Previous Values of the Staff MFFs

	(1)	(2)
	Smoothed 2007 - 2009 PCT	Smoothed 2013-2015 CCG
Mean	103.45	102.13
SD	10.29	7.91
Number of geographical areas (England)	152	209
10th Percentile	93.83	95.33
50th Percentile	98.61	98.49
90th Percentile	119.98	114.89
90-10 Percentile	26.15	19.56
Minimum	90.71	91.50
Maximum	126.87	121.52

Again there appears to have been a narrowing in the dispersion of sMFF. The SD is smaller, the maximum is smaller, the minimum has increased and accordingly the 90-10 percentile difference has reduced. Indeed the smoothed values reveal a greater narrowing than do the 'raw' values

3: CHANGES IN STAFF MFF VALUES FOR HOSPITAL TRUSTS

In 2007-2009 a total of 233 Trusts were attributed a sMFF of these 214 exist in 2013-2015, though two have since closed or their geographical location may have changed. Table 7 below shows the summary statistics of the changes in the sMFF that were attributed to these 214 Trusts between 2007-2009, when they were attributed on values estimated on PCT geography, and 2013-2015 when they were attributed on values estimated on CCG geography.

The Table reveals that on average the differences between the new and the old sMFF values for these 214 trusts are small. However an average value can conceal large differences in the values attributed to individual Trusts.

Table 7

Summary Statistics for Changes in Attributed Values of Staff MFF to Hospital Trust

	Absolute difference between MFF Values for Hospital Trusts (Mapped Trust HQs) (Percentage difference between PCT and CCG attributed values)
Mean	1.58
SD	1.34
Number of 2007/9 trusts mapped forward	214
10th Percentile	0.16
50th Percentile	1.16
90th Percentile	3.89
90-10 Percentile	3.73
Minimum	0.00
Maximum	8.49

We therefore explore further by isolating the 22 Trusts from among these 214 that experience the greatest changes in the values of their attributed sMFFs, and reported in Table 8. These correspond to the 90th percentile as reported in table 7. The trusts are anonymised. The largest change is a reduction of 8.49 percentage points, but this appears an outlier. Further analysis, as revealed by the different postcodes reported in columns (1) and (2) of Table 8 against this Trust, reveals that this is due to the Trust HQ moving location. None of the remaining Trusts in this table have had postcode changes. The differences noted may in part be due to differences in geographical coverage of the CCG compared to the PCT. However we note that all Trusts within this 90th percentile are located in or are contiguous to London and that all have a reduction in the value of the sMFF. Further all experience reductions of the order of 4 percentage points. This suggests systematic changes in the London labour market which have reduced geographical wage differences between London and the rest of the country over the period 2007 to 2015. While this is of considerable interest and potential importance it is an observation only and beyond the scope or remit of this research to investigate further.

Table 8: **Changes in Trust Attributed sMFFs (of those comparable): the 90th percentile**

Trust Name	(1) Postcode 2007-2009	(2) Postcode 2013-2015	(3) Absolute difference as percentage PCT-CCG	(4) Rank Absolute difference Percentage PCT-CCG	Government Office Region	(5) Direction of Change
*	XXX XXXX	YYY YYYY	8.49	1	South East	-
*	*	*	4.44	2	London	-
*	*	*	4.41	3	London	-
*	*	*	4.40	4	London	-
*	*	*	4.38	5	London	-
*	*	*	4.34	6	London	-
*	*	*	4.30	7	London	-
*	*	*	4.22	8	London	-
*	*	*	4.22	9	London	-
*	*	*	4.19	10	London	-
*	*	*	4.18	11	London	-
*	*	*	4.12	12	London	-
*	*	*	4.11	13	London	-
*	*	*	4.06	14	London	-
*	*	*	4.05	15	London	-
*	*	*	4.00	16	London	-
*	*	*	3.99	17	London	-
*	*	*	3.99	18	London	-
*	*	*	3.93	19	London	-
*	*	*	3.91	20	London	-
*	*	*	3.91	21	London	-
*	*	*	3.89	22	South East	-

4: CONCLUSIONS

A comparison of the new estimates of the sMFF with the previous estimates suggests a narrowing in the dispersion of sMFF values. Within this there are movements in values for individual Trusts. Furthermore, identification of the Trusts which will experience the biggest changes suggested there had been systematic changes in the London labour market which have reduced geographical wage differences between London and the rest of the country over the period 2007 to 2015. We noted that though of considerable interest and importance this is an observation only and investigating this particular aspect further was beyond the scope or remit of this research.

More generally we cannot say how much of the apparent narrowing in the dispersion of sMFFs is due to changes in the geography that has been used (CCGs in the new estimates, PCTs in the old) and how much is due to the passage of time (2013-2015 for the new, 2007-2009 for the old). In the next part of this report, Part C, we therefore seek to distinguish what part of the change may be due to the passage of time.

PART C

UNDERSTANDING THE DIFFERENCES: CHANGES IN THE STAFF MFF ON A 'COMMON' GEOGRAPHY

1: INTRODUCTION

In Part B we reported an apparent narrowing in the dispersion of sMFF values. We recognised we cannot say how much of this was due to changes in the geography employed and how much was due to the passage of time. Geography had changed as a result of the abolition of the PCTs, and therefore the new estimates were for CCGs. To distinguish the impact of the passage of time on the SMFF we need to be able to 'control' for the effect of the change in geography; we need to employ a common geography. Local Authority District (LAD) geographical areas have been recorded in ASHE throughout the period of interest to us here. In this part of the report we therefore employ this geography to distinguish the time element of the changes in the sMFF we have observed in Part B.

2: STAFF MFF ESTIMATES FOR 2013-2015 ON LAD GEOGRAPHY

Here we report estimates of values for the sMFF for the period 2013-2015 using the method outlined in Part A but using LAD instead of CCG geography. Table 9 presents the summary statistics for the unsmoothed sMFFs, the sMFFs adjusted for higher responsibility and the smoothed sMFFs. The full set is reported in the Technical Appendix, Table A2.

In Table 9 Column 1 reports the 'raw', or unsmoothed, MFFs for the period 2013-2015 estimated by applying equation (1) above, and before the Higher Responsibility adjustment. Column 2 reports the sMFF that are adjusted for Higher Responsibility using the auxiliary LFS regression. These values remain unsmoothed. Column 3 presents the summary statistics of the sMFF once smoothing has been applied to the Higher Responsibility adjusted sMFF. All are for LADs.

As we saw in Part A, when we estimated the sMFF using CCGs, adjusting for Higher Responsibility reduces the dispersion of the raw sMFF. The maximum value reduces, as does the SD and the 90-10 percentile range narrows slightly.

Table 9

Summary Statistics for Estimated Staff MFFs for LADs: 2013-2015

	(1)	(2)	(3)
	GLM 2013-2015	GLM 2013-2015 Adjusted for Higher responsibility	Smoothed (c=0.1)
Mean	100.84	100.69	101.80
SD	8.29	7.83	7.41
Number of geographical areas (England)	325	325	325
10th Percentile	93.13	93.38	95.17
50th Percentile	98.73	98.91	98.72
90th Percentile	110.84	110.46	113.90
90-10 Percentile	17.71	17.08	18.73
Minimum	88.94	89.17	90.42
Maximum	149.51	145.90	121.62

Smoothing the sMFF figures has a larger impact on the dispersion of the raw sMFFs than does the adjustment for Higher Responsibility as we saw before. The SD is further reduced, as is the maximum value, with the minimum value again increasing slightly. The full set of smoothed sMFFs, along with their upper and lower confidence intervals are reported in the Technical Appendix, Table A2, columns 3, 4 and 5.

Again the smoothed sMFF, on the LAD geography, can be interpolated to both Trust HQ and Trust sites using the full postcode in order to identify the actual location of the provider site within the LAD area. The interpolated sMFF based on LAD geography for 2013-2015 are reported in the Technical Appendix, where Table A3, column 4 is for Trust HQs and Table A4, column 4 is for Trust Sites. A full set of smoothed sMFF interpolated to postcode sectors has also been estimated. Again this ensures that all areas in England have an interpolated LAD based sMFF at the level of postcode sector. This allows a sMFF value to be allocated to any new trust site in a geographical location that does not have an existing hospital trust site and therefore an existing sMFF value.

3: COMPARING STAFF MFFs FOR LADs AND CCGs FOR 2013-2015

A comparison of the summary statistics for both the raw (columns (1) and (2)) and the smoothed values (columns (3) and (4)) of the sMFF on LAD and CCG geographies estimated using 2013-2015 data is presented in Table 10.

Table 10

Summary Statistics for Estimated Staff MFFs for CCGs and LADs: 2013-2015

	(1)	(2)	(3)	(4)
	CCG Geography GLM (no HR adjustment)	LAD Geography GLM (no HR adjustment)	CCG Geography Smoothed (c=0.1)	LAD Geography Smoothed (c=0.1)
Mean	101.16	100.84	102.13	101.80
SD	8.80	8.29	7.91	7.41
Number of geographical areas (England)	209	325	209	325
10th Percentile	93.35	93.13	95.33	95.17
50th Percentile	98.58	98.73	98.49	98.72
90th Percentile	111.85	110.84	114.89	113.90
90-10 Percentile	18.50	17.71	19.56	18.73
Minimum	90.59	88.94	91.50	90.42
Maximum	144.15	149.51	121.52	121.62

There are more LADs than CCGs (325 and 209 respectively) and therefore the geographical area covered by an LAD is on average smaller than that covered by a CCG. Not surprisingly therefore Table 10 reveals a higher maximum for LADs among the raw sMFFs (columns (1) and (2)). Despite this the SD and the 90-10 percentile range are smaller for LADs than for CCGs though the differences are not large. Smoothing substantially reduces maximum values on the two geographies and again the values of the SD and 90-10 percentile range are smaller on LAD geography than on CCG geography, but again the differences are not large.

4: CHANGES IN STAFF MFFs FOR LADs BETWEEN 2007-2009 AND 2013-15

Though LADs remained relatively stable over the period 2007 to 2015 there were a number of mergers in England with the result that the number of LADs fell from 354 in 2007-2009 to 326 in 2013-2015[4]. The mergers mean that there is no one-to-one mapping of LADs over this period and this impedes comparison of 2007-2009 with 2013-2015. In the following analysis we have constructed an LAD geography for 2007-2009 which matches the LAD geography in 2013-2015 to enable more systematic analysis. We did this by merging the LADs that existed in 2009 to match those in 2013-15; we thus imposed the current LAD geography before estimating on the 2007-2009 data. Since this is an artificially imposed geography on the 2007-2009 data we do not report the full set of sMFF values.

Table 11 compares changes in the sMFF over the period from 2007-2009 to 2013-2015 using the actual and constructed LAD geographies. Column 1 reports the summary statistics for the raw sMFF in the years 2007-2009 using the LAD geography in place at that time. Column 2 reports the raw sMFF for the constructed LADs for 2007-2009. Column 3 reports the sMFF for the current LAD geography for 2013-15 as reported in Table 9, column 1 above.

Table 11

Summary Statistics for raw Staff MFF[*]s in 2007-2009 and 2013-2015 using LAD geography[+]

	(1)	(2)	(3)
	GLM 2007 - 2009 LAD	GLM 2007 - 2009 Constructed LADs	GLM 2013-2015 LAD
Mean	101.04	101.15	100.84
SD	9.58	9.56	8.29
Number of LAD areas (England)	353	325	325
10th Percentile	91.91	92.11	93.13
50th Percentile	98.40	98.50	98.73
90th Percentile	113.13	113.79	110.54
90-10 Percentile	21.22	21.68	17.41
Minimum	81.42	85.86	88.94
Maximum	156.02	155.18	149.51

[*] sMFFs are unsmoothed and unadjusted

[+] Note that within the analysis stage, the LAD of Isles of Scilly was identified as having too small a sample to be estimated separately (n=16) even when pooled over the 3 years of interest (2013-15) and so was merged with the LAD "Cornwall" to ensure non-disclosure but also to ensure a more robust area estimate.

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[4] Note these numbers are greater than those shown in Table 6 because due to small sample size for the Isles of Scilly was merged with Penwith in the 2007-2009 analysis and with the "new" LAD of Cornwall in the 2013-2015 analysis.

A comparison of columns (1) and (2) with (3) in Table 11 reveals important changes in the dispersion of SSWDs over the period since the Staff SSWD was last estimated. Dispersion has narrowed, the Standard Deviation is smaller in 2013-2015 than in 2007-2009, the difference between the 90th and 10th percentile has reduced and the value of the maximum has fallen. At the same time the value at the minimum has increased substantially, though clearly almost half of the increase in the minimum is due to the merging of LADs.

Table 12 reports the same comparison once the Higher Responsibility adjustment has been applied and the sMFF are smoothed. Over time, the smoothed values follow the same pattern as seen in Table 11 above. Dispersion has narrowed, the Standard Deviation is smaller in 2013-2015 than in 2007-2009, the difference between the 90th and 10th percentile has reduced and the value of the maximum has fallen. The value of the minimum has risen slightly but no longer does the change in geography contribute to this rise.

Table 12

Summary Statistics for Staff MFFs in 2007-2009 and 2013-2015 for LADs

	(1)	(2)	(3)
	Smoothed 2007 - 2009 LAD	Smoothed 2007 - 2009 Constructed LADs	Smoothed 2013-2015 LAD
Mean	102.36	102.31	101.80
SD	9.14	8.85	7.41
Number of LAD areas (England)	353	325	325
10th Percentile	94.24	94.23	95.17
50th Percentile	98.94	98.92	98.72
90th Percentile	118.15	117.24	113.90
90-10 Percentile	23.91	23.01	18.73
Minimum	87.26	87.12	90.42
Maximum	127.55	126.01	121.62

5: LADs WITH THE LARGEST CHANGE IN THE STAFF MFF

Table 13 reports the 20 LAD areas with the largest absolute percentage change in the smoothed sMFF values. The table reports those LADs where there is the largest absolute percentage change between the 2007-2009 and 2013-2015. Note again that the estimates employ the constructed LAD geography and not the PCT geography that is currently in use within the sMFF. As such these changes are only hypothetical changes. The largest change over this period is experienced by LAD East Lindsey with an increase in the smoothed sMFF of 5.9747 percentage points.

Table 13

LADs ranked by the Largest Difference in the Smoothed sMFFs between 2007-2009 and 2013-2015

Rank	LAD code	LAD	(1) %'age point differences in MFF (Ignoring signs, Re-ranked, i.e. absolute level)
1	E07000137	East Lindsey	5.9747
2	E07000030	Eden	5.7893
3	E07000147	North Norfolk	5.0993
4	E07000114	Thanet	-4.8289
5	E07000190	Taunton Deane	4.7539
6	E06000013	North Lincolnshire	4.6798
7	E07000029	Copeland	4.4724
8	E07000073	Harlow	-4.3449
9	E07000072	Epping Forest	-4.1702
10	E09000031	Waltham Forest	-4.1457
11	E09000026	Redbridge	-4.1098
12	E07000077	Uttlesford	-4.0319
13	E09000002	Barking and Dagenham	-3.8655
14	E09000010	Enfield	-3.7825
15	E09000014	Haringey	-3.7323
16	E09000025	Newham	-3.7241
17	E09000012	Hackney	-3.7228
18	E09000019	Islington	-3.6779
19	E09000030	Tower Hamlets	-3.6269
20	E09000011	Greenwich	-3.5910

6: CONCLUSIONS

LAD geography exists throughout the period 2007 to 2015; it thus enables systematic analysis of changes in the dispersion of SSWDs over this period. That said some LADs merged between 2007-2009 and 2013-2015 and this impedes such analysis. To overcome this difficulty we constructed LAD geography for 2007-2009 which matched that of 2013-2015. Comparisons of the dispersion of SSWDs between 2007-2009 and 2013-2015 reveal a narrowing of dispersion. The maximum value has fallen, the minimum risen the SD is smaller and the 90-10 percentile difference has reduced. It would appear that since the sMFF was last estimated spatial differences in wages have reduced. This has important implications for the sMFF and the distribution of funding consequent upon this.

PART D

CHANGES IN THE STAFF MFF: THE LATEST AND PREVIOUS CHANGES COMPARED

1: INTRODUCTION

In Part C we report that the dispersion of SSWDs narrowed between 2007-2009 and 2013-2015. In Part D we investigate whether the differences in the sMFF this time around are greater than they were when the sMFF was last estimated. In order to answer this question in this part of the report we compare the changes between 2013-2015 and 2007-2009 to the changes between 2004-2006 and 2007-2009. The analysis is undertaken for both the raw and smoothed sMFF values. This section again utilises LAD geography as the basis of comparison and as such only can provide a guide to changes from the previous PCT based sMFF values.

2: COMPARING CHANGES IN THE STAFF MFF

Table 14 below reports summary statistics for *differences* in the raw, the unsmoothed and unadjusted, sMFFs for the periods between 2004-2006 and 2007–2009 (the estimates immediately prior to the last estimates and the last estimates) and 2007-2009 and 2013-2015 (the last estimates and the new). In the latter period the constructed LAD geography is used to ensure greatest comparability.

Columns (1) and (3) report the average percentage point difference and the differences at the 10th, 50th and 90th percentiles as well as the largest and the smallest differences. A comparison of the values in the two columns reveals that the differences between the new estimates and the last set of estimates are greater than were the differences between the last and its predecessor: evidently there have been bigger changes in the underlying labour market since the MFF was last estimated. That is in part likely due to the fact that there has been a much longer interval between the new and last estimates, six years, than between the last and its predecessor, three years. However the passage of time alone does not necessarily produce an increasing dispersion in geographical pay; it would appear that underlying labour market conditions were subject to greater change.

Table 14

Summary Statistics of Differences in Unsmoothed and Unadjusted sMFFs: 2004-2006 compared to 2007-2009 and 2007-2009 compared to 2013-2015 (LADs[*], England)

	Difference between 2004 - 2006 and 2007 - 2009 (PCT)		Difference between 2007 - 2009 and 2013 - 2015 (LAD)*	
	(1)	(2)	(3)	(4)
	Percentage point differences in MFF	Percentage point differences in MFF (Ignoring signs, Re-ranked, i.e. absolute level)	Percentage point differences in MFF	Percentage point differences in MFF (Ignoring signs, Re-ranked, i.e. absolute level)
Mean	-0.10	1.60	-0.15	2.58
SD	2.09	1.33	3.40	2.22
10th Percentile	-2.51	0.27	-4.06	0.32
50th Percentile	-0.38	1.29	-0.17	2.19
90th Percentile	2.22	3.42	4.20	5.20
90-10 Percentile	4.74	3.15	8.26	4.88
Minimum	-4.29	0.00	-15.69	0.01
Maximum	8.05	8.05	11.35	15.69

[*]Constructed LAD boundaries for 2007 – 2009

Of greater interest is a comparison of Columns (2) and (4) which report the absolute size (ignoring the sign) of the differences in the sMFFs. The reason this is of greater interest is that both reductions and increases are of equal interest, when evaluating the distributional consequences of changes in the sMFF. Such a comparison reveals some large changes. The largest difference in the unsmoothed and unadjusted MFFs is 15.69 compared to 8.05 last time and just under 10% (see the value at the 90th percentile) have a change of 5.2 or greater compared to 3.42 last time round. The median of the MFFs has also changed, by 2.19 compared to 1.29 last time.

Table 15 reports the summary statistics for *differences* in the smoothed MFFs between 2004-2006 and 2007–2009 and 2007-2009 and 2013-2015.

Table 15

Summary Statistics of Differences in Smoothed sMFFs: 2004-2006 compared to 2007-2009 and 2007-2009 compared to 2013-2015 (LADs*, England)

	Difference between 2004 - 2006 and 2007 - 2009 (PCT)		Difference between 2007 - 2009 and 2013 - 2015 (LAD)*	
	(1)	(2)	(3)	(4)
	Percentage point differences in MFF	Percentage point differences in MFF (Ignoring signs, Re-ranked, i.e. absolute level)	Percentage point differences in MFF	Percentage point differences in MFF (Ignoring signs, Re-ranked, i.e. absolute level)
Mean	-0.08	0.78	-0.39	1.50
SD	1.07	0.74	1.87	1.17
10th Percentile	-1.32	0.07	-2.89	0.23
50th Percentile	-0.10	0.55	-0.27	1.26
90th Percentile	1.28	1.70	1.86	3.16
90-10 Percentile	2.61	1.63	4.75	2.93
Minimum	-3.08	0.01	-4.83	0.01
Maximum	4.47	4.47	5.97	5.97

*Constructed LAD boundaries for 2007 – 2009

Smoothing again makes a substantial difference to the values: the maximum reduces, the minimum increases, and the SD and 90-10 percentile range are smaller. But again we see that the values on both the percentage points differences (comparison of columns (1) and (3)) and when ignoring signs (comparison of columns (2) and (4)) are greater in the more recent of the two periods, the period 2007-2009 to 2013-2015. The distributional consequences of changes in the sMFF might be greater this time round than they were last time.

3: CONCLUSIONS

In Part C we reported that the dispersion of SSWDs narrowed between 2007-2009 and 2013-2015. In this Part we investigated whether the differences in the sMFF this time around are greater than they were when the sMFF was last estimated. We compare the changes between 2013-2015 and 2007-2009 to the changes between 2004-2006 and 2007-2009. We found that the changes in the sMFFs were greater in the more recent of the two periods, the period 2007-2009 to 2013-2015 using LAD geography as our comparison geography and concluded that the distributional consequences of changes in the sMFF might be greater this time round than they were last time.

PART E

OVERALL CONCLUSIONS

The MFF that is currently employed to compensate for unavoidable geographical differences in the cost of providing healthcare services was generated using data for 2007 – 2009. In this report we have detailed the current method of generating the sMFF and reported a new set of values for the sMFF for 2013-2015. We have used the existing method and the CCG geography as requested by the commissioners of this research. In a Technical Appendix to this report we have reported the full set of smoothed sMFFs for CCGs and then reported the values when they have been interpolated to both Trust HQ and Trust sites. Further we have estimated a full set of sMFFs interpolated to postcode sectors to ensure that sMFFs can be allocated to any new Trust site.

In Part B of this report we undertake a comparison of the new estimates of the sMFF with the previous estimates. This revealed a narrowing in the dispersion of sMFF values. Furthermore identification of the 20 Trusts which will experience the biggest changes suggested there had been a systematic reduction in geographical wage differences between London and the rest of the country over the period 2007 to 2015. We noted that though of considerable interest and importance investigating this particular aspect further was beyond the scope or remit of this research.

We were not able to say how much of the apparent narrowing in the dispersion of sMFFs was due to changes in the geography that has been used to estimate sMFF – the move from PCTs in the previous estimates to CCGs in the new - and how much was due to the passage of time. So in Part C we sought to 'control' for differences in geography and distinguish that part of the changes that was due to the passage of time. We employed LADs that exists in ASHE throughout the period 2007 to 2015. We noted that some LADs merged between 2007-2009 and 2013-2015 and overcome this difficulty by constructing an LAD geography for 2007-2009 which matched that of 2013-2015. Comparisons of the dispersion of SSWDs between 2007-2009 and 2013-2015 again revealed a narrowing of dispersion. It appeared that since the MFF was last estimated spatial differences in wages had reduced and this has important implications for the sMFF and the distribution of funding consequent upon this.

In the final Part of the report, Part D, we investigated whether the differences in the sMFF this time around were greater than they were when the sMFF was last estimated. We compared the changes between 2013-2015 and 2007-2009 using LAD results to the changes between 2004-2006 and 2007-2009 PCT based results. We found that the changes in the sMFFs were greater in the more recent of the two periods, the period 2007-2009 to 2013-2015 and concluded that the distributional consequences of changes in the sMFF might be greater this time round than they were last time.

Supporting document B

Unavoidable costs: Approaches in other sectors and view of NHS Finance Directors

The King's Fund

Please note: The views expressed in these reports are those of the independent research teams. They do not necessarily reflect the views of NHS Improvement and NHS England.

The research presented here was commissioned by NHS Improvement and NHS England to inform a review of the market forces factor. While the research makes a number of recommendations, it is for NHS Improvement and NHS England to determine which to adopt, or to consider additional options.

Please see the document *Market forces factor review and proposed updates* for details of the proposed changes to the MFF following this review.
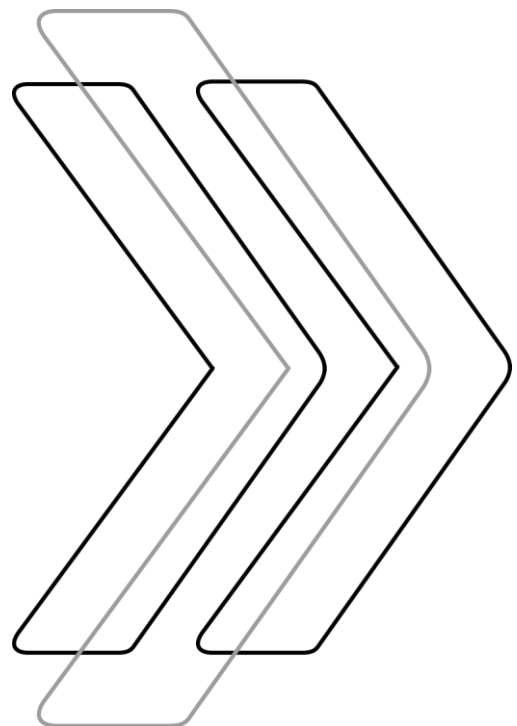
Unavoidable costs:

Approaches in other sectors and views of NHS Finance Directors

Authors

The King's Fund

University of York

October 2016

Unavoidable costs: approaches in other sectors and the views of NHS Finance Directors

Brief

1. NHS Improvement with NHS England is reviewing its approach to unavoidable differences in the costs faced by providers. The King's Fund and University of York were commissioned to:
   - Undertake a short overview of approaches to unavoidable costs within other public sector and healthcare systems; and to
   - Undertake qualitative research to identify what factors NHS providers believe are creating uncontrollable additional pressures on their cost bases, when compared to otherwise similar peers.

2. Both elements were to adopt a single economic framework.

Structure of this Report

3. This Report considers:
   - Approaches in other sectors
   - Views of NHS Finance Directors
   - Limitations
   - Conclusions
   - Annex 1: Methodological Framework
   - Annex 2: Detailed comments from Finance Directors and others
   - References

4. In presenting both the approaches taken in other sectors and the views of Finance Directors, we have followed a methodological framework as set out in Annex 1. This categorises unavoidable costs into three categories: those related to the costs of labour; those related to the costs of capital; all other costs. Finance Directors also raised other issues around implementation and the broader strategic direction for NHS payment systems that are also set out.

Approaches in other sectors

5. This note sets out in brief the approaches to unavoidable costs in four jurisdictions:

- Schools in England: the Department for Education (DfE) closed a consultation in April this year on a new approach to the funding of schools. This paper sets out both the current and proposed approaches to the handling of unavoidable costs;
- Local authority funding in England, as set out by the Department for Communities and Local Government (DCLG);
- Medicare in the USA: there have been a series of proposals for change to the approach to unavoidable costs in the USA. Key features of these proposals are set out alongside the current approach.
- Funding for public hospitals in Australia, which includes specific allowances for unavoidable costs based upon the residency of the patient.

Summary

6. For all four systems the approach to geographical unavoidable costs is nested within a wider payments system and sometimes these elements are difficult to separate. The approach adopted here analyses these approaches by looking at:
   - Unavoidable variations in input prices – labour, capital and `other'
   - A range of other unavoidable costs not linked to input prices

7. In terms of input prices, geographical variations in labour costs dominate the approaches in England and the USA, whether in terms of current and proposed approaches. Summary differences are set out below in Table 1 when compared to the NHS acute sector Market Forces Factor for labour. Australia instead identifies the costs based upon the patient rather than on the location of the hospital. However, it is likely differences in wages across areas will explain some of the variation in costs.

8. Systems for capital financing are very varied and depend closely upon the wider payments system. These are covered in discussion of the individual jurisdictions. The conclusion links these jurisdictions to comments received from NHS acute hospital Finance Directors.

Table 1: Summary of approaches to geographical variations in labour costs: differences with the NHS acute sector Market Forces Factor

Jurisdiction	Basis of approach	Key differences to the NHS acute sector
England – local authorities	Variation in private sector pay rates	DCLG applies a lower limit, below which local authorities in low-pay areas are assumed not to benefit
England – schools	Pre 2015-16: variation in private sector pay rates Current and proposed: regional pay rates for teachers; private sector pay rates for other staff	Based upon pay bands for teaching staff; extensive additional discretionary payments to schools may cover other pay-related issues
USA - Medicare	Current: pay of provider staff organised by geography. Proposed: pay of staff hired by providers using commuting data to establish a local labour market	Based upon pay of healthcare staff. Extensive additional discretionary payments for pay; floors and ceilings applied to elements of the formulae.

Schools funding in England

9. Funding for schools is in major transition. Historically, funding for schools was part of the local authority allocation. Once allocated to authorities, it was then up to each one to determine its own funding formula for schools within their jurisdiction. Effectively there were 152 funding formulae for schools, one for each local authority, and extensive variation between the approaches taken.

10. Funding for schools is now on a path to 2019-20, when the funding for each school will be set by a national formula. DfE consulted in April 2016 on the future approach to funding and further consultations are planned (Department for Education, 2016). This means elements of the national system are still in design.

11. Schools funding retains (and may retain in the future) considerable scope for local variation. This means that while there are formulae for labour and capital costs variations, these may be supplemented or offset by other local variations to funding.

Variations in labour costs

12. For 2015-16 DfE adopted a `hybrid area cost adjustment' methodology (Department for Education, 2014). The two key elements of this hybrid approach are:

   - For teachers pay, notional averages were calculated for four regional pay bands: inner London, outer London, the fringe, and the rest of England. Ultimately, by building on national pay scales for teachers, this reduces the variation across the country when compared to indices based upon private

sector pay. Explicitly, it reflects (or implies) that the costs of teachers in high-cost areas are actually lower than private sector indices would suggest; and

- For non-teaching staff, the approach used in local government is adopted. Labour cost indices for these staff reflect whole economy pay rates. This is covered in the next section.

13. In the transition period to 2019-20, 5 local authorities around London retain freedoms to support schools who have to pay higher salaries to staff, where only part of the overall Local authority is in this area.

14. The Department for Education currently proposes to maintain a hybrid approach in the future national funding formula (Department for Education, 2016).

Variations in capital costs

15. The approach taken by DCLG to local authority allocations for capital costs in schools was based upon the 2010 Revaluation of Local Authority Schools in England and Wales (Department for Communities and Local Government, 2013). Valuations are based on a combination of location and site factors where location factors pick up variations in building costs and site factors pick up variations in land values. Calculations are undertaken for 4 zones: The City and Inner London, Outer London, the Rest of the South East and the South East Fringe and compared to the Rest of England.

Other factors

16. Local Authorities have adopted many alternative models for the funding of schools. These `other' factors applied by individual authorities have begun to be restricted by DfE on the path toward a national funding system in 2019-20. For the transition years of 2017-18 and 2018-19, DfE proposes a system made up of (Department for Education, 2016):

- Lump-sum and sparsity payments: these are intended to reflect the presence of fixed costs in schools' cost structures and additional costs from running schools in isolated areas;
- Further payments related to specific issues facing the school (rather than the nature of the pupils attending the school). These include payments for rates and issues around premises and the estate. DfE proposes to allocate these on the basis of historic expenditure during the transition period and will consider alternative ways to allocate this expenditure in the future. Premises payments include payments for PFI, running split sites and `exceptional' factors that raise a school's costs. 462 schools received exceptional support in 2015-16. These `other' payments in total amount to £566million. In addition, DfE adopt a similar approach to growth in-year in pupils not recognised by the lagged approach to per-pupil funding; and
- The wider education funding model is built on per-pupil payments, adjusted for a range of factors that include deprivation, low prior attainment and English as a second language. In other words, these elements are designed to cover unavoidable costs linked to pupil characteristics rather than characteristics of the school itself.

Local authorities funding in England

17. DCLG allocates resources to local authorities who then commission or provide services for their local populations. As such it is similar to allocations to CCGs, rather than a payment system for providers. However, as with the NHS Market Forces Factor (MFF), the allocation system does attempt to control for unavoidable cost differences faced by providers in order to enable equity of access across local authorities (Department for Communities and Local Government, 2013). The rest of the local authority allocation formula largely relates to indicators of `need' – i.e. akin to the CCG allocation formula.

18. The Area Cost Adjustment (ACA) is specifically designed to make allowances for variations in input prices. It covers:
    - Differences in Labour costs - the `Labour Cost Adjustment' (LCA). This accounts for the great majority of the ACA; and
    - Differences in business rates paid on local authority premises – the `Rates Cost Adjustment' (RCA).

19. Elements of the ACA and its component parts have historically included the Education budget (i.e. schools). This has been covered in the previous section.

The Labour Cost adjustment

20. Of all the approaches in these 3 jurisdictions, the LCA is closest to the NHS Market Forces Factor (MFF). Using the Annual Survey of Hours and Earnings (ASHE), the LCA uses regression modelling to create an estimate of labour costs (controlling, for example, for occupation, industry and gender) across each English county area based on 1991 geographies. It is then applied to the labour share of costs within the services paid for by Local Authorities.

21. However, the LCA also:
    - Applies a lower limit. Significant occupations within the services paid for by local authorities are on national pay scales and these make up a higher proportion of local government employment than they do in the wider economy. This lower threshold is set by judgement and all areas with an LCA below this lower limit have their LCA raised to the threshold;
    - Applies smoothing over time, using three year averages; and
    - Engages in a further extensive round of analysis reflecting the fact that many local authority services are contracted out. No comprehensive data source exists for contracted out services and alongside further data collection and analysis an element of judgement is again required in order to determine the labour share of costs.

Rates Cost Adjustment

22. The RCA is based on a weighted average of the rateable value per square metre in broad regions – i.e. it is not calculated on a per-authority basis. The regions are the City of London, Inner London, Outer London, London Fringe, the Rest of the South

East, South East Fringe, and Northern Conurbation. Values for these regions are compared to that for the Rest of England and Wales whose RCA value is set at unity.

23. There is a link between the use of the RCA and LCA. Where an LCA for an area is at the lower threshold (i.e. at unity), the RCA is automatically also set to this level. This `unity' rating for the RCA is that applied to the Rest of England and Wales. The resulting RCAs are applied to the shares of expenditure accounted for by rates.

Other differences in capital costs

24. There is no explicit cost adjustment factor in the capital financing element of local authority finance. This is because the credit approvals process already takes account of cost differences between areas.

Medicare funding in the USA

25. The funding system for Medicare shares some obvious commonalities with the English NHS, in that it builds up from an HRG-DRG currency. However, in its treatment of other unavoidable costs the US system has a number of key differences to England and comparisons are not straightforward.

26. Medicare does contain an element of the payment system designed to pick up local variation in input prices arising both from operational and capital costs. This is dealt with first before turning to the other elements of Medicare payments that consider other unavoidable costs.

Medicare wage index system

27. The existing approach in Medicare establishes wage indices for hospital labour market geographies, where the geographies are based upon standard metropolitan statistical areas (MSAs) (see for example, U.S. Department of Health and Human Services, 2012). Medicare calculates an average hourly wage for each MSA and a single statewide rural wage index for each state. Average hourly wage data from every hospital is used to develop the wage index. This also makes adjustments for skill mix in nursing staff. This has been done to limit the impact of individual hospitals' decisions over higher-waged specialty staff versus lower-waged general staff. Wage indices are created by comparing average hourly pay rates to the national average.

28. The indices are applied to the labour share of total hospital costs, except that for hospitals below national average pay, the labour-related portion is capped at 62% of total cost. This has the effect of lowering the impact of the adjustment for low-pay areas. For hospitals with a wage index equal to or above the national average the labour share is also set as a matter of policy. In 2012 this was set at 68.2%. Different shares apply in Puerto Rico.

29. Hospitals can appeal their wage index value, and if successful, be `moved' into an adjacent (higher) wage index geography. They can also request other variations to their classification under other rules and these rules change over time. The extent of these variations is significant: over one third of hospitals receive a wage index not based on their geographic location. These various exceptions include:

- Demonstrating that they are physically close to a nearby area paying higher wages; that they pay higher wages than other hospitals in their geographic area; that they pay similar wages to hospitals in the area to which they wish to be re-classified;
- An `outmigration adjustment', if commuting data shows significant numbers of workers in their area travel to other areas for work;
- Rural floors, whereby an urban hospital cannot be given a lower wage index than rural areas in the same state; and
- Hospitals in states classified as `Frontier States' cannot be given a wage index less than the national average.

30. This approach has been subject to repeated reviews, with extensive reports on its advantages and disadvantages alongside potential alternative approaches. These would be an obvious area for further work, but only if a US-style approach is of interest – i.e. one that uses the pay differences of actual healthcare workers employed in the provider sector.

31. The most recent proposal for reform proposes switching to a Commuting-Based Wage Index (U.S. Department of Health and Human Services 2012, Acumen 2011). This would use commuting data from hospitals to define hospital labour markets. This would enable a hospital-specific wage index based on the actual labour markets a hospital employs from. There is an extensive literature covering this proposal and the assessment of the prior system and other earlier proposals for reform.

Capital payments

32. A similar approach is used for the capital element within the prices paid to hospitals covering costs for depreciation, interest, rent, and property-related insurance and taxes (see for example, Department of Health and Human Services, 2016). Hence the wage index is applied to the capital base rate within prices for each hospital. Again the capital share of costs is set differentially for areas above and below the national average. The wage index applied to the capital base rate is raised to a fractional power, which narrows the geographic variation in wage index values among market areas.

Other input prices

33. Cost of Living Adjustments (COLA) allow for higher non-labour supplies in Alaska and Hawaii.

Other adjustments

34. Medicare makes many other adjustments some of which are very specific to the US model. Table 2 attempts to pick out some with potentially more relevance to England (U.S. Department of Health & Human Services, 2016).

Table 2: Other adjustments to Medicare payments

Adjustment	Description
Bad debts	Payment made after reasonable collection effort has been made
Direct Graduate Medical Education Indirect Graduate Medical Education	Payment systems for hospitals engaged in approved training
Sole Community Hospitals	Payments for rural or isolated providers based on a series of criteria
Low-volume hospitals	Based upon both geographic and volume criteria
Medicare Disproportionate Share Hospitals	Hospitals treating a disproportionate share of low income patients
Medicare Dependent Hospitals	May also provide support if hospitals experience a significant decline in income

Public hospitals in Australia

35. The main funding route for public hospitals in Australia builds from payments for activity defined by an Australian system of diagnosis-related groups. This, alongside overall responsibility for setting the payment system, is overseen by the Independent Hospital Pricing Authority (IHPA) (IHPA, 2015b). IHPA has an explicit remit to ensure unavoidable costs are recognised including costs arising from:
    - Hospital type and size;
    - Hospital location, including regional and remote status; and
    - Patient complexity which is not otherwise captured by the payment classification system. (IHPA, 2015a)

36. However, as a first step IHPA attempts to link any additional unavoidable cost to the patient: i.e. rather than make an uplift to a hospital based upon some `wage index' (as in England and the USA), IHPA attempts to link additional costs to patient characteristics using actual hospital treatment costs. Payments then follow the patient rather than being linked to any specific provider. A key element of this is additional payments for patients living in remote areas, considered below, before turning to other unavoidable costs some of which do include provider-specific payments.

Payments for patients living in remote areas

37. Based upon a standard geographical classification, Australia supplements treatment prices as set out in Table 3 (IHPA, 2016). In addition, a 5% uplift is applied to people who identify as of being aboriginal or Torres Strait Islander origin and this is applied to a wider set of treatment costs than the various remote adjustments.

Table 3: Adjustments for patients living in remote areas: Australia (IHPA, 2016)

Name	Basis of approach	Amount
Outer Regional Adjustment	For a person whose residential address is within an area that is classified as being *Outer Regional*	Admitted Acute or Admitted Subacute Patient: 8%
Remote Area Adjustment	For a person whose residential address is within an area that is classified as being *Remote*	Admitted Acute or Admitted Subacute Patient: 18%
Very Remote Area Adjustment	For a person whose residential address is within an area that is classified as being *Very Remote*	Admitted Acute or Admitted Subacute Patient: 23%

38. The great majority of Australia by geographic area falls into the zones covered in Table 3 (see, for example, Australian Bureau of Statistics (2006)).

Other payments

39. Setting to one side other adjustments to payments that essentially reflect refinements to the underlying diagnostic groupings e.g. the Paediatric Adjustment, IHPA allows applications for additional payments to be made and has set out the process by which these adjustments are considered (IHPA, 2015a). While IHPA prefers to make activity based payments based upon patient characteristics and for these to be applied on a national basis (as has happened with the remoteness adjustments), some are made on the basis of provider characteristics instead. The key elements are shown in Table 4 (IHPA, 2015b).

Table 4: Additional payments for unavoidable costs: public hospitals in Australia

Name	Basis of approach
Teaching, Training and Research	Block funding
Small size/recognition of economies of scale	Block funding. Paid if: • in a metropolitan area (defined as 'major city') and the hospital provides ≤ 1,800 acute inpatient National Weighted Activity Units (NWAU) per annum; or • in a rural area (defined as all remaining areas, including 'inner regional', 'outer regional', 'remote' and 'very remote') and the hospital provides ≤ 3,500 total NWAU per annum.
Payments from other sources	Some costs are met via other funding streams and so are discounted from the main hospital funding streams. These include payments for highly specialised drugs, bloods and some elements of organ transplantation costs.

Views of NHS Finance Directors

Interviews: approach

40. Interviews were undertaken with NHS Finance Directors (FDs) to identify their views both about unavoidable costs in general but also specifically about the current Market Forces Factor.

41. Targets were selected to ensure coverage from:
    • Different geographic areas of England, based upon Inner London, Outer London, Other major conurbations, Other urban areas (`urban with significant rural, `urban with city and town' but not a conurbation), and Rural (`mainly rural' and `largely rural'), where the final three categories are based on standard rural-urban definitions (ONS, 2011).
    • Each quartile of the MFF distribution, whether defined by the range of MFF values or by the number of Trusts;
    • Teaching Hospitals, members of the Shelford Group and District General Hospitals (DGHs).

    All these targets were reached.

42. We also looked to get responses from the 4 NHS England regions. In doing so, a pattern emerged whereby FDs in London and the South were generally quick to respond and agree to be interviewed. FDs in the North and Midlands & East were slower to respond and on the first round of contacts, very few reached interview stage.

A second wave of invitations specifically targeted the North and Midlands & East and these did succeed in attracting participation from the North. Responses remain low amongst FDs currently employed in Midlands & East.

43. To date, 14 providers have been interviewed, involving 16 people. All included the current FD In some cases, FDs also wished to speak about previous employers, covering a further 10 Trusts. These additional perspectives did cover Midlands & East. As agreed with NHS Improvement and NHS England, an additional set of interviews (comprising 5 interviews with 6 people) were undertaken from representative bodies, including NHS Providers and NHS Confederation.

Interviews: findings

44. Comments from FDs and others have been grouped into 6 key areas:

   A. Awareness of the MFF and overall views
   B. Factors that impact on the price of labour
   C. Factors that impact on the price of capital
   D. All other factors
   E. Other issues raised around strategic direction
   F. Other issues raised around implementation and handling.

A: Awareness of the MFF and overall views

45. FDs fell into two categories:
   • Those who had been engaged in earlier reviews or assessments of MFF and unavoidable costs; and
   • Those who had not. This group represented the clear majority of respondents.

46. However, in neither case had there been any recent engagement whether by FDs or by any representative body. Hence in almost all cases, respondents were very clear that MFF was not an issue they had thought about recently – often for years and gave a number of reasons for this including:
   • The length of time since the last review;
   • That there was no way to appeal, with respondents saying `it is what it is'; and
   • That at least for some, it was not seen as a `live' issue for the organisation i.e. it was not seen as a major impact on the organisation's financial health.

47. This relative lack of recent engagement did impact on the ability of many respondents to discuss issues of detail, as they were coming to the issue `cold'. This meant much of the commentary on issues other than pay and estates were due to prompts by the interviewer following on from a first look at the literature sitting behind `unavoidable costs'. This relative lack of current engagement was also observed in other ways:
   • In some cases interviewees were unsure of the current basis of MFF and what is, and is not, already included;
   • In some cases interviewees were confident of their understanding, but incorrect; and

- Most felt there was a lack of transparency over its purpose, objectives and methodology though some volunteered that they had not looked for information.

48. To the extent that FDs were willing to express an overall view (rather than focus on specific elements) opinion spread right across the spectrum from:
    - `I think MFF is about right on our costs and in my discussions around London and the South East others think the same'; to
    - `It is fundamentally flawed'.

49. Representative bodies said there had been some complaints from rural providers when a previous review was postponed but that otherwise MFF was largely not seen as a priority. However, in interviews, there were a small number of FDs who were very keen to fundamentally review MFF now. Set against this were others that felt:
    - MFF was a zero-sum game and that a review would not help providers as a whole;
    - It would provoke losers, and could also provoke winners if there was a long transition period; and
    - Many raised other issues on the payment system that they considered of higher importance (these are noted later).

B: Factors that impact on the price of labour

50. There was a deep division of views between those that largely accepted the current basis of MFF and those that did not. Even amongst those that did, (mostly in London and the South East) there were comments:
    - Reference was made by 2 interviewees to previous work commissioned by the Project Diamond group (though attributed to different consultancies) that argued the approach did not adequately measure where people were commuting from and the push towards bringing people in at higher grades in London. The implication was MFF underestimated London's costs; and
    - Others also noted the possibility that high-cost areas may have a tendency to grade inflation in order to overcome difficulties in recruiting.

51. However, a significant group disagreed with the current approach to pay. Common concerns were:
    - The use of private sector pay comparisons was seen by some as recognising only one driver of pay costs to the exclusion of all others – i.e. it only recognised additional pay costs experienced by London through its competition with the private sector in an area with a high cost of living;
    - A wider and more open review of unavoidable costs would recognise recruitment and pay issues that were experienced by many other areas. For example, many referred to difficulties experienced in more peripheral or rural areas of England in recruiting and retaining staff, including medical, nursing and AHP staff. This often pushed these areas into the use of expensive agency staff and the same recruitment churn as London. These areas could face greater problems when they were trying to attract new staff into an area (rather than retain the ones they already had).

52. A few felt that MFF had a perverse effect when these wider pay and recruitment issues were taken into account. For example, under MFF many of these relatively peripheral areas are low-cost of living, low-pay geographies as their local economies are depressed and so attracted a low MFF ranking. Yet these areas were sometimes unattractive areas for health staff (or indeed others, as these towns generally witness net-outmigration) – e.g. declining, economically depressed, smaller towns in the North and Midlands. These issues could be compounded when local providers also tended to be small, non-academic, institutions. Some felt these problems had worsened in recent years as competition for staff increased and as the emphasis staff placed on wider quality of life rose.

53. Fundamentally, some argued the comparison should be based on NHS cost structures – i.e. on actual NHS pay structures. Hence, some argued that Agenda for Change (AfC) and other national pay structures meant the additional costs faced in London were limited. They also noted that these same national pay scales meant that the NHS reaped no cost benefit in areas of low private sector pay yet MFF assumed they did. National pay bands led some to argue that pay pressures were infact similar over large geographies and having an MFF for each organisation was unnecessary.

54. Two interviewees also rejected MFF's underpinning justification of higher recruitment costs in London. One argued that if recruitment and churn was the source of additional costs, then MFF should measure the actual HR costs involved and that these would be far smaller than any MFF based upon pay in the wider economy. Another noted that the benefits of low turnover had their limits e.g. by slowing the replacement of older, high paid staff by younger lower paid staff.

55. Finally, one interviewee argued that recruitment and pay issues should not be built into PBR (other than London weighting) but instead lead to a time-limited uplift for areas based on local evidence of difficulties. This reflected concerns that the pattern of additional unavoidable costs from pay would vary over time and that MFF risked `freezing' these pay differentials into prices. Others also raised concerns that the current pattern of wage and recruitment costs could change due to Brexit. One noted the reliance in areas of low unemployment on migrants to hold down costs in `ancillary' services such as laundry, portering and catering. Another noted that international recruitment had provided a safety valve for nursing staff that would otherwise be very difficult to recruit.

56. Representative bodies tended to be less critical, thinking that the fundamental basis of MFF has wider acceptance and indeed there were a group of interviewees that accepted pay variation was unavoidable but did not comment further on any alternative approaches or methodologies.

C: Factors that impact on the price of capital

57. In general, factors that impact the price of capital were raised as much as ones relating to labour costs. However, there was far greater commonality of view across FDs when discussing capital costs than there was over labour costs.

58. FDs that expressed a view, there was unanimity in recognising that land and estate in London was more expensive and was appropriate for MFF. The only dissenting views were from London itself, where it was felt MFF now underestimated London's costs and from an interviewee outside London who queried whether London also benefitted from land sales.

59. There were a range of other capital and estates issues that were commonly discussed by FDs that are not currently part of MFF:
    - PFI – though views differed over how far MFF could adjust for PFI costs, whether this was best handled through other funding streams and indeed, whether these other funding streams already existed;
    - The physical nature of the estate, e.g. in terms of age, number of sites, extent of backlog maintenance. This was a very common issue spontaneously raised by interviewees; and
    - A number expressed increasing concern over estate costs which seemed to be motivated by an awareness of shortfalls in public capital and new PFI.

60. However, while FDs believed these were important issues inflicting unavoidable costs on organisations (some of which were growing in importance), many were either unsure whether MFF or any other formulaic (i.e. based upon a formula applied at national level) approach would be able to capture them or indeed, were sure that they could not do so.

D: All other factors

61. Table 5 sets out the range of other factors raised by FDs that were considered (by the interviewee) to impose `unavoidable costs'.

Table 5: All other factors: summary

Issue raised	Justification
Teaching hospital status	Opinions varied over how far other funding streams met any additional costs.
The state of social and community care	Poor local services lead to delayed transfers of care (DTOC) and inefficiency.
Economies of scale and rurality	Mainly raised in relation to difficulties in recruitment and retention but also in terms of higher costs of provision in running dispersed services and that the dependence on a small number of staff could force smaller providers to rely on agency staff.
Mergers	MFF seen as too slow in updating post-merger.
Fixed costs, other cost structure issues	Fixed costs in A&E were unavoidable and accounted for in other parts of PBR. This sometimes reflected a wider view that MFF/PBR did not reflect organisations' cost structures.
CNST/NHSLA/NPfIT payments	Based upon historic performance or contracts and unavoidable to the current management.
Consumables	Though many argued these were bought at common prices across the NHS, some contracted-out services e.g. laundry, might not.

62. Some of these other issues raised are covered in greater detail in Annex 2 (particularly where they are fairly straightforward). The others are also covered below.

63. Though not suggested as appropriate for MFF, regional variations in access to community health services and social care were believed to inflict unavoidable costs on acute hospitals. This was mainly through increased DTOC, which either raised costs (by raising length of stay) or reduced income (as elective capacity was reduced). However, it was argued that it reduced morale and attractiveness as an employer if staff were providing care to routine admissions of the frail elderly that were seen as avoidable from a systems-perspective (i.e. avoidable if sufficient investment was made in community health and social care services). Clearly, these patients were not avoidable from an acute trust perspective once patients arrived at A&E in poor health.

64. There were differences in opinion over the presence of economies of scale:
   - One argued that the minimum scale of a clinical service needed to be efficient was small. Larger providers simply had more units operating at the same time;
   - Some FDs referred to diseconomies of scale where large size could make decision-making slow;
   - Others argued that small size meant providers became dependent on very small numbers of staff and that this made them vulnerable to high agency costs; and

- More generally, for many, the issue was difficult to distinguish from issues around rurality or the peripheral nature of some providers. Certainly small size was not accepted as a reason for higher costs in urban areas as reconfiguration was an option.

65. Examples were given of higher costs created by running a more dispersed service e.g. outpatient clinics in more isolated areas. These generally related to non-inpatient services.

66. When discussing pay costs, some interviewees argued for an approach based on actual NHS costs, i.e. on the national pay structures. However, when discussing NHS cost structures some went further than just pay and argued that MFF and PBR also did not correspond to cost structures in other ways (i.e. were not consistent with the production function in acute hospitals, although this was not the terminology used). The example given was of A&E, where it was argued the real cost structure was one of substantial fixed costs and minimal activity-related costs. These were argued to be unavoidable to a provider. It was not argued that MFF specifically should have regard to these costs, but that the payment system as a whole should.

E: Other issues raised around strategic direction

67. Some interviewees raised a wider set of issues around any changes to MFF or to the treatment of unavoidable costs. Some of these are effectively policy questions for NHS Improvement. Before turning to these questions, many interviewees also found it difficult to comment on unavoidable costs and any link to MFF without having confirmation about a range of other possible changes to payment systems. These included HRG4+, specialist top-ups and business rules (e.g. fines). This reflected a more general point: there are `unavoidable' costs arising from patient characteristics, specialised services etc but many of these are meant to be dealt with by other parts of the payment system. FDs in general wanted to understand the package of possible changes in the round.

68. In terms of strategic direction, FDs raised a number of issues:
- Some are involved in STPs and/or in Vanguards or were aware of ACO type models. There are practical issues around how changes to MFF would feed through these different models e.g. between a Prime Contractor or Alliance contracting model and of course, existing Vanguards. On a related issue of sub-contracting, the private sector raised issues about how MFF did (or did not) follow the patient when they were passed between providers; and
- Through these initiatives some FDs are engaged in discussions around capitation-based models. There was interest to understand how changes to MFF would impact these newer models and how NHS Improvement saw the payment system evolving over time.

69. Related issues led a number of interviewees to express equal or greater interest in the impact of MFF on commissioners. This was explained a number of ways:
   - Some organisations also operate community services where there is no national tariff. In these areas, commissioner affordability was seen as the key issue. A similar point was raised by an FD whose organisation has moved onto block contracts even for acute care; and
   - Where some FDs were engaged in capitation-payment discussions, again, overall commissioner affordability was seen as the key determinant of the provider position.

70. Some providers were aware that Morecambe Bay NHS Foundation Trust had argued local issues meant its tariff was too low and had applied for, and got, an upward variation in its prices. However, the views of those provider FDs that referred to this case were negative:
   - They thought the process had been a difficult one for the Trust, using up management time and heavily reliant on consultant support; and
   - The outcome provided little or no benefit as the local CCG had to make offsetting economies in order to be able to pay the higher tariff;
   - Despite this, one Trust was considering developing its own application for a similar variation. This was not in the belief it would provide extra income (given the affordability constraint on local CCGs), but rather to prove the case to NHS Improvement that the Trust was facing unavoidable pressures that damaged its financial performance.

71. Overall, this meant some FDs were keen to know how any changes to MFF would be passed through to CCG allocations, especially given that these had already been set out some years in advance.

F: Other issues raised around implementation and handling

72. Issues around implementation and handling were raised by many FDs and particularly by representative bodies. Some comments referred back to previous reviews of the MFF where the standpoint of the Trust had not been accepted e.g. over the use of NHS pay structures. Others clearly reflected experience with other parts of PBR rather than MFF.

73. The suggestions from FDs and representative bodies included:
   - A desire for early engagement with the sector. Some felt there was a tendency to spend too much time getting the details `right', which then left too little time for engagement and discussion. Earlier release of less polished analysis would be helpful;
   - Also on timing, that some felt there was too much time spent on technical details and too little on helping the NHS implement new rules;
   - Some were also concerned that lots of work would be invested in highly detailed analysis which would then be combined with very broad brush assumptions on e.g. the marginal tariff and efficiency assumptions with the latter really driving the provider position; and

- That a clear statement of the objectives of the MFF e.g. that included which unavoidable costs it was intended to mitigate and which it was not, linked to a more simple technical methodology would help with transparency. This should directly confront common issues with MFF e.g. why wider economy pay was used rather than NHS pay structures (if this is where any review of MFF ended up).

74. A number discussed issues around stability but there was little common view. Hence some argued for greater stability and that any major review of MFF could e.g. destabilise STP deals. Others felt that if MFF was wrong then it should be changed. As part of any narrative around MFF and potential changes, an understanding of how NHS Improvement had balanced the competing needs for equity (MFF should be right) and stability (underlying existing negotiations over STPs) may be helpful.

Limitations

75. This was a short and targeted review and not intended to be exhaustive.

76. In particular:
- The overview of approaches in other systems did not attempt to evaluate these alternatives;
- In interviews with FDs, many noted they had come to MFF only recently and it is possible their views will change once there has been deeper involvement. Many noted they had not recently engaged with the issue because it was not under review;
- Opinions already varied from the deeply held to the tentative;
- Qualitative research is not intended to represent a statistical sample of views but rather of the range of opinions; and
- We spoke only to acute trusts and NHS Clinical Commissioners. Even for acute FDs some were more interested in implications for commissioners than for tariff. Views of mental health, community services, ambulance and primary care providers may be different.

Conclusions

77. During this brief overview there were a number of issues raised by NHS FDs that were echoed in approaches taken in other jurisdictions. These are identified in Table 6.

Table 6: Common themes between the views of NHS acute provider Finance Directors and the 4 jurisdictions

Issue raised	Examples from the 3 jurisdictions
Some FDs do not accept the use of wider labour market indices to determine the pay element of MFF	- DfE use national pay structures for teachers, split into 4 regional pay bands - CLG places a lower threshold on pay indices to reflect national pay deals - Medicare uses the pay and employment data of healthcare providers and applies a further set of caps
Many FDs raised issues over the costs of the estate	- DfE allows other payments to reflect e.g. PFI, multi-site schools
Some FDs raised issues around sparsity/ rurality linked to economies of scale and the presence of fixed costs	- DfE recognise fixed costs and sparsity for schools - Medicare makes a number of adjustments for sparsity and size - Australia makes adjustments for both remoteness and for economies of scale

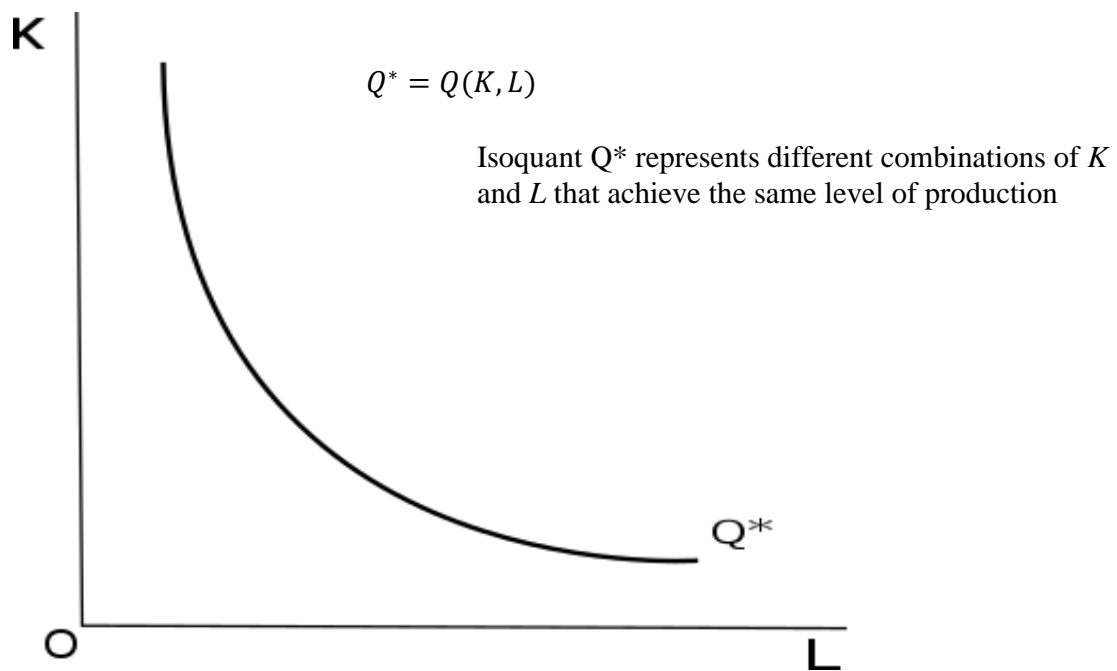78. However, it should be noted:
    - Both schools and many providers of local government services are far smaller organisations than NHS acute providers;
    - Some US providers covered by Medicare payments and Australian public hospitals are also smaller than English providers and clearly, US and especially Australian, geography is very different to that of England; and
    - Many FDs raised recruitment issues in peripheral providers. It is possible some of the methods used by local authorities in education or by Medicare might cover these. However, there did not seem to be any commentary on similar challenges in these other systems other than, implicitly, in Australia given its focus on additional costs in `remote' areas rather than those of major cities.

Annex 1: Methodological Framework

Production functions

$$Q = Q(K, L)$$

Hospitals choose a level of output Q and a mix of inputs L and K to produce health services. Figure 1 depicts the isoquant of output level Q*, assuming a Neoclassical Production Function and imperfect substitution between K and L.

$$Q^* = Q(K, L)$$

Isoquant Q* represents different combinations of *K* and *L* that achieve the same level of production
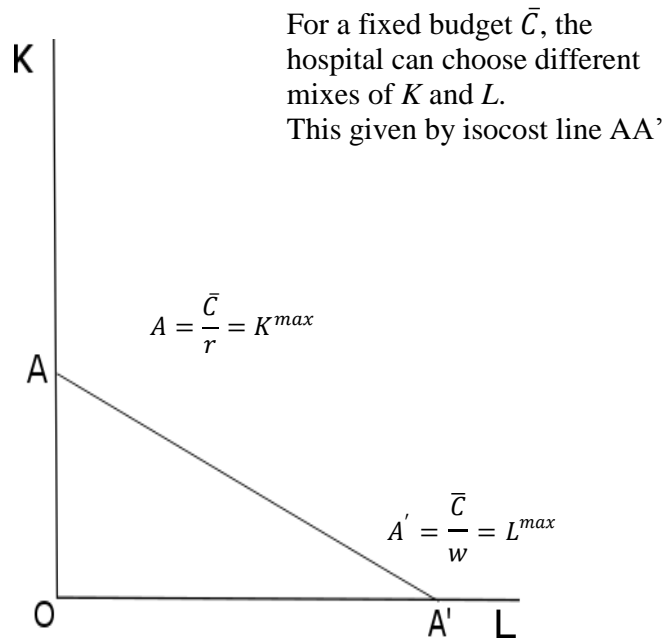
Cost function

$C = C(K, L)$

In a model with only two inputs, *K* and *L* and their corresponding prices *r* and *w*, the cost function will be $C = rK + wL$
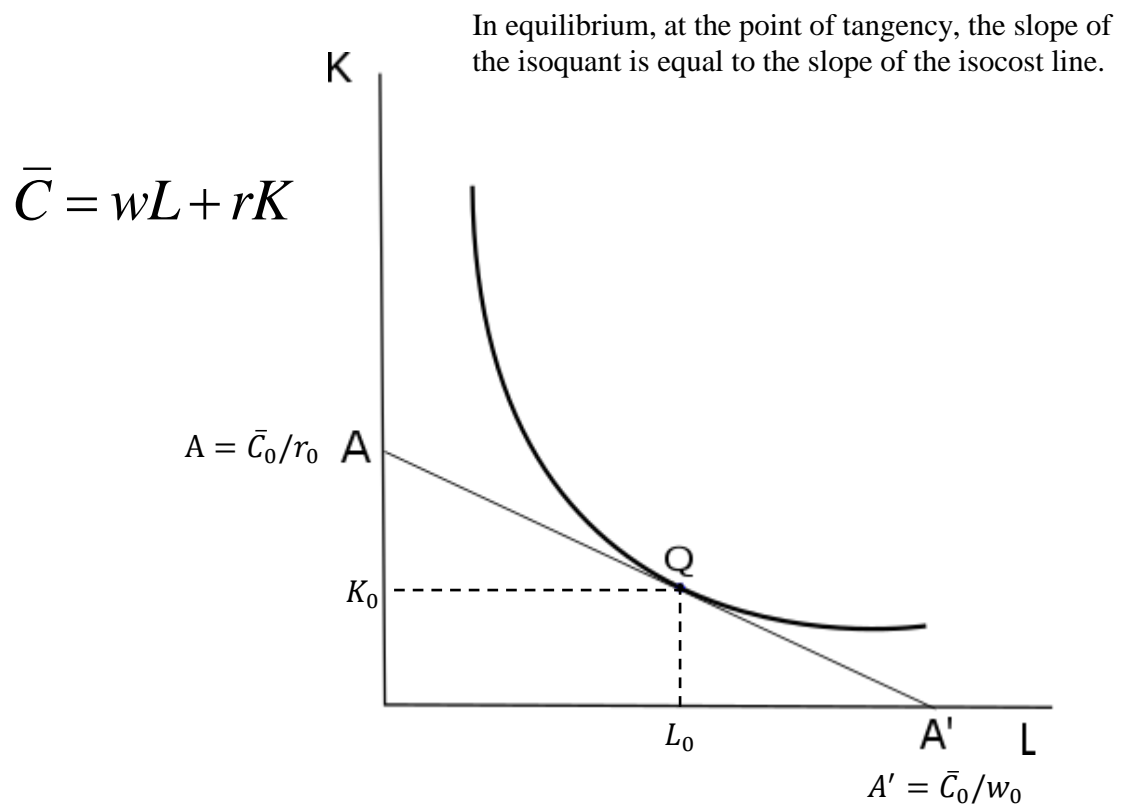
Assume a hospital has a limited budget for a period.
If fixed at level $\bar{C}$, then the cost function will be:

For a fixed budget $\bar{C}$, the hospital can choose different mixes of *K* and *L*.
This given by isocost line AA'

$\bar{C}$

$K^{max} = \bar{C}/r$

$L^{max} = \bar{C}/w$

$A = \dfrac{\bar{C}}{r} = K^{max}$

$A' = \dfrac{\bar{C}}{w} = L^{max}$

In equilibrium, at the point of tangency, the slope of the isoquant is equal to the slope of the isocost line.

$$\bar{C} = wL + rK$$
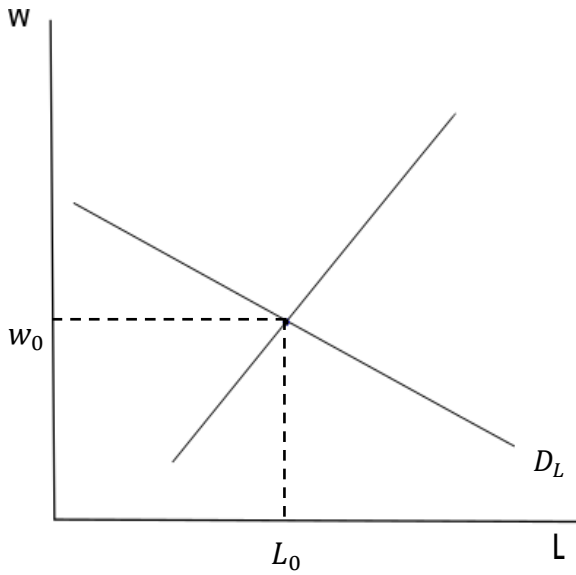
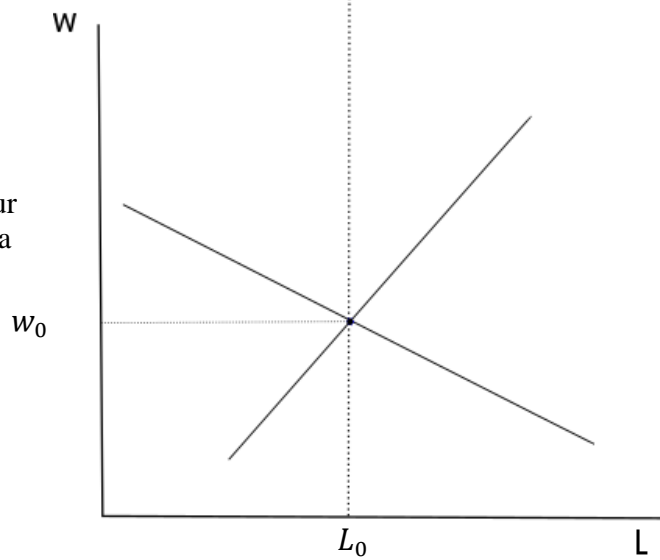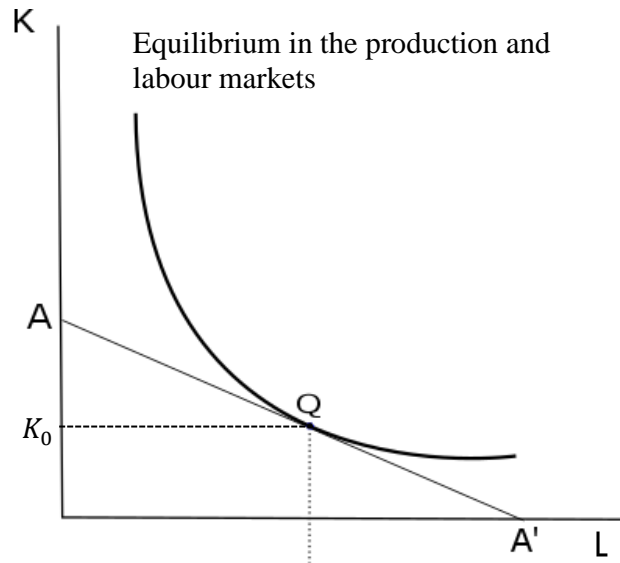$A = \bar{C}_0/r_0$

$A' = \bar{C}_0/w_0$

The equilibrium defines the optimum quantities of *K* and *L*, given their relative prices, to produce the level of output Q

The equilibrium in the labour market

Equilibrium in the production and labour markets

The equilibrium defines the quantity of labour input and the wage for the hospital sector as a whole.

Sources of exogenous cost factors

Three types of exogenous factors (Z) can impact on the production and cost functions.
- Those impact on the price of labour L(w), Z_w
- Those impact on the price of capital K(r), Z_r

All other impacts Z_X

Case 1: Effects of unavoidable cost on wages when salaries and the budget are fixed
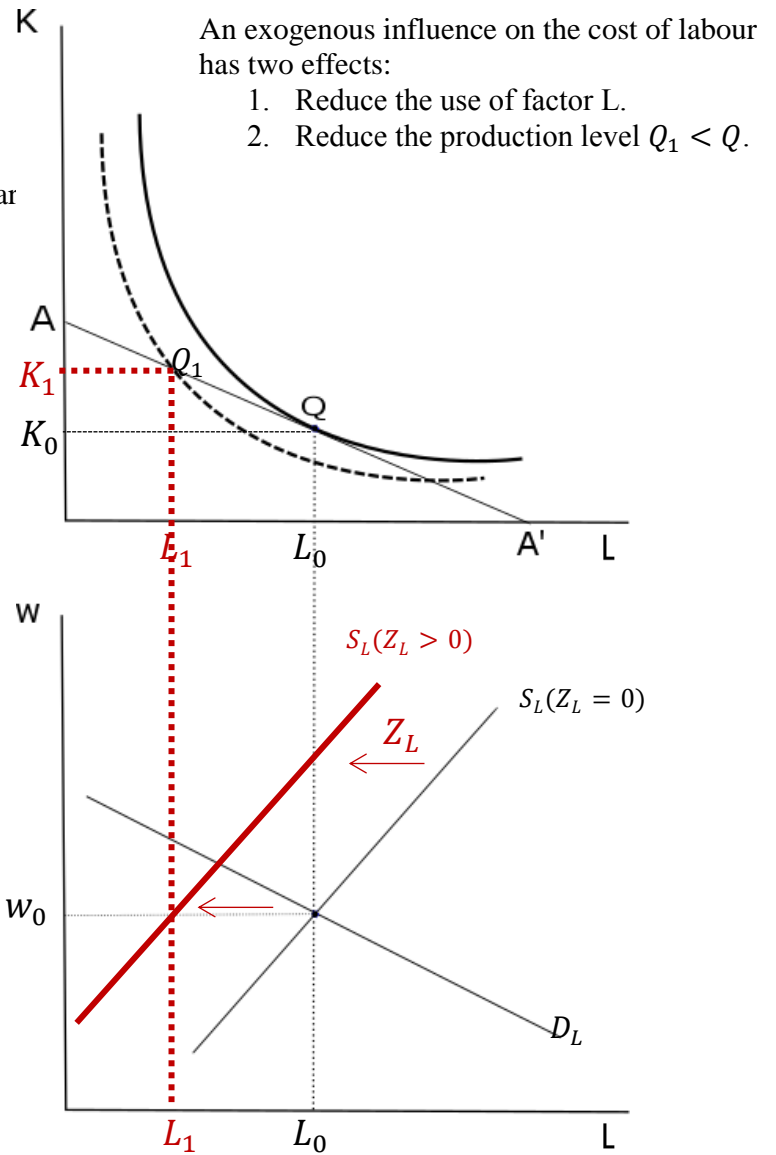
Initial cost curve

$$\bar{C} = rK + w_0L$$

Unavoidable cost affects the labour supply and, indirectly, the level of salar

$$w = w(Z_L)$$

The presence of an unavoidable cost effect on wages ($Z_L > 0$) shifts the S_L curve to the left.

If the salary is fixed nationwide, the hospital is able to hire less labour and, given the same isocost, achieve lower production, Q_1.

An exogenous influence on the cost of labour has two effects:
1. Reduce the use of factor L.
2. Reduce the production level $Q_1 < Q$.

Case 2: Effects of unavoidable cost in labour market with a flexible wages and budget

Initial cost curve

$$\bar{C} = rK + w_0 L$$

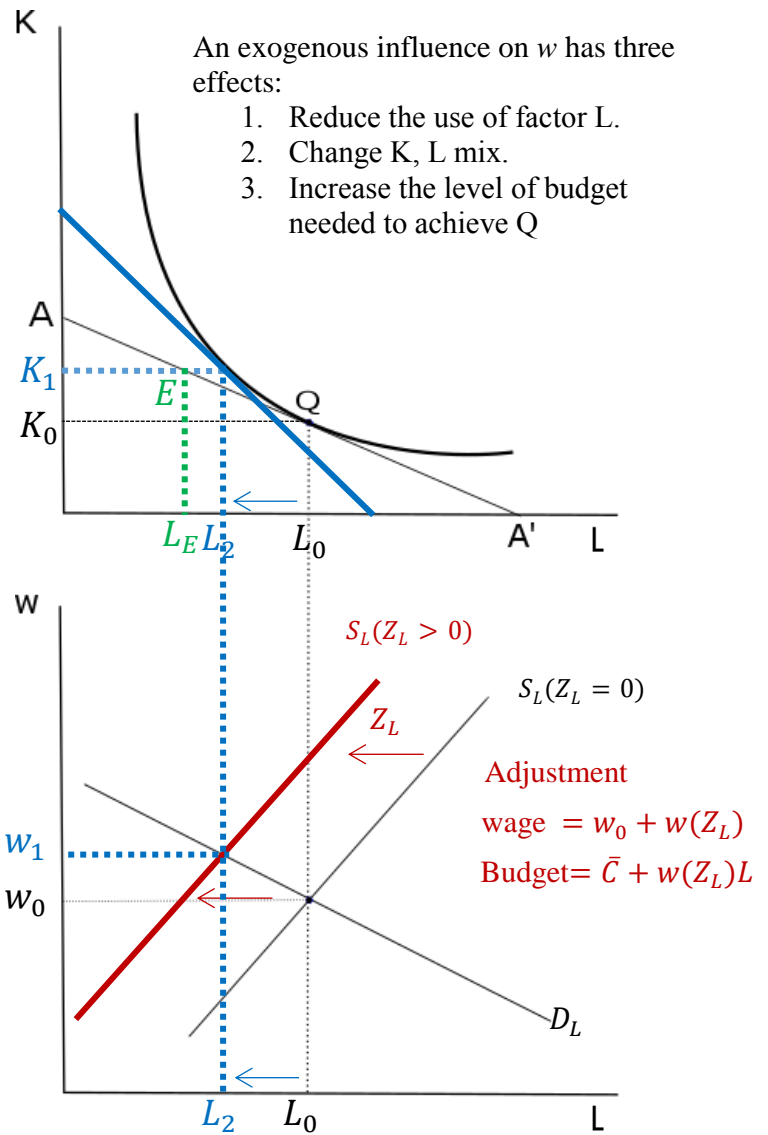Unavoidable cost affects the labour supply and, indirectly, the level of salary

$$w = w(Z_L)$$

$Z_L > 0$ shifts the S_L curve to the left. If the salaries are flexible (and the hospital can increase their budget) the hospital will the choose (K_1, L_2) combination.

The combination (K_1, L_E) consume all the previous budget.
To hire up to L_2 by increasing wages to w_1 the budget need to be increased.

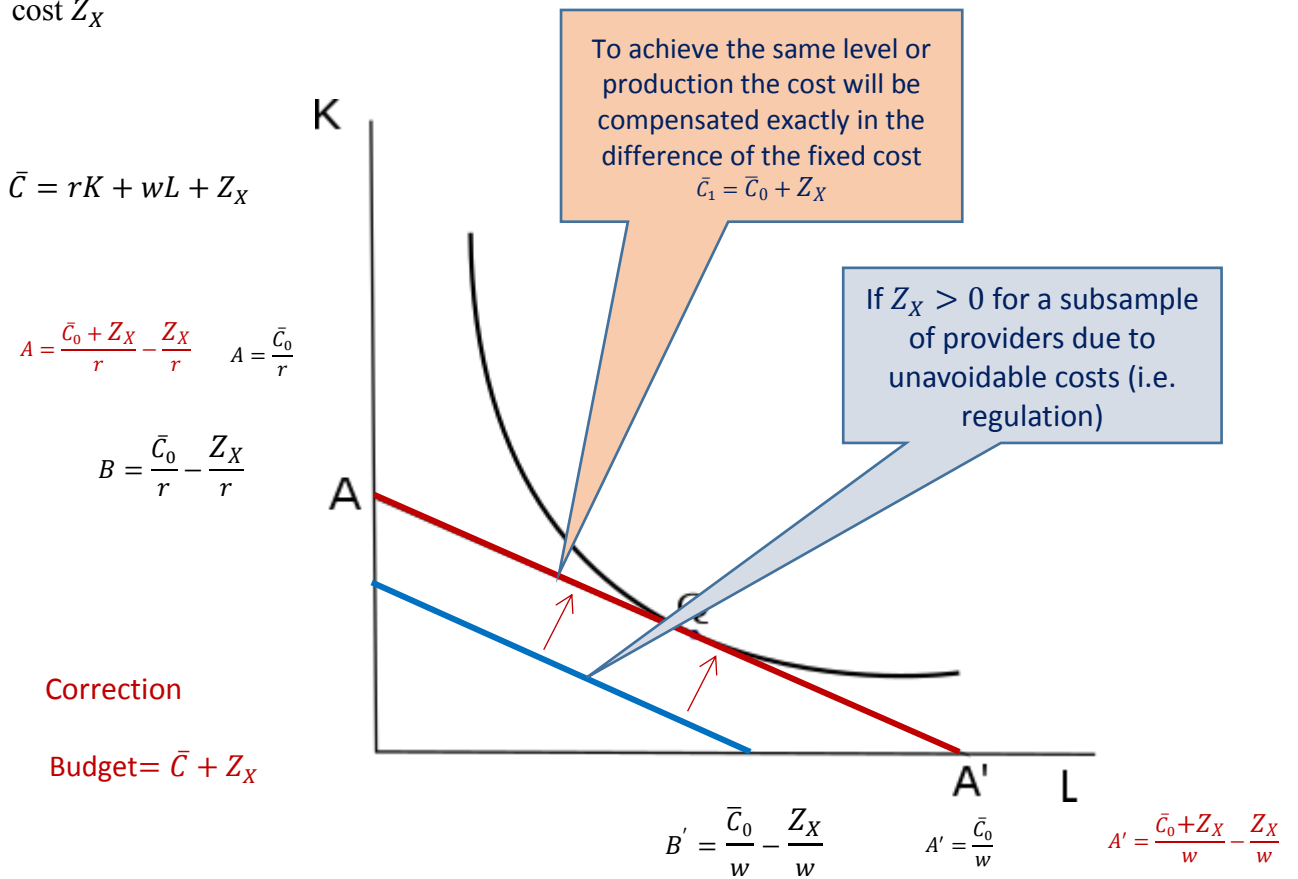$$\bar{C} + w(Z_L)L = rK + (w_0 + w(Z_L))L$$

$initial\ relative\ price = w_0/r$

$Corrected\ relative\ Price = \dfrac{w_0 + w(Z_L)}{r} \quad Z_L \uparrow$

An exogenous influence on *w* has three effects:
1. Reduce the use of factor L.
2. Change K, L mix.
3. Increase the level of budget needed to achieve Q

$S_L(Z_L > 0)$

$S_L(Z_L = 0)$

Z_L

Adjustment
wage $= w_0 + w(Z_L)$
Budget $= \bar{C} + w(Z_L)L$

D_L

Case 3: Other forms of unavoidable costs (eg differential regulatory burden)

Modelling other sources of exogenous cost Z_X

$$\bar{C} = rK + wL + Z_X$$

$$A = \frac{\bar{C}_0 + Z_X}{r} - \frac{Z_X}{r} \qquad A = \frac{\bar{C}_0}{r}$$

$$B = \frac{\bar{C}_0}{r} - \frac{Z_X}{r}$$

Correction

Budget$= \bar{C} + Z_X$

K

To achieve the same level or production the cost will be compensated exactly in the difference of the fixed cost
$$\bar{C}_1 = \bar{C}_0 + Z_X$$

If $Z_X > 0$ for a subsample of providers due to unavoidable costs (i.e. regulation)

A

A'   L

$$B' = \frac{\bar{C}_0}{w} - \frac{Z_X}{w} \qquad A' = \frac{\bar{C}_0}{w} \qquad A' = \frac{\bar{C}_0 + Z_X}{w} - \frac{Z_X}{w}$$
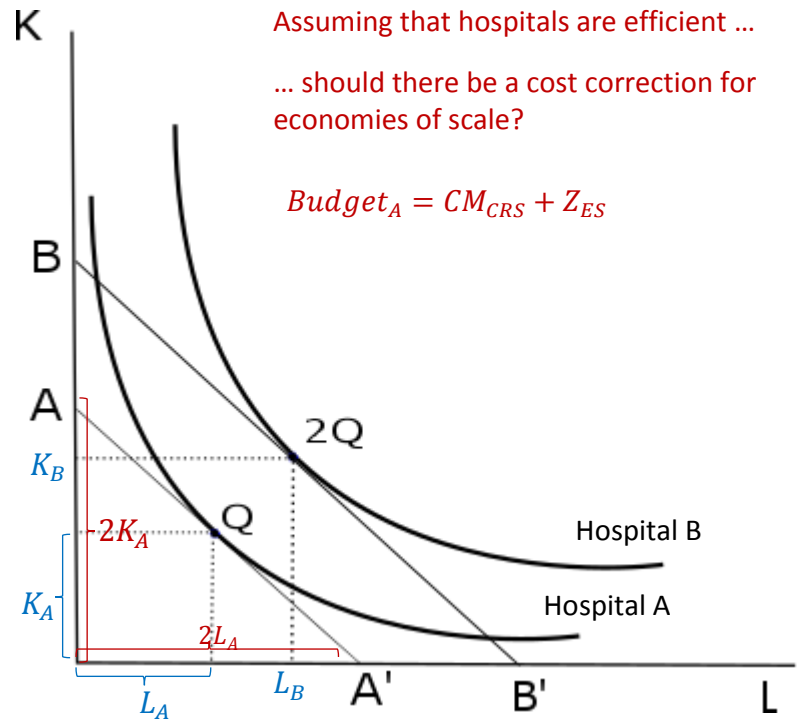
Case 4: Economies of scale

Modelling hospitals with
different economies of scale

$$C_A = rK_A + wL_A$$

$$C_B = rK_B + wL_B$$

Hospital B uses less than
twice K and L but produces
double the output (2Q) so:

$$\frac{C_A}{Q} > \frac{C_B}{2Q} \qquad CM_A > CM_B$$

Assuming that hospitals are efficient …

… should there be a cost correction for
economies of scale?

$$Budget_A = CM_{CRS} + Z_{ES}$$

Hospitals below the minimum efficient scale will produce proportionately lower output.

Annex 2: Detailed comments from Finance Directors and others

    A. Awareness of the MFF and overall views
    B. Factors that impact on the price of labour
    C. Factors that impact on the price of capital
    D. All other factors
    E. Other issues raised around strategic direction
    F. Other issues raised around implementation and handling

A: Awareness of the MFF and overall views

Awareness

- `I only got engaged when [the Trust) merged'
- `I haven't spent much time worrying about it'
- `It is what it is, there is no appeal'
- `this is not a daily or weekly issue'
- `I understand this basis and what it does. [local CCGs] think if they move activity here from [nearby provider] they make a saving'
- `it doesn't change over time and it only moves a small amount of income for us'
- `I read it all once and understood. But not recently – it's not easy for people to understand what's going on'
- `I have been here 3 months and I don't know what our MFF is – it has not come up'
- `It has not registered massively in my thinking and hasn't at my two previous Trusts either'
- `I only looked in the past when it changed'
- `This is not flashing as an issue'
- `I know what it is, that it changed 5 years ago or so. I don't know how MFF changes pass through to CCGs'
- `It's a dark art and I am not involved'
- `As an FD you can't fight every fight'
- `We have looked closely'
- `I have worked on tariff and incentives for four years' [i.e. I know it well]
- `It has become a fact of life'
- `I was engaged and involved with DH in the last review. My awareness and interest has declined since then'
- `I have not thought about it for some time'

Transparency

- `If feels opaque both as to how it is derived and what it sets out to do.'
- `How is it that such a big element is so little understood?'

- `The narrative in the past has been too detailed, without providing real clarity.'
- `There is a tendency to issue too much detail and miss out key steps – how did I get to this end-point? It may be less contentious than some other areas if it was clearly documented and people could both understand it and validate it.'
- `I suppose everyone can see everyone else's MFF but that's as far as transparency goes. Otherwise I cannot see how the numbers were reached.'
- `It's not transparent. People do not understand its basis.'

Overall views

- `Has it done what it was supposed to do?'
- 'There is a perception it is out of date'
- `Everyone thinks their own [MFF] is too low'
- `It was reviewed some years ago but didn't change so it's basically old – 10 years'
- `There has not been a proper debate on whether the factors included are still relevant'
- `They should speak more to FDs on their cost structures and it needs practical application and face validity'
- `It is fundamentally flawed'
- `It's been basically the same for 10 years'
- `It is right to review it'
- `I think MFF is about right on our costs and in my discussions around London and the South East others think the same: there is no reason to change it'
- `The basic truth is that tariff does not pay for the costs in London. So we bolt on lots of things – MFF, specialist top-ups etc – and it has got very unclean.'
- `MFF has face validity and is ok for many. People understand it can't incorporate everything without becoming infeasibly complicated.'

B: Factors that impact on the price of labour

Comments from FDs and representative bodies:

- `Of course there is a London weighting on salary and it needs to be recognised'
- `Economy wide differentials are manifestly not present in the health service. The only reasons are turnover and its recruitment costs and there may be grade inflation. The relevant costs are those of recruitment and not the private sector pay element'
- `You might pay an 8B in London and an 8A or 7 outside of it, but I am not sure there is any evidence for this. Newly qualified nurses go in at band 5 wherever they are. There is possibly a better case for managerial roles but these are such a small element of the salary bill'
- `There may be other areas [than London] of high turnover that don't get compensated in this way'
- `We have higher turnover in lower salary, unskilled roles such as cleaners, porters, catering where we compete with supermarkets etc'.
- `Why would a Portuguese nurse want to come here rather than Manchester or London' [related to recruitment difficulties in peripheral areas]

- `The centre of London is all probably pretty much the same, as is all outer London'
- `There can be blight from being so close to the fringe of London'
- `People are sucked into big Teaching Trusts if they are career minded. But this is proximity to Teaching Trusts not to London per se'
- `General issues about the area matter too – up and coming [London borough], are you on the Tube? is there any social housing?'
- `I have not noticed we are in competition with the private sector for staff, although non clinical support functions are a problem though this is not for junior staff'
- `We do have problems recruiting nurses because of pay and wider competition with London. Hence the MFF is necessary'
- `[previous work] conjectured that the PCT of location did not adequately measure where people were commuting in from, along with the cost of living that implies and the grade mix that results. London and other urban areas are pushed to pay at a higher grade and lose out. Is grade mix picked up by MFF?'
- I understand rural areas may have to pay more to get people to move there and you can't consolidate because of access'
- `Can it really be that London is 30% more expensive when everyone is on a national pay scale? This seems wrong'
- `It seems wrong to have different MFF's for organisations next to each other'
- `If I looked at us vs [nearest large urban centre], we have to pay a premium to get people to come [here]'
- `It is undoubtedly harder to recruit here than [nearby area]. It's nicer to live there. AHPs are particularly mobile and want to live in areas that suit their lifestyles. They are more focused on out-of-work lifestyles. That benefitted [other area] because of its access to countryside and [another area] because it's nice'.
- `Nurses do not move here – we rely on our own trained staff. Ditto for many medical staff especially when there is under supply and people have choices to make. These other places also often look better on the CV too.'
- `[one site] is at the bottom of the food chain. Doctors are more mobile though not as much as AHPs and nurses. Being in a rural deprived area is probably the worst of all. You get pushed into temporary staff'.
- `Recruiting into [this area] is hard. This is what has hurt one of our isolated hospitals. It's hard to recruit and retain. We get pushed into agency staff. We are trying to offer posts in two hospital locations, relying on the more attractive one. Does MFF look at this? Relative rurality?'
- `We recognise London cost of living and buildings but our costs get pushed up for other reasons'.
- `How with AfC can differences in near geographies be justified? – i.e. putting London to one side'.
- `AfC means we cannot pay low local economy wages. We get hit by other costs – premiums on agency costs to get people to travel, less natural churn as people stay put. There are high agency costs in rural areas.'
- `You need to demonstrate more clearly the validity of private sector pay scales when everyone is on national pay scales'
- `Salaries and property costs have moved against London [i.e. got higher] since MFF was last done. London is losing out'.

- `Whose perspective is this supposed to be from? It's harder to recruit in Cumbria than London. In small isolated providers if you lose one member of staff you have no choice but to recruit.'
- `There are also inner city issues: social services in trouble, deprivation, A&E's clogged with the routine frail, poor elderly. It's relentless but not interesting.'
- `We have national Terms and Conditions determining 2/3rds of costs. Use this fact. Instead we benefit London against Cornwall, Cumbria and Lincolnshire. Its argued this is because of workforce supply but these areas struggle to recruit too. Yes, we need an adjustment but not the one we have now.'
- `AfC London weighting is a no brainer. But why link to pay in the local area? In [location] we pay AfC, it's a low cost area and we still struggle to recuit. Its low cost because its poor [and unattractive]. The wider economy does not reflect our position.'
- `Who wants to live here? Agency is expensive'.
- `MFF just looks at London pay and ignores other R&R problems. [nearby bigger town] has night life, a city and is more attractive than us. It's not about local salaries'.
- `There are gaps in medical staff everywhere so people can pick and choose. Why come to a smallish DGH? The problem was less acute ten years ago.'
- `MFF needs to be simpler, stratified across the country. London is different, but even within London MFF is odd – it moves too much between nearby organisations. I think they tried to reduce this.'
- `They should reflect pay structures in the NHS: on pay it's the same in [Southern town] as in Lancashire. Only London has a pay weighting. For the rest of the country it should be the same.'
- `It will vary by staff group. In the North East it's hard to get medical staff and easy on nurses, in the South it's hard to get nurses and easier on medical staff.'
- `MFF needs to be reviewed every few years. For ancillary staff the South is reliant on migrants and this may change fast with Brexit. This has held e.g. laundry bills down but may change fast. It may not be for MFF but may need to be elsewhere in tariff on a regional basis.'
- `It's not clear any London Trust is really competing with the City.'
- `Agency costs are being treated as avoidable: they are not always.'

Note: some interviewees did not question the current basis of MFF relating to pay.

C: Factors that impact on the price of capital

- `We have a very expensive estate, a PFI. There is a structural problem in that it is based on averages and the average estate. There was old talk about incentivising better use of the estate and possibly MFF is a route. There is a great difference between PFI and an estate that has been 100% depreciated. I wonder if funding mechanisms should reflect this though I am not sure its MFF.'
- `The estate can limit any economies of scale – poor estate blocks efficiencies from size'.
- `The land and buildings element has credibility – clearly buildings in London will cost more.'
- `PFI needs to be picked up somewhere.'
- `The estate here is old and in poor quality. This is inflicting increasing costs. Its problematic and not picked up by MFF.'

- `There is a big difference between one new single site and two old multi-sites. The current model does not handle this. We have areas with massive maintenance backlogs: we lose theatre usage when the lifts breakdown and this happens a lot. We can't afford to replace it. We are in buildings not designed for modern healthcare. We will struggle with elements of Carter.'
- `Multi-site adds to the costs of staff moving from one building to another and adds site managers.'
- `If you do something for old, multi-site estate then you should for PFI too.'
- `I have appalling backlog maintenance. This is top of my concerns.'
- `Electrics have blown, IT has gone down, etc. This is absolutely the biggest problem for me. Others have similar problems as the estate of the 1960's ends its life just as capital budgets are slashed. There were significant costs at [former Trust] though not to the scale of here.'
- `Multi-site locations can be a problem but they are not always unavoidable in the real sense.'
- `I wouldn't put a PFI adjustment in MFF but you may need a PFI adjustment somewhere.'
- `The estates and property element is too low for London.'
- `Property and estates are a much higher share of costs in London than MFF allows for. It's not 3% of costs, it's more like 8-10% in London.'
- `We need a more general solution to excess MFF costs.'
- `I accept the land cost element though I don't think many are buying land now. Buildings costs even on maintenance may be higher in London – i.e. there may also be a labour element to higher costs around estates though it's probably a small element of overall costs.'
- `Trusts can choose to apply the Modern Equivalent Valuation, This can reduce capital charges and running costs but also creates a lower weighting for the MFF. Compared to staff this is not a big issue in [rural provider].'
- `We are worried over the estate. It's a slow motion car crash.'
- `We have a big PFI. It is expensive but there was insufficient public funding. The old hospital was in a state of disrepair – access was difficult, we had concrete cancer. I would rather have the expensive PFI than the old hospital.'
- `London also makes money from land sales. How is this handled?'
- `We are encouraged to impair our estates but the extent to which you can is organisational specific.'
- `Yes, the cost of capital is higher in London [northern provider]. It will create higher capital charges and higher costs when you replace capital.'
- `[Northern provider] We have underinvested locally. But is this really for MFF? Peterborough over-invested and now has stranded assets. MFF could try and cover it but how? It's a zero-sum game.'
- `This is not always a geographical issue. It sometimes reflects history. [former provider]'s investment decisions leave it with the estate it has. This includes a 200-year-old building with awful energy costs. It's not for MFF but it does impact an organisation.'
- `We need to look at PFI but it's not for MFF. It should be done as a separate transaction. Who pays for Barts? Everyone needs to undergo the asset revaluation required by NHS Improvement before re-thinking the estates and capital impacts in MFF.'

- `PFI does not get raised as much as it once was.'

D: All other factors

Teaching hospital status

Note: most interviewees who discussed teaching did not question that it imposed unavoidable costs. The main issue discussed was how far payments for teaching met these costs and the interaction with MFF.

- `We have tariff, SIFT and MFF and super-specialist deals done by the Shelford Group. You can't look at any one of these in isolation.'
- `Other sources of funding are available to insulate against tariff. [Teaching hospital] was saved by teaching, R&D etc.'
- `Four or five years ago it was ok [additional payments for teaching hospitals] – teaching money was there. But it has been cut back and additional costs are no longer covered. Junior Doctors make you less efficient in care.'
- `The difference [in financial performance] between some of the organisations I have worked for was the extent of teaching funding. This did not seem explainable.'
- `Do not include anything for teaching status: it's easier for them to recruit.'
- `Don't complicate MFF with this [issues around teaching hospital costs].'
- `You need to know how tariff interplays with teaching and research. If you begin to look at how MFF overlays teaching you will probably need to include R&D as well. All of this is held in balance within the big teaching hospitals – there is a mix of cross-subsidies and it's hard to sort one out on its own.'
- `You may need to pick up Project Diamond again depending on where this all gets to.'
- `We lost a lot on the last teaching re-basing. Yet we cannot strip out the costs.'
- `Too much goes to London. If teaching payments were sorted out, then MFF is the last distorting factor.'
- `Status and services do matter. [Provider] was at a disadvantage due to not being a Trauma Centre or a DGH for an easy life. We as a DGH struggle to recruit. Its not as simple as just teaching and non-teaching.'

The state of social and community care

- `The relative state of community health services and social care matter. Social care is not in the gift of the NHS but impacts massively on some acute trusts even if this is not a matter for MFF.'
- `MFF is way down the list. Targets, reconfigurations, cuts to social care and community health services all inflict costs that you cannot avoid.'

Economies of scale and rurality

- `Rurality has costs: we must deliver in a more distributed way. Outpatient clinics out in GP practices, diagnostics too. Community health services and ambulances are affected and they can then affect us.'
- `The potential gains from economies of scale can be limited – poor estate blocks efficiencies from size.'
- `We do know in some areas the relationship between size and efficiency or quality.'
- `[Economies of] scope issues are hugely complex.'
- `The fundamental economic units in a hospital are quite small. Big hospitals just combine more units. Economies of scale are about beds on wards, not the number of wards. The proportion of overheads between big and small is not material.'
- `I wouldn't use MFF to sort this even if there were economies of scale. It will get too convoluted and meaningless.'
- `I am not sure why, but economies of scale just don't seem to be there. Perhaps a lack of relationships in large organisations or difficulties in co-ordinating decisions on procurement for example.'
- `Perhaps suppliers refuse discounts to richer, larger providers.'
- `Yes this is an issue for Morecambe Bay. It is not for urban areas.'
- `Just size per se is not an issue for MFF, no. This is a commissioning issue and an STP issue.'
- `Not size but isolation is the issue. For Isle of Wight, Hull, Truro – yes, you may need to include something as its harder to recruit.'
- `There are no economies in an urban area. Diseconomies set in and the merger track record is poor. You get less agile. I can't see how MFF builds this in or how you would get an evidence base.'
- `Tariff does not cover the costs of a small, isolated hospital and we may go for a price modulation even if the CCG can't afford it. We want to prove the case.'
- `We have a number of smaller hospitals in rural areas, losing economies of scale and there must be others like us.'
- `Outpatients is harder to deliver in dispersed areas. Outsourcing is harder as well.'
- `It's harder to provide the full range of services. With low medical cover it's easy to get pushed into agency costs.'
- `Yes there are [a lack of] economies of scale in Cumbria. They also matter in very large hospitals where you pick up teaching and research. In between its not much of an issue.'
- `It's really about the costs of providing services to dispersed populations.'
- `I have worked in organisations from the £250m to the over £1bn. Big hospitals do benefit from size. Part of this is resilience in clinical and non-clinical services. In small teams you need to instantly recruit [if you lose someone].'
- `Transportation may be higher in dispersed areas.'

Mergers

- `We merged in-year and this meant we lost out in MFF.'
- `Boundary definition is a problem especially in smaller geographies.'
- `Sorting out mergers and alliances will be more important as integrated organisations develop. How will MFF handle them?'

Fixed costs/other cost structure issues

- `There are some big issues within tariff. You can make it more complex but ultimately large elements of cost are not related to volume e.g. A&E. The bulk of costs relate to capacity.'
- `The system needs a better understanding of costs. Not all are activity related. What costs are fixed, avoidable, unavoidable. The relates particularly to A&E.'
- `We cannot strip out costs [in the way activity-based funding assumes].'
- `The variation in costs in a DGH is small. In big specialist trusts it's bimodal or trimodal.'

CNST/NHSLA/NPfIT payments

- `NHSLA: there are historic reasons why people pay more. This is distorting but is it really for MFF?'
- `Other things have hit us e.g. when NPfIT folded, we had no choice but to pick up the costs although this is not necessarily for MFF.'

Consumables

- `For consumables there is no geographical variation except for London. You can look at NHS Supply Chain on price variation. We have looked at laundry and London was paying around 10% higher. Some other non-clinical support services bought in will be higher. This needs looking at because some companies just ship people into London to do the work and prices are not as high as the current MFF suggests.'
- `Everyone is on national procurement contracts so there is no variation in pricing.' [a number of interviewees said this]
- `How does this fit with community health services, ambulances and mental health? Fuel prices are important to ambulances but are not in the MFF.'

E: Other issues raised around strategic direction

- `How does MFF and changes to MFF work in STPs and across organisations?'
- `STPs are going down a different [payment] direction. Without PBR do you need MFF? Or a different MFF?'
- `Integration is now all the rage – is the internal market and all that came with it [i.e. PBR] still the way?'
- `Focus more on allocations and allow local areas to find their own way of recognising cost differences.'
- `We are on a block contract. Focus more on allocations.'
- `Don't play about with MFF for providers – it's all about allocations.'
- `Will MFF in its current form continue to deliver as we move away from PBR?'
- `We are on the path to an ACO using capitation. MFF will be irrelevant to the provider and critical to the CCG.'
- `What is the strategy for PBR: how effort should be put into it? There is a balance between more work on PBR vs the direction of travel in STPs, working across commissioners and providers, capitation and ACOs. Work on this would be more help than MFF.'
- `If MFF changes we might want to change our STP. It's not helpful to change planning assumptions now.'
- `Where are we going to be in four or five years' time? STPs will only work if we change the regulatory and system framework.'
- `If the delivery vehicle ends up ACO-like, then MFF is less important – possibly for cross-boundary flows and specialist work.'
- `Feed the money into STPs beyond 2016/17.'
- `Is [the costs of] modernisation supposed to be in tariff? Or off-tariff/'
- `A system control total? We don't need a war of attrition with our CCG who is also in trouble. Demand management, fines, risk – park MFF and sort these issues out instead.'
- `There is a dissonance between setting out three year allocations and then allowing tariff to change.'
- `[There is a conflict between] If we have better data on costs within tariff, should we not use them vs the strategic move to capitation.'
- `In Prime Contractor and Alliance contractor models: how do the rules apply? Some IS [independent sector organisations] look like provider and some like commissioners in these cases.'
- `Sub-contracting is an issue. IS inherit fines for any breaches. The IS should get any MFF attached but they don't always. Some providers pocket the difference.'
- `For many in STPs, the question will become `what does this mean for my PAC/MCP?'. Many are interested in the CCG impact as they are thinking about taking over commissioner functions or are off PBR, or are thinking of multi-year contracts'.
- `The lessons of Morecambe Bay were not positive. It led Morecambe Bay down a lot of effort, time and consultancy. The net result was the CCG lost out and this was self-defeating to the Trust. Local variations are not helpful.'

F: Other issues raised around implementation and handling

- `Don't start a bidding war.'
- `Avoid instability and seismic shifts.'
- `There will be some winners and some losers. Losers will kick off. If there is a long transition period, those who were meant to win will feel their costs have not been met.'
- `The result needs to be clear early enough for providers to respond and build into plans.'
- `There is not much trust in integrity. The accuracy of the calculations needs to be open to scrutiny.'
- `There are other big changes about: identification rules from NHS England, HRG4+, STPs and now MFF. What is the net impact?'
- `The timing is wrong and not co-ordinated. We are already facing massive instability from HRG4+.'
- `You need to take a view on transition across the piece – a view in the round.' [across the elements of payments systems that are changing]
- `This should not be about stability at all costs – equity is important.'
- `No one has ever listened to us on MFF.'
- `This is a zero sum game. It won't win votes [in providers] or help providers as a whole.'
- `The baseline and transparency are important. People must believe in it.'
- `We need a wider, more open-ended discussion on avoidable costs. Wider issues of staffing and PFI should be included.'
- `Don't try to get it all right, and then issue it late. Issue it early and let people engage.'
- `People need to see all the changes [in tariff and other payment systems] at the same time.'
- `It's probably unreasonable to freeze tariff on the basis we are moving to something else. But there must be some kind of balance. Equally, yes go for HRG4+ but recognise the need for some stability.'
- `National bodies need to provide more support to local areas to absorb tariff changes and respond to their needs. 80% of the work goes on working out the answer and 20% responding to the impacts it has. This is the wrong balance.'

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Supporting document C

Review of the market forces factor

Frontier Economics

Please note: The views expressed in these reports are those of the independent research teams. They do not necessarily reflect the views of NHS Improvement and NHS England.

The research presented here was commissioned by NHS Improvement and NHS England to inform a review of the market forces factor. While the research makes a number of recommendations, it is for NHS Improvement and NHS England to determine which to adopt, or to consider additional options.

Please see the document *Market forces factor review and proposed updates* for details of the proposed changes to the MFF following this review.

REVIEW OF THE MARKET FORCES FACTOR

A report prepared for NHS Improvement and NHS England

July 2017

CONTENTS

Staff at NHS Improvement and NHS England met and corresponded with Frontier Economics regularly in order to develop and steer this research project. However, the robustness of the findings are the responsibility of Frontier Economics, and the findings and views presented in this report do not necessarily reflect those of NHS Improvement and NHS England.

EXECUTIVE SUMMARY

The Market Forces Factor (MFF) is a formula that reflects cost differences between organisations in the NHS. It is designed to cover only costs that are unavoidable for providers. The MFF is a critically important formula as it is used to adjust tariff prices and revenue allocations to commissioners. It will cause tariffs and allocations to have higher values in high cost areas and lower values in low cost areas.

The main reason for this study is that the MFF was last updated in 2012, and other than some relatively small adjustments has remained unchanged since then. In this context, NHS England and NHS Improvement have contracted Frontier Economics to review the MFF.

The following are the main areas of work carried out in this report:

- Review the existing methodology for calculating the MFF;

- Develop a framework for assessing which costs should be either included or excluded in the MFF;

- Create an exhaustive long-list of cost items and test them against the criteria in the framework to decide if they ought to be included or excluded; and

- Develop methodologies for calculating and weighting each of the cost items to be included in the MFF.

Below we highlight our key findings.

1. Existing methodology for calculating the MFF

The current MFF has five main cost categories:

- Staff (excluding medical and dental) (54.9%);
- Medical and dental staff (13.9%);
- Land (0.4%);
- Buildings (2.7%); and
- Other (28.1%).

The percentages in brackets indicate the relative weight in the current MFF of each category, with the two staff categories having the greatest combined weight of 69%.

The essential reason for including an MFF factor to adjust tariffs and commissioner allocations in the NHS is to ensure that patients receive a similar level of service wherever they receive treatment in the country. This is difficult to achieve if costs that are unavoidable and non-controllable vary significantly between providers.

If unavoidable and non-controllable costs are not compensated for in some form, then patients are likely to experience lower quality services in the higher cost areas. The role of a mechanism such as the MFF is a means of compensating for higher unavoidable costs, and is a standard approach across UK government departments and agencies.

The King's Fund in a review of MFF-type measures in other parts of government, found that the main departments that allocate significant funds to local entities use some form of an area cost adjustment mechanism like the MFF. The study covered the Department for Communities' allocation of resources to local authorities, and the Department for Education's allocation to schools and further education colleges.

The MFF works by ensuring more resources are allocated to higher cost areas and less resources to lower cost areas, but this is within the context of a fixed NHS budget. This means if costs rise faster in some areas than others, the MFF will push relatively more resource to the higher cost areas and away from the lower cost areas.[1] This is the function of the MFF.

There are other reasons that could lead to changes in the MFF. It is important to note that this review is also looking at a wide range of potential costs, and these have been assessed on whether they should be included or not in the MFF. Further, we have been asked to assess whether there are better ways of estimating the MFF formulas and weights. Again, any recommended changes that arise from this analysis will cause both gainers and losers if the recommendations are accepted.

Given the potential for significant changes in resource allocation, we have attempted to be entirely transparent and clear in our analysis and in the recommendations that are proposed. All our workings and analysis are available in the report and are replicable. Our approach has been not to suggest change unless we have robust evidence to support the proposal. And, if there has been insufficient evidence to support a change, we have identified the further work that is required to develop evidence that will allow robust decisions to be made.

2. A framework for assessing which costs should be included in or excluded from the MFF

We have stated above that the costs that ought to be included in the MFF should be those that are unavoidable by providers. Given there are a significant number of costs that could potentially fall into this category, it is important to have a clear and transparent framework to aid decision-making on which costs should be included in the MFF and which should be excluded. The framework we developed addresses two main questions:

- Should a cost element be included in principle in the MFF?; and
- If so, is it practical to capture the cost element within the MFF?

The box below highlights the criteria used in assessing whether a cost element should be included in the MFF in principle. For a cost to be included the answer must be "yes" to the three criteria which cover (i) whether the cost is unavoidable or not, (ii) whether the MFF is the best mechanism to adjust for the cost

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[1] This does not happen automatically, the MFF has to be updated with new data for this new allocation to take place. It is worth noting here that if all providers' costs increased by the same amount since the last MFF review, then the MFF would not change and it would provide the same allocations as before. However, it is more likely that costs will have increased at different rates across the country, and this by itself will lead to gainers and losers under the new MFF.

difference, and (iii) whether the cost variation across providers is significant. In **Chapter 3** we describe how we have made the framework operational.

Is the cost element unavoidably higher for some providers?	Is MFF the most appropriate mechanism for adjusting for this unavoidable cost element?	Is the unavoidable element of the cost significant?
Is the variation in the expenditure item (wholly or partially) outside of the control of providers now and for the foreseeable future?	Is the variation in expenditure caused by this unavoidable element currently accounted for in an adequate manner by other parts of the payment system or other policies? Should the variation in expenditure caused by this unavoidable element be accounted for by other parts of the payments system /allocation system or other policies?	Does the unavoidable element of expenditure cause a significant variation in expenditure from one provider to another? Elements that are judged individually immaterial may need to be considered together.

The framework also considers whether it is practical to capture the cost element within the MFF – see the box below. This practicality test checks (i) whether cost items would be consistent with positive incentives and the avoidance of unintended consequences and (ii) whether it would be practical to include the costs. Again, for any cost to be included in the MFF, the answer must be "yes" to both questions.

Is inclusion in MFF consistent with positive incentives?	Is it broadly practical to include the unavoidable cost element?
What changes in incentives would providers likely experience following the inclusion of this unavoidable element? Is there a strong possibility that adjusting for this unavoidable element within the MFF would result in significant unintended consequences in terms of providers' behaviour?	Is data currently available to account for this element? If not, how difficult and onerous is new data collection likely to be? Is the effort required to recalculate this element each time likely to be proportionate to its effect on providers' funding?

In summary, the framework asks that any cost item must pass the five tests described above to be included in the MFF. This framework is used to provide

recommendations of the costs to include in the MFF, and it is also intended that NHS Improvement and NHS England can use the framework for any future assessment of costs. The results from this analysis are described below.

3. Applying the framework to assess the cost elements to include in the MFF

Frontier was asked to consider a long-list of potential cost items or cost drivers. These were identified by NHS Improvement and NHS England, based on previous research by the King's Fund and other existing work. Frontier also contributed to the list by drawing on its knowledge of cost drivers in the regulated sectors in the UK economy.

The cost items that passed the tests set out in the framework are:

- Labour market pressures;
- Buildings costs;
- Land costs; and
- Business rates.

The analysis found that items including costs of utilities, complexity of casemix and capital financing structure should be excluded from the MFF. The table below lists the full set of 18 expenditure items and cost drivers,[2] and shows the results from assessing each item using the framework and each of the three "in principle" criteria described above.[3] If any element fails, one criterion it's not assessed against the remaining criteria. The elements are ordered based on the results of the assessment and then sorted alphabetically.

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[2] The cost elements are deliberately kept separate at this stage. When we consider calculation options we may recommend that two or more elements are combined.

[3] To assess significance we estimate the maximum unavoidable impact of each element. We discuss the calculation of these unavoidable impact figures and what we consider to be significant in **Chapter 4**.

Summary of cost and cost driver assessment

Cost element	Unavoidable	MFF most appropriate mechanism	Significant	Include
Buildings depreciation	Yes, trusts will be unable to control the cost of building inputs in their area. This will lead to some unavoidable variation in building values and depreciation charges.	Yes, all trusts are required to depreciate their buildings and the cost of building will vary unavoidably between providers.	Yes, in our view the maximum unavoidable impact is significant	☑
Business rates	Yes, the unit market rental values of commercial land and buildings will exhibit unavoidable variation. Certain trusts will have to make business rates payments which are to some degree unavoidably higher than others.	Yes, providers who own their buildings will have to make business rates payments. Providers who lease their buildings will pay business rates indirectly via a rental or management charge. These cost will vary unavoidably between providers due to variation in market rental values.	Yes, in our view the maximum unavoidable impact is significant	☑
Labour market pressures	Yes, trusts are unable to influence prevailing local wage rates. Trusts in certain locations are obliged to pay equivalent staff more. This element covers all staff employed by providers. Certain groups of staff (e.g. medical and dental) may be affected differently by labour market pressures than other groups (e.g. administrative and clerical staff). We will consider this in detail when assessing possible calculation methods.	Yes, all trusts are affected by variation in staff costs and there is a consistent pattern to the effect. Staff costs are closely linked to activity such that an activity uplift is appropriate.	Yes, in our view the maximum unavoidable impact is significant	☑
Variation in cost of building leading to higher capital charges	Yes, trusts will be unable to control the cost of building inputs in their area. This will lead to some unavoidable variation in building values and financing costs such as public dividend capital (PDC) charges.	Yes, all trusts have to finance their buildings and there is a consistent pattern to the effect on input costs.	Yes, in our view the maximum unavoidable impact is significant	☑
Variation in cost of land leading to higher capital charges	Yes, unit land values will vary around the country and trusts will be price takers in this regard. This will lead to some unavoidable variation in financing costs such as PDC charges.	Yes, all trusts will have to pay capital charges on their land and the cost of land will vary unavoidably between providers.	Yes, in our view the maximum unavoidable impact is significant	☑
Cost of utilities	Yes, electricity, gas and water input prices are unavoidably higher in certain areas.	Yes, utilities costs will affect all providers, constitute a regular annual charge and reflect a consistent pattern in input prices.	No, in our view the maximum unavoidable impact is not significant	☒

Cost element	Unavoidable	MFF most appropriate mechanism	Significant	Include
Capital financing structure	Yes, in some cases, there is an unavoidable element to some capital expenditure repayment costs as contracts may be long term in nature and the terms will exhibit variation. However, this may be as a result of previous management decisions by the provider.	No, we do not recommend that capital expenditure structure (e.g. public finance initiative (PFI) vs. Department of Health (DH) loans) are compensated via the MFF. This is because each arrangement is unique and requires individual attention. Also lump sum payments may be more appropriate than activity based compensation.	Not assessed as didn't pass MFF most appropriate criterion.	☒
Clinical Negligence Scheme for Trusts (CNST) payments	Yes, some providers will have unavoidably higher payments than others due to the type of services they provide.	No, tariffs for Healthcare Resource Groups (HRG) sub-chapters and the tariff cost uplifts have already been uplifted to reflect CNST contributions	Not assessed as didn't pass MFF most appropriate criterion	☒
Complexity of casemix	Yes, providers who see more complex cases on average will have unavoidably higher costs per patient than providers who offer more routine services.	No, the current system already reflects difference in casemix via HRG currencies and specialist top-ups.	Not assessed as didn't pass MFF most appropriate criterion	☒
Fragile local health economy	Yes, characteristics of a given local health economy, including social care, are likely to unavoidably impact on secondary providers' efficiency. Secondary providers may be unable to control these factors.	No, other measures are in place to deal with this issue such as Delayed Transfer of Care payments and the Better Care Fund. The best solution is to address struggling aspects of a health and social care system directly.	Not assessed as didn't pass MFF most appropriate criterion	☒
Inefficient estate set-up	Yes, the layout and characteristics of a provider's estate will impact their efficiency and this cost will be partially unavoidable at least in the short and medium term. However, this may be as a result of previous management decisions by the provider.	No, in our view adjusting for estate efficiencies does not fit within the MFF. Specific trusts who cannot access finance to improve their estate may require compensation which is not based on activity.	Not assessed as didn't pass MFF most appropriate criterion	☒

Cost element	Unavoidable	MFF most appropriate mechanism	Significant	Include
Rurality/remoteness	Yes, previous work has found that a small number of remote sites suffer additional unavoidable costs due to their size.	No, in our view these costs should be compensated via local arrangements to reflect the existing national rurality adjustment to Clinical Commissioning Group (CCG) allocations.	Not assessed as didn't pass MFF most appropriate criterion	☒
Training costs	Yes, some providers will undertake more training than others	No, training tariffs are already in place	Not assessed as didn't pass MFF most appropriate criterion	☒
Travel time	Yes, certain areas will have unavoidably higher travel times than others. Providers in these areas who deliver services off-site will experience higher costs.	No, only a small number of providers will be affected (community and mental health trusts in rural areas). These trusts could be compensated separately if necessary. One option would be to extend the existing travel time allocation adjustment which currently only covers ambulance trusts.	Not assessed as didn't pass MFF most appropriate criterion	☒
Asset renewal costs (not including land and buildings)	No, asset renewal costs will generally not vary unavoidably; therefore there is no need to include a compensating adjustment.	Not assessed as didn't pass avoidable criterion.	Not assessed as didn't pass avoidable criterion.	☒
Cost of purchasing supplies	No, in our view the cost differences arising from purchasing supplies are likely to reflect fixable inefficiencies rather than intrinsic differences between providers.	Not assessed as didn't pass avoidable criterion.	Not assessed as didn't pass avoidable criterion.	☒
Multi-site costs	No, generally trusts will be able to determine the number of sites from which they operate. There is no compelling reason why multi-site trusts will have higher costs.	Not assessed as didn't pass avoidable criterion.	Not assessed as didn't pass avoidable criterion.	☒

4. Options for calculating and weighting the cost items

The final stage in this report has been to assess the calculation options for each of the cost items that were identified as suitable for inclusion in the MFF.

Staff MFF components

We have examined calculation options estimating unavoidable costs for three staff groupings:[4]

- Non-clinical staff;
- Non-medical and dental clinical staff; and
- Medical and dental staff.

The original terms of reference recognised the high weighting and importance of the staff elements of the MFF, and this is because even relatively small changes to it can have important resource allocation consequences.

The current formula for calculating both non-clinical staff and non-medical and dental clinical staff costs is different from the calculation for the medical and dental staff index. The current medical and dental staff index gives a small uplift to London trusts which reflects the London weighting they are obligated to pay.

The method for calculating the non-clinical staff and non-medical and dental clinical staff index is called the General Labour Market (GLM) method and research by the King's Fund has shown that variants of this method are used in other parts of government for estimating staff costs.

It is important to consider two important factors in the arguments for and against the use of the GLM. The first relates to whether the external drivers that have influenced wage setting in the private market (such as housing costs and the attractiveness of the area) are the same for staff in the NHS. The second is whether institutional factors such as national wage agreements are likely to weaken the match with private sector wages for comparable workers in a provider's local area, and whether any mismatch leads to any indirect costs.

It can be seen that a key piece of analysis in this report is about deciding how appropriate the GLM approach is for developing an MFF staff index. Indeed, it may justifiably be asked why the GLM approach is not used currently in the case of medical and dental staff. We have re-assessed the case for maintaining the use of the GLM approach for non-clinical staff and non-medical and dental clinical staff, and for completeness, we have also considered whether the GLM approach is relevant to calculating the medical and dental staff index.

The GLM method and its rationale are described in the box below.

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[4] Non-clinical staff includes estates and ancillary, and administrative and clerical staff. Non-medical and dental clinical staff includes nursing and midwifery, additional clinical services, healthcare scientists, additional professional scientific and technical staff and allied health professionals. The creation of these grouping is discussed in detail in **Chapter 6**.

GENERAL LABOUR MARKET METHOD

The GLM method is based on the economic theory of compensating wage differences. A simple explanation of this is that if an employer is located in an area that is high cost (e.g. housing costs are high) or the area is perceived to be unattractive, then they will need to offer a higher remuneration to attract employees with a given set of skills. If they do not do this they are likely to face indirect costs. Indirect costs include attracting lower quality staff and facing higher turnover and/or higher vacancy rates, as examples.

To calculate such wage differences involves a statistical analysis that examines the wage differences of comparable workers in different parts of the country. Currently, the MFF staff index (covering non-clinical staff and non-medical and dental clinical staff) uses the GLM statistical model using private sector wage data to calculate the area differences in wages for its employees. The rationale for doing this is that it is the best proxy for "real" NHS staff costs. For example, if trusts can match private sector pay in their areas then they can maintain services but at a direct cost on the pay bill. Alternatively if they pay below the private sector rate this could well mean that trusts fail to attract or retain the quality of staff they need, and/or face other indirect costs such as higher turnover rates and higher vacancies.

Non-clinical staff

The non-clinical staff grouping covers a wide range of occupations that include individuals working in estates and ancillary jobs and also administrative and management positions. We argue that these NHS employees do have outside opportunities in the local private labour market, and that if trusts do not pay the "going rate" in the private sector they will lose a significant number of employees, hire less qualified employees or face other indirect costs. We observe regional wage variation that shows that trusts who operate in high cost areas tend to pay these groups more on average. Our recommendation is to continue with the GLM approach for this group.

Non-medical clinical staff

This group includes nursing and midwifery staff. We explain that this staff group also has the potential to switch to other occupations in their local labour markets where their skills can get them a more competitively paid job. It may not be as fluid as with non-clinical staff, but the labour market pressure is still likely to be there. We observe regional wage variation for these groups in the statistical analysis.

However, an important issue to consider is the role national wage agreements have on staff pay differentials across geographies, in particular Agenda for Change.[5] We show evidence to suggest that these factors can reduce geographical variation in pay. However, it is always important to assess whether

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[5] Agenda for Change applies to both NHS Trusts and Foundation Trusts. However, the agreement offers Foundation Trusts greater flexibility in certain areas; these are set out in Annex 11 of the Agenda for Change Handbook. It is also possible for Foundation Trusts to opt out of Agenda for Change although this is very rare. http://www.nhsemployers.org/employershandbook/afc_tc_of_service_handbook_fb.pdf

such "compression" of the geographical wage distribution generates additional indirect costs. For example, if wages are compressed below the going rate in an area we would expect to see indirect costs such as higher vacancy rates, higher turnover and greater use of agency, etc. Our findings indicate that there is evidence of these costs and, therefore, our recommendation is to continue with the GLM approach for this group.

Medical and dental staff

Our analysis indicates that the labour market for medical and dental staff behaves differently from most other occupations. Pay rates for these staff are relatively flat across the country, but there is also mixed evidence on indirect costs affecting trusts. Stakeholders have suggested that there is an attractiveness to working in the larger trusts in urban areas and these factors can compensate for the higher costs experienced in urban areas, in London in particular. Interestingly, for nearly all staff groups it is possible to observe statistical differences in wages for comparable workers in and around London relative to the rest of the country; this is the case for nurses and midwifes for example. However, the comparable statistical analysis for medical and dental staff generally shows no evidence of area wage differences for this occupational group.[6] However, due to a lack of precision in the estimates, our analysis could not definitely rule out the hypothesis that London trusts were paying higher total wages in line with the London weighting. Therefore, given that we know that providers in London are obliged to pay uplifts to medical and dental staff our recommendation is to continue with the current model.

Non-staff MFF components

Buildings: we recommend that the current method for reimbursing unavoidable building costs is retained, but with some small refinements to more accurately weight the index to take account of the role of different sites in a provider's overall index.

Land: we recommend that the current method for reimbursing unavoidable land costs is retained. Further work is required to investigate the potential distortive effects of this index, and additional mechanisms to limit potential over-reimbursement of providers in expensive areas should be considered.

Business rates: we recommend that an approach based on local area differences in business rates is adopted for the calculation of the index (the details of which are set out in the main report).

Weighting

As outlined above, we propose that the MFF will include the following sub-indices:

- Medical and dental (M&D) staff;
- Clinical (non-M&D) staff;

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[6] This is also the case when we extend our analysis to consider each Government Office Region of England separately.

- Non-clinical staff;
- Land;
- Buildings; and
- Business rates.

It will also include – as in the current MFF – an "other" component for costs that do not vary between providers. These are costs which are not higher or lower in different locations, and therefore this MFF sub-index has the same value (1.00) for all providers.

We recommend that these sub-indices of the MFF are weighted in proportion to their share of total provider costs (as per the current MFF). We also recommend that these weights are calculated separately for different provider types (acute, mental health, community and ambulance). We recommend that each provider is designated a primary type, and given the corresponding weights for that type, so the MFF more accurately reflects variations in cost structures.

Geographical boundaries

The current geographical boundaries in the staff index of the MFF are CCG areas. There is no clear labour market economic rationale for the use of such boundaries.

We provide an economic argument for defining the appropriate boundaries to be used in the GLM context. Conceptually, the ideal approach would be to define the size of the geographical labour market for each area. The definition and calculation of Travel to Work Areas (TTWAs) follows this conceptual framework.

We recommend adopting a more simplified model based on calculating factors at the TTWA level.

The TTWA method is related directly to labour market areas as opposed to the current administrative boundaries. It also requires less complicated data manipulation than the current model.

This allows the estimated differences in the staff index between TTWAs to be based on sound economic reasoning.

Looking ahead

Every time the MFF is updated, there may be significant winners and losers. NHS Improvement and NHS England should consider the use of transition arrangements to minimise the risk of significant revenue and allocations fluctuations for providers and commissioners. In our view the appropriate frequency for updating the MFF is in line with tariff updates.

Our work has reviewed the MFF within the context of the current NHS payment system and fundamental changes of the system have not been considered. Yet NHS structures are evolving and the MFF may need to adapt. We believe that the basic principles and underlying rationale for the MFF will remain. The current MFF is (as far as possible) location based and we believe this is adequate to deal with a range of potential new organisational structures. For any given service in any given location it is possible to calculate the appropriate MFF, which can then

be weighted to organisational level if required. Which factors should be included or excluded from the MFF may change over time too, so this should be revisited periodically by NHS Improvement and NHS England. The conceptual framework we developed (see **Chapter 3**) will enable such assessments to be carried out in future.

1 INTRODUCTION

1.1 Background

The Market Forces Factor (MFF) is currently an estimate of unavoidable (non-controllable) cost differences between health care providers based on their geographical location. The MFF is there to ensure that payments across the NHS are made in a way which does not advantage or disadvantage patients depending on where in the country they are treated. The aim is to provide additional compensation for providers that face higher costs to ensure that they are able to deliver the same level of care as providers in less expensive areas.

There is evidence that the current approach to calculating the MFF is poorly understood and administratively burdensome to calculate and apply. It is also possible that the MFF fails to accurately reflect the true unavoidable costs faced by providers, resulting in a potentially distortionary redistribution of resources.

The current estimates of the MFF are based on out-of-date data and the cost categories currently included in the MFF have not been reviewed for a number of years. This means the MFF does not currently provide a route for capturing a broader range of unavoidable costs facing providers.

NHS Improvement and NHS England commissioned Frontier to review whether or not the composition of and calculations used to calculate the current MFF were fit for purpose and to suggest how the methodology could be improved going forward. Specifically, Frontier was asked to:

- Develop a framework to assess costs and cost drivers for inclusion in the MFF;
- Carry out an assessment of which non-controllable costs should be included in the MFF going forward;
- Suggest options for how each of the component parts of the MFF should be calculated going forward; and
- Suggest a method for weighting each of the component parts of the MFF.

Wholesale changes to the structure of the MFF, for example moving from an uplift applied to prices to lump sum transfers, were outside the scope of our work.

1.2 Methodology

We used a range of analytical methods and approaches to enable us to meet the project objectives. Our work involved a review of existing literature and regulatory documents in other sectors, a review of public and NHS Improvement/NHS England internal documents, data and descriptive analyses of a range of data sets, large scale econometric work using administrative and survey data sets and detailed discussions with colleagues at NHS Improvement and NHS England during a series of workshops held at crucial points during the project. Our work

was reviewed in detail by Professor Richard Disney[7] who provided input at key stages of the project.

Specifically, the project involved a number of steps:

Step 1: Understanding the current system. We undertook a thorough examination of the methodology used to calculate the current MFF. Specifically, we reviewed all publicly available documentation as well as documents and data held by NHS Improvement and NHS England relating to each of the components of the MFF. For each component of the MFF we reviewed the data sources used, the methods for processing the data and the resulting index values. This allowed us to gain an in-depth understanding, including being able to replicate, the current methodology. To aid our review of the MFF, we were granted access to all relevant data held at NHS Improvement and NHS England as well as access to relevant staff within the organisations to answer our queries and provide clarification.

By far the most complex part of the MFF is the non-medical and dental staff index which follows the General Labour Market (GLM)[8] method and has most recently been estimated by the University of Aberdeen (UoA). Our review of this component of the MFF involved regular communication and a workshop with UoA to get a full and thorough understanding of the detailed workings of the GLM method. Ultimately, this allowed us to create a statistical model replicating as closely as possible the current methodology.

Step 2: Developing a framework for determining the components of the MFF. During this phase of work we developed a framework to help us determine whether the current elements of the MFF as well as a range of other expenditure items and cost drivers should be included in the MFF in future. In designing the framework we drew on our knowledge and expertise of regulation in other UK sectors as well as other jurisdictions. We also reviewed relevant documents and research to ensure that we understood how similar adjustments were carried out in other sectors. In addition to the document review and drawing on our regulatory expertise, we held two workshops with colleagues at NHS Improvement and NHS England to agree the framework.

Step 3: Assessing cost elements against the framework. During this phase of work we carried out a detailed and evidence based assessment of a long-list of expenditure items and cost drivers against the framework to determine if they warranted inclusion in the formula. The list involved 18 expenditure items and cost drivers. The existing components of the MFF were included alongside a range of additional expenditure items and cost drivers based on previous research by NHS Improvement, NHS England and the King's Fund as well as our

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[7] Professor Disney is a renowned academic expert in the field of labour economics and its application to public sector pay issues. Richard is a visiting Professor in Economics at University College London, a part-time Professor of Economics at the University of Sussex and Research Fellow at the Institute for Fiscal Studies. He was previously a member of the Senior Salary Review Body (2009-14) and the NHS Pay Review Body (2003-09). He has researched and written very widely on labour markets, pensions and pay, including publishing many papers in peer reviewed journals on the issue. Outside the NHS pay review work he was a member of the pay review team for the independent Review of Police Officer and Staff Remuneration and Conditions and has written widely on pay issues.

[8] The GLM method is a statistical process that attempts to proxy the private sector wage a given individual would be able to command if they were employed in different parts of the country concurrently. This is discussed further in **Chapter 6.2.**

knowledge of other regulated sectors. Our assessment of the cost elements was discussed at a workshop with colleagues from NHS Improvement and NHS England.

Step 4: Developing methodology for calculating MFF components. During this phase of work we developed options for calculating the MFF components which were deemed worthy of inclusion in the MFF formula following the assessment against the framework (in Step 3). This was followed by an evidence based assessment of the strengths and weaknesses of each potential methodological option against a set of criteria (accuracy, simplicity, incentives) enabling us to select a preferred option. During this phase of work we carried out large scale econometric analysis of administrative and survey data sets, descriptive analysis of other NHS accounting data, review of alternative data sources and economic thinking. The methodological options we designed (including the options for how they should be weighted to construct the overall MFF index) were debated at length with colleagues from NHS Improvement and NHS England during a workshop.

Step 5: Reporting. During this phase of work we compiled our thinking and the evidence gathered into this report. While discussions with NHS Improvement and NHS England throughout the work informed our final assessment, all recommendations contained within this report reflect the views of the authors and not those of NHS Improvement or NHS England.

1.3 Structure of this report

The report is structured as follows:

- **Chapter 2** presents a high level overview of the MFF as it currently stands;
- **Chapter 3** presents the framework we designed to assess which expenditure items and cost drivers should be reflected in the MFF;
- **Chapter 4** assesses a number of expenditure items and cost drivers against the framework and recommends which should be captured in the MFF;
- **Chapter 5** presents the framework we designed to assess calculation options of included expenditure items and cost drivers;
- **Chapter 6** discusses the calculation options for the staff component of the MFF;
- **Chapter 7** discusses the calculation options for the non-staff components of the MFF;
- **Chapter 8** discusses how the different components of the MFF fit together and discusses how their weighting should be calculated; and
- **Chapter 9** considers strategic issues for the MFF going forward and concludes.

2 THE CURRENT MARKET FORCES FACTOR

SUMMARY

- The MFF is defined in Monitor's (2016) Guide to the Market Forces Factor as "an estimate of unavoidable cost differences between healthcare providers, based on their geographical location".

- The current MFF assigns each provider a value for each of five sub-indices: land, buildings, staff, medical and dental London weighting, and other.

- Each sub-index is calculated to reflect the unavoidable costs that health care providers face that result from geographical differences in land, building and staff costs.

- A set of weights (based on the average expenditure on each of the expenditure categories of all healthcare providers across England) is used to weight the indices and provide distinct values for each provider.

- For this study, NHS Improvement and NHS England asked that the scope of MFF be broadened to consider all unavoidable cost differences between health care providers and not simply those that are driven by geography.

2.1 Definition and rationale

The MFF is defined in Monitor's (2016) Guide to the Market Forces Factor as "an estimate of unavoidable cost differences between healthcare providers, based on their geographical location".

The underlying rationale for the adjustment is to recognise that some inputs are like-for-like more expensive in some areas of the country for reasons beyond the control of the health care provider e.g. the cost of buildings or the price of land. The MFF aims to adjust national prices and payments in the NHS to ensure that patients are neither advantaged nor disadvantaged by the relative level of unavoidable costs in different parts of the country.

The MFF is a relative adjustment, seeking to level the playing field between providers across the country, and does not set out to reimburse providers for the total costs they incur but to account for the unavoidable differences in costs. Importantly, it does not introduce any additional funding into the NHS. It exists simply to redistribute existing funding and is a zero sum game: any increase in one provider's MFF value (holding all others constant) will increase their income but lower the income of other providers. In other words, it seeks to level the playing field between health care providers across the country.

The MFF is used in two different ways to affect relative funding. Firstly, the MFF values[9] adjust national tariff values for NHS providers. Secondly, the underlying[10] MFF values inform Clinical Commissioning Group (CCG) allocations.[11]

For this project NHS Improvement and NHS England asked that the definition of MFF be broadened to consider all unavoidable cost differences between health care providers and not simply those that are driven by geography. The working definition of MFF for this work was therefore agreed to be "*an estimate of unavoidable cost differences between healthcare providers*".[12] We use this broader definition in **Chapter 3** when considering what factors should be reimbursed via the MFF.

2.2 Current composition and calculation of the MFF

The existing MFF is composed of five sub-indices, which each relate to one or more unavoidable geographical cost differences. These individual indices are calculated separately and then weighted to create a single MFF figure for each healthcare provider. This provider-level figure takes into account that providers may have multiple sites each with their own levels of unavoidable cost. The five sub-indices that are currently included are:

- Staff index;
- Medical and dental London weighting;
- Buildings index;
- Land index; and
- Other index.

These are described at a high level in the sub-sections that follow.

2.2.1 The staff index

The staff index is the largest component of the MFF, covering all non-medical NHS staff. On average it accounts for 54.9% of total running costs.[13] The stated rationale for the index is the assumption that the cost of employing non-medical NHS staff varies around the country, according to the broader labour market.

The estimation of variation in staff costs according to a private market benchmark has been referred to as the General Labour Market (GLM) method.[14] For the MFF, the application of this method has been developed and implemented by researchers at the Health Economic Research Unit of the University of Aberdeen. The GLM method is a statistical process that attempts to proxy the private sector wage a given individual would be able to command if they were employed in

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[9]   Standardised so the minimum value is 1.

[10]   Such that the average index value across all organisations is 1.

[11]   Commissioners' MFF values are based on the providers from whom they purchase services. If commissioners switch services from one provider to another their MFF values will temporarily be out of date. This will be fixed when the index is updated.

[12]   Primary care was outside the scope of the current report as it is not funded through the national pricing system. However, in practice, many of the considerations may be similar.

[13]   Total running costs refer to profit and loss costs. They cover all operating expenses as well as an estimate of capital financing costs.

[14]   Elliott et al. (2006).

different parts of the country concurrently. The relative private sector wages in different parts of the country are then used to create an index of unavoidable wage costs for different local areas. The data source for the index is the Annual Survey of Hours and Earnings (ASHE).[15] The GLM approach removes the effect of different occupational and industrial structures on pay between different parts of the country.

The local area[16] each healthcare provider operates in determines the initial MFF staff index value they are allocated. But, these initial staff index values subsequently go through a smoothing process to eliminate "cliff edges" between neighbouring geographic areas. The smoothed values still result in cliff edges between providers who are operating on different sides of a geographic boundary but operate in the same labour market. An interpolation process is then applied which takes account of the location of the providers' sites within a geographic area as well as the distance to other geographic areas. Interpolation is essentially provider-level smoothing after smoothing at the geographic area level. The resulting index values are the final MFF staff index values attributed to healthcare providers. Currently the values of the underlying staff index range between 0.8746 and 1.2340[17] suggesting that the highest cost provider has labour costs, unavoidably, around 40% higher than the lowest cost provider.

Further detail on the current calculation method of the staff index is included in Monitor's MFF guide (2016) and we also discuss it further in **Chapter 6** as part of our discussion of alternative calculation methods.

2.2.2 Medical and dental London weighting

The stated rationale for the medical and dental London weighting index in the current MFF is that providers in London incur higher medical and dental staff costs relative to the rest of the country due to the London weighting that providers in London are obliged to pay medical staff in the form of a specific uplift to their salary.

Previous research by the Health Economics Research Unit found no support for the use of private sector benchmarks for doctors in the MFF. Their findings revealed no association between the spatial pattern of private sector pay and NHS doctor vacancy rates (Elliott et al., 2006). The GLM method was used in the calculation of non-controllable cost differences between providers for medical and dental staff costs prior to 2009/10 but was then removed, and the medical and dental London weighting was incorporated instead.

The current index values are calculated using Electronic Staff Record[18] data on the average pay bill for hospital doctors across the country in 2008/09. London weighting payments are calculated as a proportion of this total pay bill – 2.24%. London providers are then assigned an index value of (1.0224) to reflect these higher costs while all other providers are assigned a value of 1. The weight for

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[15] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annual surveyofhoursandearnings/previousReleases

[16] Currently defined using CCG boundaries.

[17] This includes PCTs who in 2010 were providers of community services. The range excluding PCTs is 0.8746 to 1.1989.

[18] https://www.electronicstaffrecord.nhs.uk/home/

the index reflects the average proportion of expenditure accounted for by medical and dental payments. See Monitor's MFF guide (2016) for more details.

2.2.3 The buildings index

The stated rationale for the buildings index in the current MFF is that similar buildings have a different worth and hence incur a different cost in different parts of the country. This is partially because construction costs can vary by location (e.g. due to different wage costs of construction workers). Providers in areas with high building costs will be forced to pay higher annual capital and depreciation charges[19] (Monitor, 2016).

The buildings index measures the differences in unit construction costs using Building Cost Information Services data which capture average building costs in different locations around the country. This is used to derive location factors. To create the buildings index the location factors are divided by the mean value. A provider's index value is a weighted average of the location factors for areas it operates in. The values of the buildings index range between 0.89 and 1.28. See Monitor's MFF guide (2016) for more details.

2.2.4 The land index

The stated rationale for the land index in the current MFF is that the cost of acquiring land and the associated capital charges paid on that land vary significantly around the country.

The land index, unlike other indices, is specific to each provider and uses the Net Book Value (NBV) of land per hectare for each provider to create an index. Each provider completes audited summarisation schedules which contain these values. The average for each provider is calculated and divided by the overall average (for all providers) to create a standardised index. The values of the buildings index range between 0.016 and 19.550 (hence the most expensive provider's land is around 1,200 times the cost of the cheapest). See Monitor's MFF guide (2016) for more details.

2.2.5 The "other" index

The final step in creating an overall MFF index for each provider is to weight the individual indices described above by a factor reflecting the average "weight" of these different inputs (staff, buildings, land) across all providers' costs.[20] As all costs are included in these calculations, the "other" index captures those costs for which there is no evidence of unavoidable variation around the country. All providers receive a value of 1 for the "other" index to reflect this.

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[19] Examples of these charges include public dividend capital (PDC) charges, Department of Health (DH) loans and private finance initiatives (PFIs).

[20] The average is calculated based on national expenditure and so does not truly reflect an "average" provider as it will be influenced more by larger providers than smaller providers.

2.2.6   Calculation of the overall index

The overall MFF is a weighted average of each of the sub-indices. The weights are currently calculated using the proportion of overall spending across all providers attributed to each of the relevant categories (staff, medical and dental (M&D) London weighting, buildings, land and other).

We have illustrated the current weights in **Figure 1** below.

Figure 1   Proportion of expenditure attributable to each element of the MFF
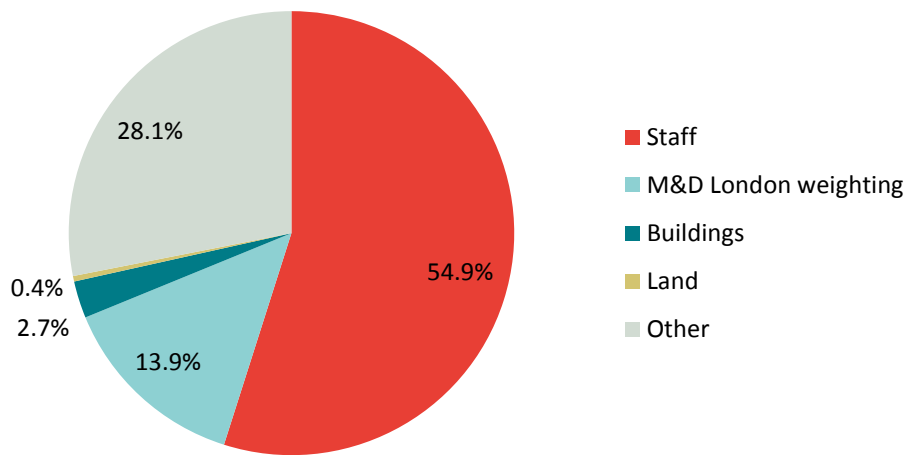
Source: Monitor (2016)

Note: The weight for the staff index is based on total spending on non-medical and dental staff and the weight for the medical and dental London weighting is based on the total spending on medical and dental staff. The weights for the buildings and land indices are based on an estimate of the capital charges which relate to buildings and land respectively (using the PDC) rate as a default) and buildings depreciation charges

3 FRAMEWORK FOR DETERMINING MFF COMPONENTS

> **SUMMARY**
>
> ▪ We have developed a framework to enable a systematic assessment of whether cost drivers and expenditure items are suitable for reimbursement via the MFF.
>
> ▪ The framework uses a two stage assessment process. The first stage considers whether an expenditure item or cost driver should be included in principle. For this stage, three questions are posed:
>
> 1. Is the cost element unavoidably higher or lower for some providers?
>
> 2. Is the MFF the most appropriate reimbursement mechanism for this unavoidable cost element?
>
> 3. Is the unavoidable cost element <u>significant enough</u> to warrant reimbursement via the MFF?
>
> ▪ If a cost element passes each question in the first stage of the assessment process, a second stage assessment is undertaken. The second stage considers the practicalities of capturing a specific cost element within the MFF. For this stage, two questions are posed:
>
> 1. Is capturing the cost element within the MFF consistent with positive incentives?
>
> 2. Is it broadly practical to capture this cost element within the MFF?
>
> ▪ Cost elements that pass this second stage assessment are then taken to a further stage of assessment, which considers in detail the possible mechanisms for capturing their effect via the MFF. This is a looping assessment, such that each possible approach is then considered in detail against the second stage assessment criteria of positive incentives and practicality before a final conclusion and recommended calculation approach are reached.

3.1 Introduction

A large number of expenditure items or cost drivers were identified by NHS Improvement and NHS England as being worthy of consideration as possible unavoidable[21] costs that could be suited for reimbursement via the MFF. We reviewed and made some revisions to the list based on our experience of working on unavoidable costs in other sectors.

The starting point for our work was to develop a framework for making a systematic assessment of whether or not particular expenditure items or cost

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[21] We use the term "unavoidable costs" throughout our report to refer to those costs that are beyond the control of providers.

drivers should be included in the MFF. The purpose of creating this framework was twofold. Firstly, so that it can be used, in the context of this work, to make an assessment of all of the cost drivers that were jointly agreed by NHS Improvement, NHS England and ourselves. Secondly, so that it could be used by NHS Improvement in the future to assess additional expenditure items or cost drivers that may come to light, following this report.

This chapter sets out the framework we have developed for making that assessment. It is divided into two sections. The first sets out the three questions that must be addressed to decide if there is an "in principle" case for capturing the expenditure item or cost driver within the MFF. The second sets out the questions that must be addressed to reach a final decision that expenditure items or cost drivers are both in principle sensible to include and also practicable to include. Each expenditure item or cost driver needs to pass all criteria before we can recommend it for inclusion. Each criterion has been phrased as a question in our framework. Answering "yes" to a particular question implies that the expenditure item or cost driver under consideration passes the relevant criterion and is suited to the MFF on that basis. If a criterion is failed we do not consider any remaining criteria.

The framework needs to be sufficiently flexible to deal with both cost drivers (e.g. casemix) and actual expenditure items (e.g. business rates). Collectively we refer to cost drivers and expenditure items as cost elements throughout the report.

Selecting appropriate elements for the MFF is important for patients because the MFF can only adjust on the basis of unavoidable cost differences if it is composed of appropriate elements. Paying providers according to the degree of unavoidable costs that they face helps to ensure that providers around the country are able to offer a consistent quality of care to patients.

It should be noted that our recommendation to include a cost element is based on our assessment of the evidence currently available. A detailed implementation assessment of recommended items may uncover additional contradictory evidence. This was beyond the scope of the current project.

3.2 Should a cost element be included in principle in the MFF?

The first group of criteria in our framework collectively consider the theoretical arguments for capturing a cost element within the MFF. Three main questions are posed in order:

- Is the cost element unavoidably higher for some providers?
- Is the MFF the most appropriate reimbursement mechanism for this unavoidable cost element?
- Is the unavoidable cost element significant enough to warrant reimbursement via the MFF?

Figure 2   Criteria to determine if a cost element should be included in the MFF in principle

Is the cost element unavoidably higher for some providers?	Is MFF the most appropriate mechanism for adjusting for this unavoidable cost element?	Is the unavoidable element of the cost significant?
Is the variation in the expenditure item (wholly or partially) outside of the control of providers now and for the foreseeable future?	Is the variation in expenditure caused by this unavoidable element currently accounted for in an adequate manner by other parts of the payment system or other policies? Should the variation in expenditure caused by this unavoidable element be accounted for by other parts of the payments system /allocation system or other policies?	Does the unavoidable element of expenditure cause a significant variation in expenditure from one provider to another? Elements that are judged individually immaterial may need to be considered together.

Source: Frontier Economics

The approach for considering the answers to these questions is described in detail in the sections that follow.

3.2.1 Is the cost element unavoidably higher for some providers?

This criterion poses the question of whether or not a particular cost element is outside the control of some or all providers currently and for the foreseeable future. Unavoidable means that there is a difference in the input prices or input quantities used by different providers which those providers cannot overcome within a reasonable time horizon.

A cost element may differ unavoidably between providers for a number of reasons:

- Firstly, it may reflect **input prices** over which the provider has no control (is a price taker) but which vary between providers such as the going wage rate in a local area. These need to be unavoidable for the provider now and for the foreseeable future, at least until the next review of the MFF.

- Secondly, it may reflect the **innate characteristics of the location** that a provider is required to serve such as the casemix or remoteness of the population served by the provider, meaning that a different mix of inputs are required. These need to be unavoidable for the provider now and for the foreseeable future, at least until the next review of the MFF.

- Finally, a cost element could be unavoidably higher because of **previous investment decisions** made by some providers but not others that are difficult or costly to reverse. This could lead to either the input price or input

quantities being unavoidably higher for some providers. It is for cost elements affected by this final factor that the issue of "a reasonable time horizon" becomes particularly pertinent.

The definition of a reasonable time horizon will vary for different cost elements and will ultimately involve taking a view as to how the financial penalties associated with changing or writing off that asset compare to the financial benefits associated with a more efficient use of assets after the change has been made. It will involve consideration of:

- The remaining useful life of that asset before it is written off or replaced;
- The scale of financial penalties associated with prematurely changing (or writing off) the asset or adjusting the contractual terms governing its use; and
- The future incentives for investment created by treatment of the asset within the MFF.

For example, take a PFI[22] contract signed ten years ago. PFIs will generally cover an asset such as buildings with a relatively long lifespan. Each PFI contract will be different, but in general the provider pays to lease back the PFI asset they use. It is difficult and costly to change the terms of this contract. This means that even though providers could envisage contracts now that would operate on much better terms than their PFIs, they continue to unavoidably incur the cost of the PFI.

In this context, the fact that many of these assets are buildings with long remaining useful life spans and the scale of financial penalties associated with prematurely changing the asset or terms lead to a view that this cost element has unavoidable elements to it. This needs to be weighed against whether or not accounting for this cost element in the MFF creates incentive issues that may affect future similar investment decisions. It would not be desirable to reimburse providers for all poor investment decisions.

Clearly lessons have been learned by providers about PFI contracts that should positively influence future investment decisions. But providers may continue to take undue risks if they believe that they will be able to recoup financial losses associated with poor decision-making. For example, as would be expected, the nature of PFI[23] contracts signed today look very different to those signed ten years ago. This means that the information available at the time a decision was taken also plays a role in influencing whether or not a cost element can be deemed unavoidable or not.

Compare the PFI example above with a provider's decision to buy a particular piece of scanning equipment. Let us also suppose that there is now a version of that equipment available with much cheaper running costs. In this instance, as the cost of the asset is much smaller than a PFI building, the financial penalties associated with writing off the asset are likely to be much smaller and thus means a change is much more likely to be within the provider's control.

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[22] See: https://www.publications.parliament.uk/pa/cm201012/cmselect/cmtreasy/1146/1146.pdf for more details on PFI.

[23] The government addressed the concerns with PFI contracts in 2012 and began to follow a new approach known as PF2. Further details are available here: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/205112/pf2_infrastructure_ne w_approach_to_public_private_parnerships_051212.pdf

In **Figure 3,** to illustrate the application of this criterion in the framework, we present an example of a cost element which we judge to differ unavoidably between providers and one which we do not consider differs in that way.

Figure 3   Illustration of a cost element which differs unavoidably between providers and one that does not

		Is the cost element unavoidably higher for some providers?
Business Rates	Yes	Rental values of commercial property vary significantly around the country. Providers will be unable to impact prevailing prices in their area (they are price takers). This variation will lead to some unavoidable differences in business rates paid by providers.
Cost of Supplies	No	There is variation in the cost of clinical (e.g. hip prosthesis) and general supplies (e.g. bedding) between providers. There is no obvious reason why some providers should be able to negotiate significantly better prices than others. In fact, the differences in the cost of supplies across trusts has been identified as an avoidable source of potential savings.

Source: Frontier Economics

3.2.2   Is the MFF the most appropriate mechanism for adjusting for this unavoidable cost element?

Cost elements that are assessed as being unavoidably higher for some providers are then assessed as to whether or not the MFF is the most appropriate mechanism for providing reimbursement.

To make this assessment, it is worth reminding ourselves of the way the MFF works. For providers, MFF adjusts tariff prices. It is essentially an activity based adjustment such that every unit of tariff activity for each provider is afforded a price that reflects its MFF uplift. It can also be used as part of a multipart payment model or when providers and commissioners are negotiating block contracts. For commissioners, MFF is used to influence their allocations.

MFF also needs to be seen in the context of other mechanisms that adjust funding to account for specific provider or local area based differences. These include:[24]

- Locally determined prices;
- Specialist top-ups; and
- PFI support payments.

This criterion in the framework asks the question as to whether the MFF is the most appropriate mechanism for providing reimbursement for these unavoidable

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[24]   There are numerous other funding mechanisms in place such as the Stability and Transformation Fund which are not directly relevant here as their primary aim is not to adjust funding for providers based on cost differences.

costs. We consider whether an alternative mechanism is currently used or would be more appropriate, either in practice or in principle.[25]

We believe that the MFF is generally the most appropriate reimbursement mechanism for cost elements that:

- **Affect a large[26] number of providers:** as a reasonably complex redistributive mechanism any additional element that is included within the MFF risks further complicating the index and making it less transparent to providers, particularly those that are unaffected by the unavoidable cost. Unavoidable costs, which impact only a small number of providers may be better dealt with elsewhere, such as through locally determined prices. These alternative adjustments can target the specific local issue as they are negotiated at an appropriately local level between the relevant commissioner and provider.[27] Using such mechanisms avoids complicating the MFF with elements that are not relevant to the vast majority of providers.

- **Demonstrate a consistent pattern of variation:** the MFF is calculated using an index approach that looks for a pattern in unavoidable unit costs between providers. These index values are then applied to a series of average weights. It is not reasonable to expect the MFF to perfectly reimburse each provider relative to the average level of unavoidable costs, even if it is designed appropriately. Some unavoidable costs are likely to be fairly idiosyncratic in nature and hence any adjustment via the MFF mechanism is going to represent a fairly blunt tool for dealing with these idiosyncrasies. In certain cases unavoidable costs may be precisely identified and a high degree of precision in terms of compensation may be warranted. In those circumstances lump sum fixed reimbursements may be more appropriate.

- **Reflect repeated cost differences and not one-off elements:** elements included in the MFF should result from persistent cost differences between organisations. The MFF will typically operate with a lag and it is more logical to deal with special one-off costs directly rather than complicating the MFF by adding and then possibly removing a new index.

The recommendations that follow in the report reflect our views as to the appropriate balance to take between capturing unavoidable costs via the MFF and keeping it tractable, given the range of other reimbursement mechanisms available. However, we recognise there may be circumstances where NHS Improvement wish to take a different view about the number of providers that need to be affected by an unavoidable cost element for it to be deemed suitable for reimbursement by the MFF.

Those unavoidable cost elements for which the MFF is considered to be the most appropriate reimbursement mechanism pass this stage of the framework. The question of whether they are significant enough to warrant reimbursement via the MFF is then considered (covered next).

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[25] We may judge that certain costs are suited to alternative compensation mechanisms which are not currently constructed to adequately deal with observed variation but seem more logical than MFF to act as a compensation mechanism in principle.

[26] A large number could be defined in a number of different ways. In our view, costs which affect less than 10% of providers are not suited to the MFF.

[27] With input from NHS Improvement.

In **Figure 4,** as an illustration of the application of this framework, we present an example of a cost element for which we judge the MFF to be the most appropriate mechanism for making an adjustment and a cost element for which this is not the case.

Figure 4 **Example of a cost element for which the MFF is the most appropriate mechanism for reimbursement and one for which this is not the case**

		Is the MFF the most appropriate mechanism for adjusting for this unavoidable cost element?
Staff Costs	Yes	Providers all face unavoidable differences in the wage rates they pay their staff. All providers are affected and they are affected every year. There is a consistent and non-idiosyncratic pattern in these differences which can be appropriately adjusted for within an index.
Casemix	No	Providers all face unavoidable differences in their case mix which affect their costs. The National Tariff Payment System reflects casemix variation (the type of activity a trust provides) in the classification of healthcare episodes. The units of currency reflect variations in severity and complexity splits. There are also specialist top ups for providers who see the most complex cases. Any additional cost variation would be most appropriately dealt with by adjusting currencies rather than including an adjustment in the MFF

Source: Frontier Economics

3.2.3 Is the cost element significant enough to warrant reimbursement via the MFF?

This criterion in the framework makes an assessment of the materiality of the cost element on providers' costs and of the proportionality of including it. This consideration is made in recognition of an implicit tension between coverage of all possible items that are unavoidable and suited for the MFF and the desire for calculations to be transparent and not unduly complex.

To avoid a situation where all cost elements, including those that will make little material difference to the MFF values of providers, are included, this criterion asks the question as to whether the element accounts for a material share of overall expenditure and also varies markedly from provider to provider. It also asks whether it would be proportionate to account for the factor in the MFF. Including multiple immaterial elements within the MFF will result in a more complex index with minimal improvement in provider income and commissioner allocation.

Our approach to making this assessment combines the observed unavoidable variation in a particular element with the share of expenditure it accounts for.[28]

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[28]   In the next chapter of our report, we assess the variation in cost elements by computing a 90:10 ratio where possible. This involves ranking each provider in terms of a specific cost. Then we estimate the extra costs associated with high cost providers at the 90th percentile of the distribution versus low cost providers at the 10th percentile of the distribution. We have chosen this method as it avoids basing our analysis on extreme outliers while also providing an indication of maximum variation. We also report the 95:5 ratio. Our

For example, electricity costs in the highest cost area are 11% higher than the lowest cost area and on average energy costs account for 0.8% of total costs. We multiply these figures together to derive an unavoidable cost impact of 0.1%.[29]

We will also if necessary consider significance separately for specific groups of providers disproportionally affected by a particular cost element where that item appears to be insignificant for all providers taken together (as revealed by the previous analysis).

While these calculations will guide us in recommending whether an element is material or not we have not set a specific % threshold for materiality. Ultimately these decisions will be based on a number of factors when we assess each element individually. For example, in our opinion, items that are extremely difficult and time consuming to calculate would need to pass a higher threshold of materiality than items which are relatively straightforward to implement into the MFF. Also, the accuracy of potential calculation methods needs to be considered before a judgement is made. If the only practical calculation methods are inaccurate, cost elements would need to pass a higher threshold of materiality. Finally, items which are of borderline significance now may be recommended for inclusion if they are expected to account for a higher share of costs in the future.

Any recommendations, including those we present in this report, involve an element of judgement regarding the materiality of certain items. These judgements may not be in accordance with the view of NHS Improvement or NHS England. In reaching our assessments in the next chapter of this report, we use the unavoidable impact of items already included within the MFF as a guide to assessing the materiality of any new cost elements. We will not recommend that an additional index is added if the apparent unavoidable impact of the cost element is markedly less than the existing indices.

This criterion has a looping element to it, in that having assessed the significance of each cost element individually we then consider whether elements that are individually insignificant are significant as a group. This is necessary as a group of elements which exhibit the same regional pattern in cost variation may have a cumulative significant impact on a group of providers.

In **Figure 5**, as an application of this part of the framework, we present an example of a cost element which we judge to be significant enough to warrant compensation via the MFF and a cost element which we judge not to be significant.

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conclusions are unaffected by which ratio is used. Due to data limitations we assess the variation in some cost elements on a regional basis.

[29] This figure is a metric we use to examine the magnitude of the unavoidable impact and has no direct interpretation. It is not a proportion of total costs and could theoretically exceed 100%.

Figure 5   Example of a cost element significant enough to warrant reimbursement via the MFF and one that is not significant enough

	Is the cost element significant enough to warrant reimbursement via the MFF?	
Business Rates	Yes	On average **0.4%** of providers' running costs are business rate payments. The local area at the 90th percentile has an average rateable value per square metre **286%** higher than the local area at the 10th percentile. This produces an unavoidable impact of **1.3%** which is large enough to warrant reimbursement via the MFF.
Energy Costs	No	On average **0.8%** of providers' expenditure is energy costs. The region with the highest electricity network charges (this is the component that is unavoidable for trusts) has **11%** higher costs than the region with the lowest network charges. This produces an unavoidable impact of **0.1%** which is not large enough to warrant further compensation.

Source: Frontier Economics

3.3 Is it practical to capture the cost element within the MFF?

The second group of criteria in our framework collectively consider the practical questions surrounding capturing a cost element within the MFF. Two key questions are posed:

- Is capturing the cost element consistent with positive incentives for efficiency and quality?[30]
- Is it broadly practical to capture this cost element within the MFF?

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[30]   In our view the MFF is not an incentive tool in its own right but should not introduce any negative or contradictory incentives.

Figure 6   Criteria to determine if it is practical to include a cost element in the MFF

Is inclusion in MFF consistent with positive incentives?	Is it broadly practical to include the unavoidable cost element?
What changes in incentives would providers likely experience following the inclusion of this unavoidable element? Is there a strong possibility that adjusting for this unavoidable element within the MFF would result in significant unintended consequences in terms of providers' behaviour?	Is data currently available to account for this element? If not, how difficult and onerous is new data collection likely to be? Is the effort required to recalculate this element each time likely to be proportionate to its effect on providers' funding?

Source: Frontier Economics

The approach for considering the answers to these questions is described in detail in the sections that follow.

3.3.1   Is capturing the cost element in the MFF consistent with positive incentives?

Many of the unavoidable costs identified by our work cannot be completely isolated from avoidable elements of cost within the same category. For example, the wage rate paid by providers to non-clinical staff may vary unavoidably around the country, but the overall expenditure item captures both this unavoidable element as well as avoidable elements relating to staff numbers. Where mechanisms for capturing these costs within the MFF do not isolate the unavoidable element of the cost sufficiently or isolate it inaccurately, there is a risk of introducing unintended incentives into the overall funding system.

It is strongly desirable that the mechanisms for allocating funds to providers do not introduce any such incentives. Prior to reflecting an unavoidable cost element within the MFF, it must be possible to conceive of a mechanism to capture the item or driver that does not introduce any of these unintended incentives.

The specific questions we consider here are:

■ What changes in incentives would providers likely experience following the inclusion of a mechanism aimed at capturing this unavoidable cost element? For example, if the MFF compensated providers based on their actual staff costs rather than those elements of staff costs related to unavoidable geographical differences in pay, providers may not be incentivised to keep the avoidable elements of staff costs at an efficient level.

- Is there a strong possibility that any conceivable mechanism for adjusting for this unavoidable element within the MFF would result in significant unintended consequences in terms of providers' behaviour? For example, if we considered compensating providers based on the total value of their land via the MFF, rather than the unavoidable element related to the unit land price, this could mean that providers have no incentive to reduce their use of land as any reduction in cost would be offset by a reduction in their MFF value and income.

The incentive implications associated with a specific element will depend on the calculation method chosen. In general, basing index values on external benchmarks rather than relying on internal provider specific information which the organisation could feasibly influence will minimise any unintended incentive effects.

Our work is primarily concerned with providers. However, it is important to note that commissioners may also change their behaviour as a result of the MFF.

3.3.2 Is it broadly practical to capture this cost element within the MFF?

Even if it were not desirable to capture an unavoidable cost element within the MFF, it may not be practically possible to devise a calculation method for doing so.

Specific questions that need to be considered are:

- Are data currently available to account for this element? If not, how difficult and onerous is new data collection likely to be? For example, is there a national data set that adequately captures local area variation in pay rates?

- Is the effort required to recalculate this element each time likely to be proportionate to its effect on providers' funding? How long will it take to update the values each time?

Current data sources may not adequately capture certain cost elements. Other elements may require a huge effort to calculate, which would be disproportionate to the elements' unavoidable impact.

4 ASSESSMENT OF COST ELEMENTS

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SUMMARY

- We have applied the framework set out in **Chapter 3** to a long-list of 18 expenditure items and cost drivers including the existing components of the MFF and a range of others derived from research by NHS Improvement, NHS England and the King's Fund and assessed and added to by us.

- As a result of this exercise, we recommend that the MFF retains adjustments for staff, buildings and land. We also recommend that an adjustment for business rates is included in future.

- A full summary of our recommendations is shown in **Figure 7** including those items that we do not recommend for inclusion and the reasons behind our conclusions.

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4.1 Introduction

The previous chapter set out a framework for determining what cost elements should be included within the MFF.

We carried out a detailed and evidence based assessment of a long-list of expenditure items and cost drivers against the framework to determine if they warranted inclusion in the MFF. The list involved 18 expenditure items and cost drivers. The existing components of the MFF were included alongside a range of additional expenditure items and cost drivers based on previous research by NHS Improvement, NHS England and the King's Fund as well as our knowledge of other regulated sectors. This chapter presents the results of this assessment for those cost elements that pass the framework criteria and hence are recommended for inclusion within the MFF.

The full list assessed against the framework as part of our work is shown in **Figure 7** below. The list contains both expenditure items which are actual cost lines in providers' accounts (e.g. business rates) and cost drivers which will potentially influence the size of cost lines (e.g. casemix).

Figure 7   Summary of cost and cost driver assessment

Cost element	Unavoidable	MFF most appropriate mechanism	Significant	Include
Buildings depreciation	Yes, trusts will be unable to control the cost of building inputs in their area. This will lead to some unavoidable variation in building values and depreciation charges.	Yes, all trusts are required to depreciate their buildings and the cost of building will vary unavoidably between providers.	Yes, in our view the maximum unavoidable impact is significant	✅
Business rates	Yes, the unit market rental values of commercial land and buildings will exhibit unavoidable variation. Certain trusts will have to make business rates payments which are to some degree unavoidably higher than others.	Yes, providers who own their buildings will have to make business rates payments. Providers who lease their buildings will pay business rates indirectly via a rental or management charge. These cost will vary unavoidably between providers due to variation in market rental values.	Yes, in our view the maximum unavoidable impact is significant	✅
Labour market pressures	Yes, trusts are unable to influence prevailing local wage rates. Trusts in certain locations are obliged to pay equivalent staff more. This element covers all staff employed by providers. Certain groups of staff (e.g. medical and dental) may be affected differently by labour market pressures than other groups (e.g. administrative and clerical staff). We will consider this in detail when assessing possible calculation methods.	Yes, all trusts are affected by variation in staff costs and there is a consistent pattern to the effect. Staff costs are closely linked to activity such that an activity uplift is appropriate.	Yes, in our view the maximum unavoidable impact is significant	✅
Variation in cost of building leading to higher capital charges	Yes, trusts will be unable to control the cost of building inputs in their area. This will lead to some unavoidable variation in building values and financing costs such as public dividend capital (PDC) charges.	Yes, all trusts have to finance their buildings and there is a consistent pattern to the effect on input costs.	Yes, in our view the maximum unavoidable impact is significant	✅
Variation in cost of land leading to higher capital charges	Yes, unit land values will vary around the country and trusts will be price takers in this regard. This will lead to some unavoidable variation in financing costs such as PDC charges.	Yes, all trusts will have to pay capital charges on their land and the cost of land will vary unavoidably between providers.	Yes, in our view the maximum unavoidable impact is significant	✅
Cost of utilities	Yes, electricity, gas and water input prices are unavoidably higher in certain areas.	Yes, utilities costs will affect all providers, constitute a regular annual charge and reflect a consistent pattern in input prices.	No, in our view the maximum unavoidable impact is not significant	❌

Cost element	Unavoidable	MFF most appropriate mechanism	Significant	Include
Capital financing structure	Yes, in some cases, there is an unavoidable element to some capital expenditure repayment costs as contracts may be long term in nature and the terms will exhibit variation. However, this may be as a result of previous management decisions by the provider.	No, we do not recommend that capital expenditure structure (e.g. public finance initiative (PFI) vs. Department of Health (DH) loans) are compensated via the MFF. This is because each arrangement is unique and requires individual attention. Also lump sum payments may be more appropriate than activity based compensation.	Not assessed as didn't pass MFF most appropriate criterion.	☒
Clinical Negligence Scheme for Trusts (CNST) payments	Yes, some providers will have unavoidably higher payments than others due to the type of services they provide.	No, tariffs for Healthcare Resource Groups (HRG) sub-chapters and the tariff cost uplifts have already been uplifted to reflect CNST contributions	Not assessed as didn't pass MFF most appropriate criterion	☒
Complexity of casemix	Yes, providers who see more complex cases on average will have unavoidably higher costs per patient than providers who offer more routine services.	No, the current system already reflects difference in casemix via HRG currencies and specialist top-ups.	Not assessed as didn't pass MFF most appropriate criterion	☒
Fragile local health economy	Yes, characteristics of a given local health economy, including social care, are likely to unavoidably impact on secondary providers' efficiency. Secondary providers may be unable to control these factors.	No, other measures are in place to deal with this issue such as Delayed Transfer of Care payments and the Better Care Fund. The best solution is to address struggling aspects of a health and social care system directly.	Not assessed as didn't pass MFF most appropriate criterion	☒
Inefficient estate set-up	Yes, the layout and characteristics of a provider's estate will impact their efficiency and this cost will be partially unavoidable at least in the short and medium term. However, this may be as a result of previous management decisions by the provider.	No, in our view adjusting for estate efficiencies does not fit within the MFF. Specific trusts who cannot access finance to improve their estate may require compensation which is not based on activity.	Not assessed as didn't pass MFF most appropriate criterion	☒

Cost element	Unavoidable	MFF most appropriate mechanism	Significant	Include
Rurality/remoteness	Yes, previous work has found that a small number of remote sites suffer additional unavoidable costs due to their size.	No, in our view these costs should be compensated via local arrangements to reflect the existing national rurality adjustment to Clinical Commissioning Group (CCG) allocations.	Not assessed as didn't pass MFF most appropriate criterion	☒
Training costs	Yes, some providers will undertake more training than others	No, training tariffs are already in place	Not assessed as didn't pass MFF most appropriate criterion	☒
Travel time	Yes, certain areas will have unavoidably higher travel times than others. Providers in these areas who deliver services off-site will experience higher costs.	No, only a small number of providers will be affected (community and mental health trusts in rural areas). These trusts could be compensated separately if necessary. One option would be to extend the existing travel time allocation adjustment which currently only covers ambulance trusts.	Not assessed as didn't pass MFF most appropriate criterion	☒
Asset renewal costs (not including land and buildings)	No, asset renewal costs will generally not vary unavoidably; therefore there is no need to include a compensating adjustment.	Not assessed as didn't pass avoidable criterion.	Not assessed as didn't pass avoidable criterion.	☒
Cost of purchasing supplies	No, in our view the cost differences arising from purchasing supplies are likely to reflect fixable inefficiencies rather than intrinsic differences between providers.	Not assessed as didn't pass avoidable criterion.	Not assessed as didn't pass avoidable criterion.	☒
Multi-site costs	No, generally trusts will be able to determine the number of sites from which they operate. There is no compelling reason why multi-site trusts will have higher costs.	Not assessed as didn't pass avoidable criterion.	Not assessed as didn't pass avoidable criterion.	☒

Source: Frontier Economics

4.2 List of expenditure items and cost drivers to be considered

The framework set out in **Chapter 3** was applied to a long-list of 18 expenditure items and cost drivers provided by NHS Improvement and NHS England and reviewed and added to by Frontier. This list was informed by a study conducted by The King's Fund and University of York (2017) as well as by internal research.

Their study provided an overview of approaches taken with regards to unavoidable costs in other public sector and healthcare systems. It also involved qualitative research with the sector to identify factors NHS providers believe are creating unavoidable pressures on their costs.

Cost drivers that were not yet mapped to specific expenditure items were initially passed through the framework to see if they fitted in principle. If they passed this stage we mapped them to specific expenditure items to determine whether an adjustment could be made in practice.

4.3 Detailed evaluation of cost elements

In the sections that follow we describe in detail our assessment of all cost elements from the list above that pass the five criteria in the framework in **Chapter 3**, in the following order:

- Labour market pressures;
- Buildings depreciation;
- Variation in cost of building leading to higher PDC dividends;
- Variation in cost of land leading to higher PDC dividends; and
- Business rates.

The remaining elements that were judged to be unsuitable for the MFF are assessed in **Annex B**.

4.3.1 Labour market pressures

This section describes our approach to applying the framework to labour market pressures. We discuss each of the criteria in turn in what follows.

RECOMMENDATION

We recommend that an adjustment is made for unavoidable variation in staff costs between providers via the MFF.

Criterion 1: Are staff costs unavoidably higher for certain providers due to labour market pressures?

The answer to this question is "yes".

Providers experience unavoidable variation in staff costs due to variation in labour market conditions around the country. Providers in London and the surrounding areas will incur higher direct staffing costs because they are required to pay higher salaries than providers in the rest of the country, notably:

- **High Cost Area Supplements (HCAS) adjustments:** all Agenda for Change (AfC) staff[31] who are working for a provider located inside or close to London are entitled to specific uplifts to their pay. These are known as HCAS. Providers in Inner London are required to pay AfC staff an additional 20% of

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[31] This covers all staff except the medical and dental group.

base pay. The equivalent figures for Outer London and Fringe are 15% and 5% of basic pay (NHS Staff Council, 2016). Maximum and minimum absolute payments also apply for each zone. For example in Inner London the maximum payment is £6,405. Therefore an employee earning more than £32,025 in Inner London will receive a top-up of less than 20%.

■ **London weighting:** each medical and dental employee working for a provider based in London is entitled to an additional £2,162 per year.[32]

There may also be variation in direct costs which is not captured by these regional uplifts – for example, if providers are forced to adjust wages in line with market conditions.

It is also possible that providers incur unavoidably higher indirect staffing costs where they are unable to vary wages sufficiently to reflect the going market rate. To attempt to attract and retain staff, providers may offer non-pay related benefits e.g. training or subsidised food. Alternatively, they may simply have to accept that the cost of not paying the market rate (which will be determined by the demand for and supply of staff with the same skillset in the relevant geographical market) is that they have higher vacancy and/or turnover rates. Finally, it is also possible that the quality of staff that a provider can attract at the rate they are able to pay will be lower, leading to reduced productivity and potentially more staff for any given grade or simply a lower overall quality of service (Monitor, 2016).[33] As well as being relevant for trusts in London and the surrounding areas, it is also possible that trusts located in areas which staff view as unattractive also incur these indirect costs.

The extent of these indirect costs will depend on a number of factors such as the ability of NHS workers to switch to the private sector and how closely HCAS uplifts mimic the variation in private sector pay around the country. We will explore the relationship between indirect costs incurred by providers and local private sector earnings in **Chapter 6**.

Given the complexity associated with these indirect costs a comprehensive quantitative analysis is difficult. We employ a number of proxy measures in our analysis[34] which provide an indication of where costs are likely to be high, but will not capture all variation.

Criterion 2: Is the MFF the most appropriate mechanism for adjusting for this unavoidable cost element?

The answer to this question is "yes". In our view the MFF is a logical mechanism by which to compensate providers for unavoidable variation in staff costs. All providers face the issue of direct and indirect costs arising from labour market pressures to greater or lesser degrees. Labour market patterns reflect consistent

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[32] Resident staff receive a top-up of £602. Providers in the Fringe zone are obliged to pay medical and dental staff an additional £149 per year.

[33] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/499490/Guide_to_the_market_forces_factor.pdf

[34] This is discussed in detail in **Chapter 6**.

patterns of variation in external input (wage) prices and these patterns persist over time.

Criterion 3: Is the unavoidable portion of the staff cost element significant enough to warrant reimbursement via the MFF?

The answer to this question is "yes". Staff costs are the largest single cost for providers and exhibit substantial unavoidable variation between providers due to the existence of regional pay adjustments and the potential for indirect costs. We have calculated the proportion of total costs accounted for by staff expenditure (including external contracts) by provider. We have illustrated this in **Figure 8** below. On average, 64.3% of providers' expenditure is accounted for by direct staff costs.

Figure 8   Staff expenditure as a proportion of providers' total costs[35]
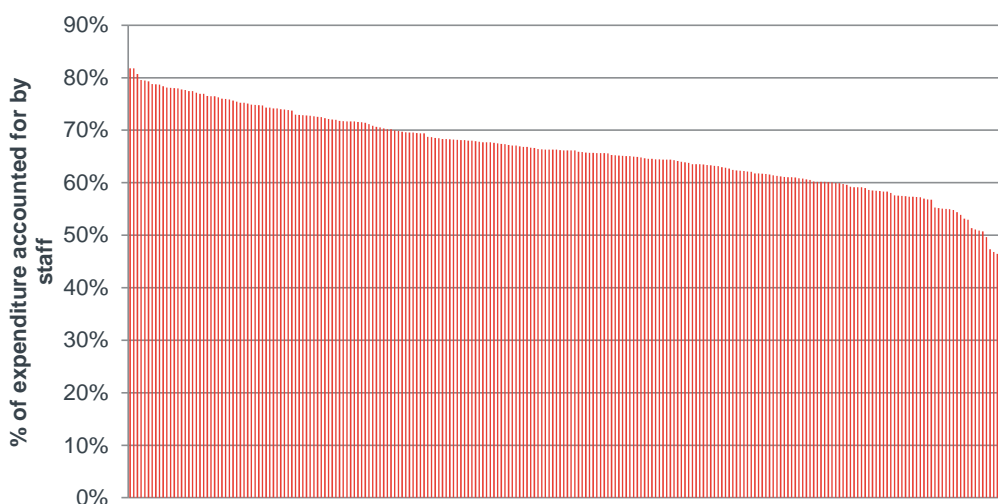
Source: Frontier Economics analysis of NHS Trust and Foundation Trust Accounts 2014/15
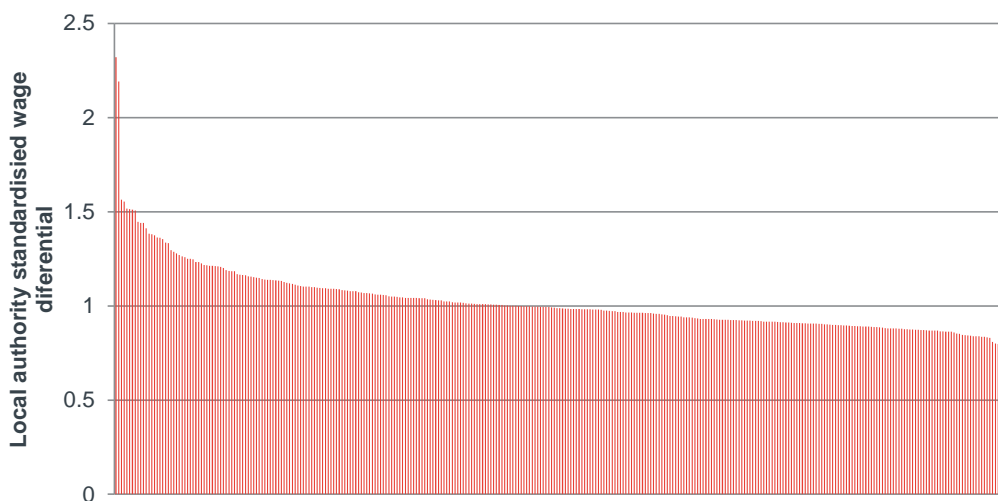Note: Total costs are calculated by adding the PDC dividend to total operating expenditure

We have conducted a detailed analysis of regional patterns in earnings using ASHE data.[36] In **Figure 9** we present standardised local authority[37] coefficients from earnings regressions. These coefficients compare each local authority to the national average in terms of like-for-like earnings for all private sector employees.

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[35] This includes all trusts. Certain trust types will have a higher proportion of staff costs than others. We explore this issue in **Chapter 8.**

[36] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annual surveyofhoursandearnings/previousReleases

[37] At the lower tier local authority level.

Figure 9   Local authority standardised earnings

Source: *Frontier Economics analysis of ASHE Data 2013-15*

We observe a 40% variation in earnings from the local authority at the 90th percentile compared to the local authority at the 10th percentile.[38]

We derive a measure of unavoidable impact by multiplying 40% with the 64.3% average spend. This produces an impact of 26%, which is clearly significant and therefore worth taking to criteria 4 and 5.

Criterion 4: Would inclusion of an adjustment for staff cost variation due to market pressures in the MFF be consistent with positive incentives?

The answer to this is "yes". It is possible to compensate providers for unavoidable variation in staff costs via the MFF without creating negative incentives. The current staff index (discussed below) uses local area private sector wages as a benchmark when assessing relative costs. This ensures that trusts still have the incentive to keep their own staff costs at an efficient level, which may not be the case if they were compensated on the basis of those internal staff costs. We discuss these issues further when we consider specific calculation options in **Chapter 6**.

Criterion 5: Is it broadly practical to include staff cost variation due to market pressures within the MFF?

The answer to this question is "yes". Including staff costs within the MFF is practically possible. There are data sources focused on both internal NHS staff costs and the wider private labour market.

Staff costs already feature within the MFF. Currently for the purposes of the MFF, NHS staff are divided into two groups:

- **Medical and dental**: all London trusts get an uplift to reflect the London weighting that trusts are obliged to pay.

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[38] The equivalent figure for a 95:5 comparison is 61%.

■ **All other staff**: a staff index for all other groups is calculated using private sector pay data. Specifically a GLM method approach is employed. Average earnings are calculated for local areas which show the regional pattern in wages that would be observed if each area had the same mix of occupations, industries and workforce ages. These values are then smoothed to avoid cliff edges in the values between adjacent areas and interpolated to take into account the location of providers' sites within local areas.

Our analysis of potential calculation methods considers each staff group separately to determine possible methodologies and examine the risks and advantages of each.

4.3.2 Buildings costs

Depreciation

This section describes our approach to applying the framework to buildings depreciation. We discuss each of the criteria in turn in what follows.

RECOMMENDATION

We recommend that an adjustment is made for unavoidable variation in buildings depreciation charges via the MFF.

Criterion 1: Are buildings depreciation charges unavoidably higher for certain providers?

Our answer to this question is "yes" on the grounds that NHS providers are required to include depreciation charges on their balance sheets and that the unit cost of building varies around the country in a way that providers cannot influence.

NHS providers are required to depreciate their long-term assets. The NHS Foundation Trust's annual reporting manual states that:

Items of property, plant and equipment are depreciated over the remaining useful economic lives in a manner consistent with the consumption of economic or service delivery benefits. Freehold land is considered to have an infinite life and is not depreciated.[39]

These depreciation charges are not a cash expense. However, they do feature in the national tariff which is designed to compensate trusts on the basis of their profit and loss account as opposed to their cash flow.

The unit cost of building varies around the country (illustrated below) in a way that NHS providers are unlikely to be able to control. The cost of building will be the result of the demand for and supply of building services in a provider's area, in which they will likely be a relatively small and infrequent consumer and hence unable, to any substantive degree, to influence the prevailing market rate.

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[39] Monitor, (2015, p. 61).

This means that providers who are located in areas with higher unit building costs will have unavoidably higher NBVs for comparable buildings when compared against providers in lower cost areas. Those same providers will incur higher depreciation charges on average.[40]

Criterion 2: Is the MFF the most appropriate mechanism for adjusting for this unavoidable cost element?

Our answer to this question is "yes". In our opinion it makes sense to compensate providers for unavoidable variation in depreciation charges using the MFF. The unavoidable variation in depreciation charges that results from variation in unit building prices, affects all providers, every year. Also, in general, the same trusts will tend to have persistently higher depreciation costs than others due to the underlying variation in building market pressures around the country.

Criterion 3: Is the unavoidable portion of depreciation significant enough to warrant reimbursement via the MFF?

The answer to this question is "yes" although close to the likely threshold of materiality.

To assess the materiality of the unavoidable element of depreciation charges, we examine the proportion of total costs building depreciation accounts for and then combine this figure with an estimate of unavoidable variation.

Each provider's depreciation charge as a proportion of total expenditure is shown for 2014/15 in **Figure 10**. On average 1.3% of providers' costs are allocated to buildings depreciation. This forms our estimate of the proportion of expenditure accounted for by building depreciation.

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[40] NBVs will also vary for reasons other than location, as providers choose different types of building, for example. This will not be unavoidable and we consequently do not want to compensate providers for this. We discuss this further later on.

Figure 10   Buildings depreciation charges as a proportion of providers' total costs[41]
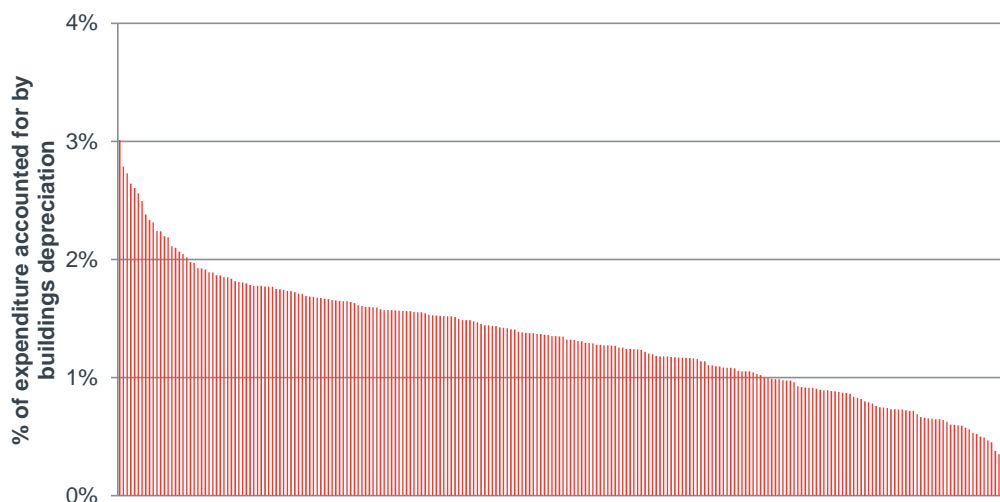
Source: *Frontier Economics analysis of NHS Trust and Foundation Trust Accounts 2014/15*

Note: *Total costs are calculated by adding the PDC dividend to total operating expenditure*

Our estimate of unavoidable variation is derived from the Building Cost Information Service (BCIS),[42] which collects granular cost information on construction projects throughout the UK. In **Figure 11** below we illustrate the BCIS Location Factor for the local area around each provider site.[43] The values range from 1.41 to 0.84.[44] The difference in unit cost of building for the site at the 90th percentile versus the site at the 10th percentile is 34%.[45] This figure of 34% forms our estimate of unavoidable variation.

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[41]   This includes all trusts. Certain trust types will have a higher proportion of depreciation costs than others. We explore this issue in **Chapter 8.**

[42]   This is part of the Royal Institute of Chartered Surveyors http://www.rics.org/uk/

[43]   The average across the UK is 1.

[44]   The variation in building costs is driven by differences in the costs of labour, plant and materials but not land values.

[45]   If we use the 95:5 ratio instead the difference is 46%.

Figure 11   BCIS location factors for each provider site
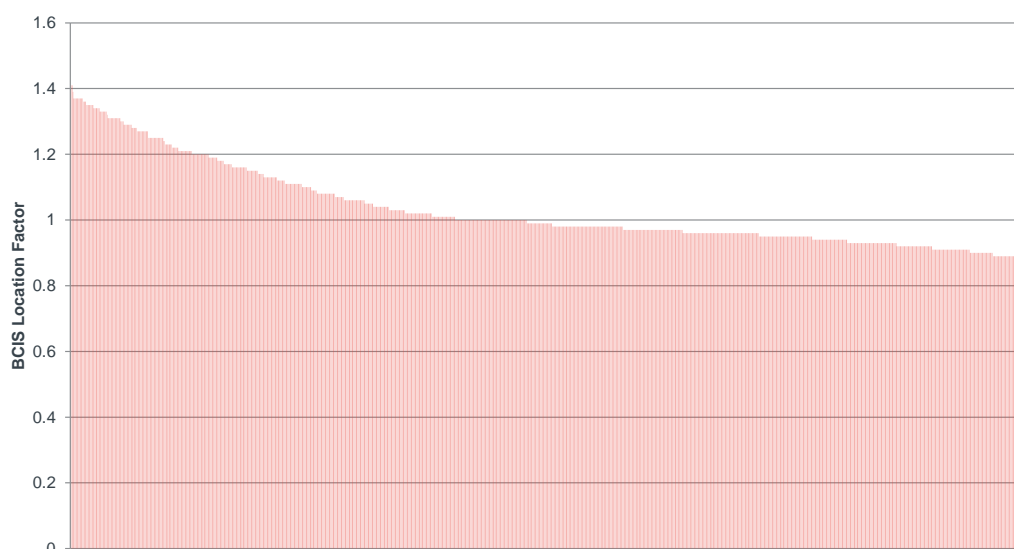
We derive a measure of unavoidable impact by multiplying 1.3% (proportion of costs) by 34% (unavoidable variation). This produces an overall impact of 0.5%.[46] We consider this impact to be close to the threshold of materiality but, given that the ease of calculation also plays a role in reaching a final decision, worthy of passing to the next criterion.[47]

Criterion 4: Would inclusion of buildings depreciation in the MFF be consistent with positive incentives?

The answer to this question is "yes". It is possible to include buildings depreciation in the MFF in such a way that is consistent with positive incentives.

The current buildings index uses depreciation charges as part of the index weight. The buildings index values are determined by external local area cost data. This method does not pose any significant incentive problems. Providers will be unable to influence the building unit cost location factors that apply to a given area. Currently the only way providers could impact their buildings index value is by moving to a different area. This is a key advantage of using external data when creating the index rather than, for example, using the NBV of providers' actual buildings, which they may be able to influence by shifting activity from one site to another or choosing when to carry out a revaluation.

When we consider alternative calculation options in **Chapter 7** we consider the incentive implications of each.

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[46]   If we considered trust-level rather than site-level building location factors we would likely see less variation and therefore derive a smaller unavoidable impact.

[47]   Our conclusion remains the same if we examine building cost by trust rather than by site.

Criterion 5: Is it broadly practical to include buildings depreciation costs within the MFF?

The answer to this question is "yes". Including building depreciation costs within the MFF is relatively straightforward and the current MFF already includes an adjustment.

Building depreciation costs are already included as part of the weight of the current buildings index. It is possible to access data both on trust specific building values[48] and local area building cost values.[49] We explore the detailed practicalities of specific calculation methods in **Chapter 7**.

Variation in cost of building leading to higher capital charges

This section describes our approach to applying the framework to the cost of building leading to higher capital charges. We discuss each of the criteria in turn in what follows.

RECOMMENDATION

We recommend that an adjustment is made within the MFF for unavoidable variation in capital charges relating to buildings due to variation in the unit cost of building.

Criterion 1: Are capital charges unavoidably higher for some providers due to variation in building costs?

The answer to this question is "yes". Providers can finance their buildings in a number of ways. The most common is likely to be PDC, which is a form of government financing provided to public sector organisations such as NHS Trusts and NHS Foundation Trusts (Department of Health and Monitor, 2013). Providers are required to provide the government with a return on its investment in the form of a PDC dividend payment.

Each provider is required to absorb the cost of capital at a rate of 3.5% applied to a provider's average relevant net assets[50] during the financial year. This figure is then paid to DH biannually as a dividend on PDC.

Providers may alternatively finance their buildings via other methods such as a PFI[51] for example. A provider's choice of capital financing is not suitable for compensation via the MFF.[52] However, regardless of the financing method chosen, the provider will incur some charge, which will be higher in certain parts

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[48] Via the published accounts.

[49] Via the BCIS data currently used.

[50] The relevant net assets are calculated as follows: total PDC and reserves less the NBV of donated assets and lottery-funded assets plus the value of any deferred income balance that funds a donated asset or lottery-funded asset less net cash balances in Government Banking Service accounts less/add PDC dividend receivable/payable.

[51] https://www.publications.parliament.uk/pa/cm201012/cmselect/cmtreasy/1146/1146.pdf

[52] This specific question is assessed in detail in **Annex B.**

of the country than others due to unavoidable variation in asset values that results from differences in the unit cost of building. The current buildings index proxies an overall buildings financing charge by applying the PDC dividend rate (3.5%) to a provider's relevant asset base (NBV of all buildings in this case).[53]

As discussed in the previous section the unit cost of building varies around the country in a way which is not controllable by the provider. This variation in the cost of building will lead to some providers having higher NBVs for their buildings. This in turn leads to some unavoidable variation in capital charges (regardless of the financing method chosen by providers). It is worth noting that not all of these capital charges are unavoidable. Providers are in control of the size, nature and number of buildings they have.[54] However, the unit cost of building is outside of their control. This will influence the underlying asset values which in turn will impact on capital charges.

Criterion 2: Is the MFF the most appropriate mechanism for adjusting for the variation in capital charges relating to building costs?

The answer to this question is "yes". In our opinion it makes sense to compensate providers for unavoidable variation in the capital charges relating to building costs using the MFF. The unavoidable variation in capital charges on buildings that results from locational variation in unit prices affects all providers every year. In addition the same areas around the country will have consistently high building costs.

Criterion 3: Is the unavoidable portion of capital charges relating to building costs significant enough to warrant reimbursement via the MFF?

The answer to this question is "yes" although close to the likely threshold of materiality.

As discussed above, it is difficult to precisely estimate the materiality of variation in capital charges due to building cost differences. When calculating the weight for the current buildings index the PDC dividend rate is applied to all buildings to proxy an overall capital charge.

Replicating this calculation across each provider (which we illustrate below in **Figure 12**) shows that on average 1.5% of total costs are accounted for by buildings' capital charges. This figure of 1.5% forms our estimate of the proportion of expenditure accounted for by buildings' capital charges.

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[53] This proxy will be higher than actual PDC payments because as discussed above trusts have other financing options. It is likely to be very difficult to accurately measure financing costs directly as in some cases the terms of repayments will vary depending on the specific contract signed.

[54] Providers will also be able to influence how often their assets are re-valued subject to the relevant accounting standards. See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/579667/2016-17_DH_GAM_Dec_16.pdf for details on NHS trusts.

Figure 12   Estimated buildings capital charges as a proportion of providers' total costs[55]
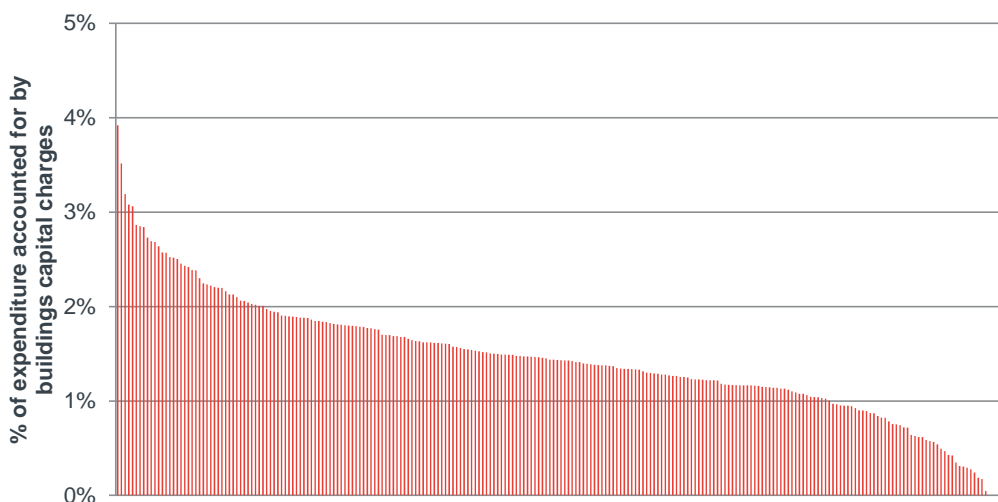
Source: *Frontier Economics analysis of NHS Trust and Foundation Trust Accounts 2014/15*
Note: *Total costs are calculated by adding the PDC dividend to total operating expenditure*

We derive a measure of unavoidable impact by multiplying 1.5% by the 34%[56] unavoidable variation identified in the previous section on buildings depreciation. This produces an overall unavoidable impact estimate of 0.5%. We consider this impact to be close to the threshold of materiality but, given that the ease of calculation also plays a role in reaching a final decision, worthy of passing to the next criterion. Moreover, if we examine the materiality of both cost elements affected by variation in building costs jointly (buildings depreciation and buildings capital costs) the overall unavoidable impact is 1%, which is clearly material.

Criterion 4: Is inclusion of capital charges relating to buildings in the MFF consistent with positive incentives?

Yes, it is possible to include capital charges relating to building costs in the MFF in such a way that is consistent with positive incentives.

The current buildings index uses an estimate of buildings' capital charges as part of the index weight. The buildings index values are determined by external local area cost data. As described above this method does not pose any significant incentive problems because providers will be unable to influence the building unit cost location factors that apply to a given area. Providers will still have the incentive to reduce their building costs as much as possible as the index is based on external data.

When we consider alternative calculation options in **Chapter 7** we consider the incentive implications of each.

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[55]   This includes all trusts. Certain trust types will have a higher proportion of costs relating to buildings capital charges than others. We explore this issue in **Chapter 8.**

[56]   We derived this figure in **Section 4.3.1** by examining variation in BCIS building cost data.

Criterion 5: Is it broadly practical to include capital charges relating to buildings within the MFF?

Yes, it is practical to adjust for variation in capital charges attributable to buildings via the MFF. As described above, the current buildings index uses an estimate of buildings' capital charges as part of the index weight and external data on regional building costs to generate the index values.

Alternative calculation options will present their own implementation issues which we will consider in **Chapter 7.**

4.3.3 Variation in the cost of land leading to higher capital charges

This section describes our approach to applying the framework to the cost of land leading to higher capital charges. We discuss each of the criteria in turn in what follows.

RECOMMENDATION

We recommend that an adjustment is made for unavoidable variation in capital charges due to variation in the unit cost of land via the MFF.

Criterion 1: Are capital charges unavoidably higher for some providers due to variation in land costs?

The answer to this question is "yes". As discussed above in the context of buildings, the government levies PDC dividends on providers' net asset bases which will include land. Trusts may also finance their land via other mechanisms. The current land index weight is a proxy for the overall land financing charge.[57]

The unit cost of land varies substantially around the country in a way that NHS providers are unlikely to be able to control.[58] The cost of land will be the result of the demand for and supply of land in a provider's area, in which they will likely be a relatively small and infrequent consumer and hence unable, to any substantive degree, to influence the prevailing market rate. Trusts in areas with higher land values will have to pay higher capital charges regardless of the capital mechanism used to finance that land.

Criterion 2: Is the MFF the most appropriate mechanism for adjusting for the variation in capital charges relating to land costs?

The answer to this question is "yes". In our opinion it makes sense to compensate providers using the MFF for unavoidable variation in capital charges due to variation in unit land costs.

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[57] Calculated by applying the PDC dividend rate (3.5%) to providers' relevant asset base (NBV of all land in this case).

[58] However, as with buildings, providers may be able to influence how often their land is re-valued subject to the relevant accounting standards. See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/579667/2016-17_DH_GAM_Dec_16.pdf for details on NHS trusts.

The unavoidable variation in capital charges on land that result from variation in unit land prices, affects all providers and reoccurs every year. In addition, the same areas of the country will have consistently higher unit land values than others reflecting the underlying variation in market pressures on land around the country.

Criterion 3: Is the unavoidable portion of capital charges relating to land costs significant enough to warrant reimbursement via the MFF?

As with buildings it is difficult to precisely estimate the materiality of variation in capital charges due to land cost differences. When calculating the weight for the current land index the PDC dividend rate is applied to all land. This is a proxy for all capital charges associated with land.

Replicating this calculation across each provider (which we illustrate below in **Figure 13**) shows that on average 0.3% of total costs are accounted for by capital charges which relate to land.

Figure 13   Estimated land capital charges as a proportion of providers' total costs[59]
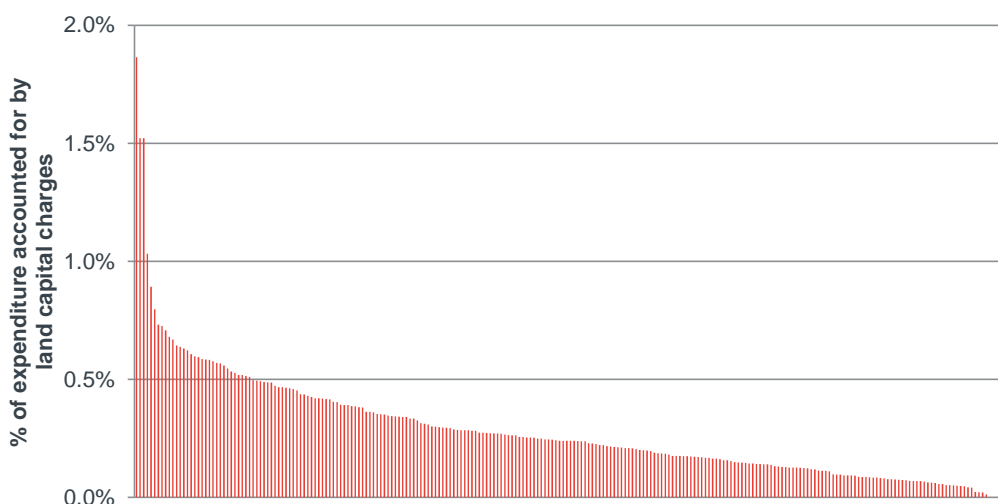
Source: Frontier Economics analysis of NHS Trust and Foundation Trust Accounts 2014/15

Note: Total costs are calculated by adding the PDC dividend to total operating expenditure

The value of land varies hugely around the country, even within relatively small areas. The difference in the NBV per hectare for trusts at the 90th percentile versus trusts at the 10th percentile is 1,055%[60] (see **Figure 14**). This variation in unit land values (holding size constant) leads to some providers having larger asset bases. This, in turn, will lead to unavoidable variation in capital charges.

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[59] This includes all trusts. Certain trust types will have a higher proportion of costs relating to land capital charges than others. We explore this issue in **Chapter 8.**

[60] The difference in the NBV per hectare for trusts at the 95th percentile versus trusts at the 5th percentile is 2,821%

Figure 14   Trusts' NBV per hectare of land (£'000s)
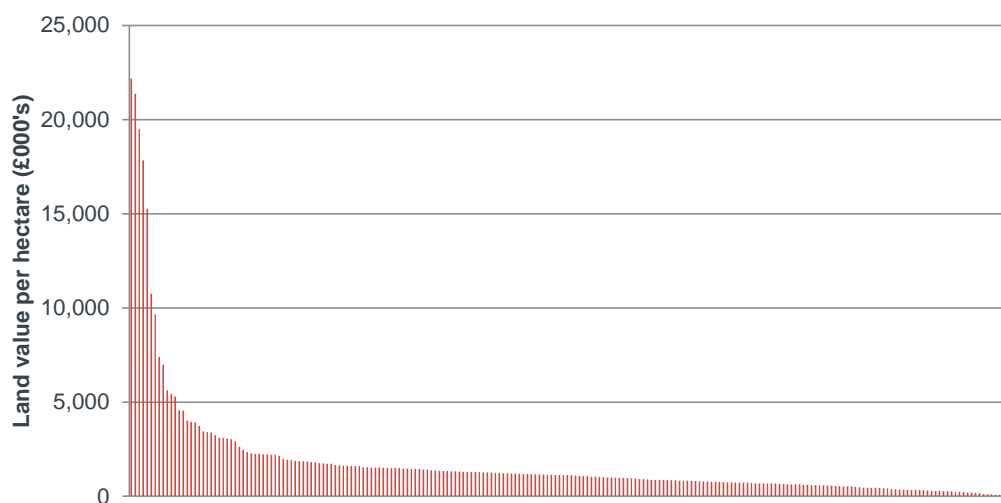
We derive a measure of unavoidable impact by multiplying 0.3% with the 1,055% unavoidable variation. This produces an impact of 3.1%, which is clearly significant and passes this criterion.

The most common form of capital financing for land is the PDC. Trusts currently pay the entire PDC dividend as one payment rather than splitting it by different asset types such as land or buildings. Therefore, it is also worth considering the materiality of capital charges as a whole. If we consider the potential impact of variation in building costs and land values simultaneously we estimate the unavoidable impact to be 3.6%.

Criterion 4: Is inclusion of capital charges relating to land in the MFF consistent with positive incentives?

Yes, it is possible to include capital charges relating to unit land values in the MFF in such a way that is consistent with positive incentives. An index could be created which is based on regional commercial land values. Providers would be unable to influence these values and could not influence their index allocation without changing location. Providers would therefore retain the incentive to minimise their land capital charges as much as possible.

The current land index calculation method bases index values on the NBV of actual land held by providers as opposed to regional averages. This is a pragmatic decision as there is currently no source of external commercial land value data at a level of granularity that would sufficiently account for differences between providers. Relying on NBV may mean that the index is not be entirely up to date and could reward trusts for selecting a more expensive plot than is strictly necessary. We will consider incentive effects in more detail in **Chapter 7.**

Criterion 5: Is it broadly practical to include capital charges relating to land within the MFF?

Yes, it is practical to adjust for variation in capital charges attributable to land via the MFF. The current land index, which is straightforward to implement, uses a proxy of capital charges as the index weight and variation in NBV per hectare to generate the index values.

Alternative calculation options will present their own issues which we will consider in **Chapter 7.**

4.3.4 Business rates

This section describes our approach to applying the framework to business rates. We discuss each of the criteria in turn in what follows.

RECOMMENDATION

We recommend that an adjustment is made for unavoidable variation in business rates via the MFF.

Criterion 1: Are business rates unavoidably higher for some providers?

The answer to this question is "yes".

Business rates are a local property tax levied on most non-residential properties. In 2012/13 business rates accounted for 4.5% of total tax revenue (Adam & Miller, 2014). The Valuation Office Agency (VOA) sets business rates on behalf of each local authority.

The VOA works out each property's business rates by estimating their "rateable value".[61] Currently, this refers to the open market rental value on 1st April 2008.[62] From April 2017 onwards the VOA will calculate business rates on the basis of rental value as at April 2015.[63]

There will be some unavoidable variation in business rates payments due to the regional patterns in rental values. Holding other factors such as size and type of building constant, providers will face a larger business rate charge if they are located in a high cost area. Providers will have no control over prevailing market rental values.[64]

Criterion 2: Is the MFF the most appropriate mechanism for adjusting for the variation in business rates?

The answer to this question is "yes". In our opinion it is logical to compensate providers for unavoidable variation in business rates using the MFF. All providers

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[61] https://www.gov.uk/introduction-to-business-rates/how-your-rates-are-calculated

[62] The amount paid by each business will be the rateable value times a multiplier which is set by central government.

[63] The government usually does this revaluation every five years but it was delayed in 2015.

[64] However, they will be able to determine the type of property they use, which will also affect their business rate charge.

with commercial property are required to pay business rates on a regular basis. The patterns of unavoidability in business rates will be consistent from one year to the next and reflect variation in external input prices.

Criterion 3: Is the unavoidable portion of business rates significant enough to warrant reimbursement via the MFF?

The answer to this question is "yes".

We have estimated the proportion of total costs accounted for by business rates by each provider. We present these proportions in **Figure 15**. It is noteworthy that a sizeable proportion of providers (23%) do not report any business rate charge in their accounts. This is likely because those providers pay a single management charge which includes business rates along with a number of other items.[65] Therefore we have calculated the average proportion of costs accounted for by business rates only amongst those providers who do report a charge. On average, 0.4% of total expenditure by providers is allocated to business rates.

Figure 15   Business rate expenditure as a proportion of providers' total costs
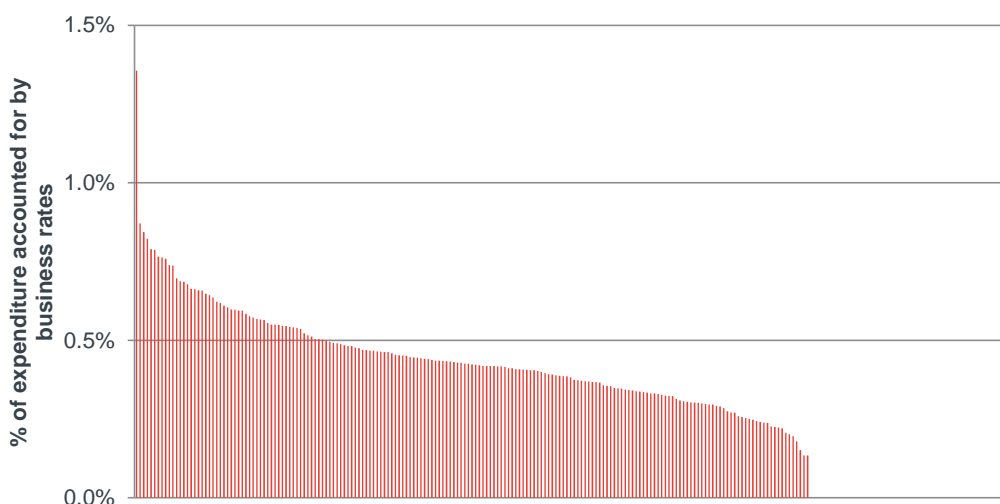
Source: Frontier Economics analysis of NHS Trust and Foundation Trust Accounts 2014/15

Note: Total costs are calculated by adding the PDC dividend to total operating expenditure

The VOA releases local area rateable value data[66] which we have illustrated in **Figure 16**.

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[65]   For example Taunton and Somerset NHS Foundation Trust do not report a business rates charge in their annual accounts but instead report a single premises charge: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/542506/TAUNTON_Annual_Report_and_Accounts_2015-16.pdf

[66]   https://www.gov.uk/government/statistics/non-domestic-rating-business-floorspace

Figure 16   Rateable value per metre squared by administrative area
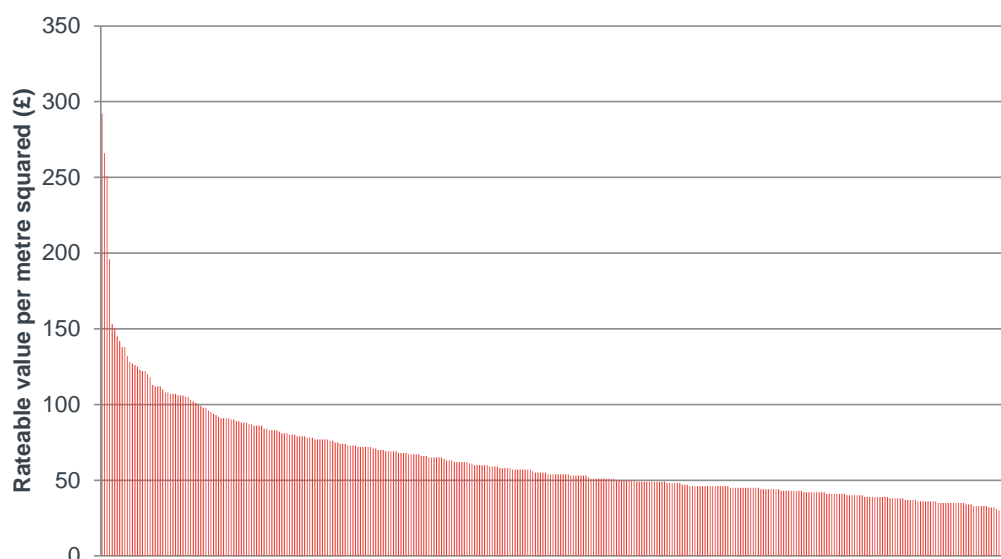
Source: Frontier Economics analysis of Valuation Office Agency non-domestic rating data, 2008

Note: England is divided into 363 administrative areas

Using 2008 values, which are the basis for business rates currently, we observe a 286% variation in rateable value from the administrative area at the 90th percentile compared to the administrative area at the 10th percentile.[67]

We derive a measure of unavoidable impact by multiplying 0.4% with the 286% unavoidable variation. This produces an impact of 1.3%, which is significant and therefore worth taking to criterion 5 where we consider potential calculation options. Furthermore, this unavoidable impact will rise from April 2017 when the VOA update the underlying rental values. This will increase the level of unavoidable variation[68] and the proportion of expenditure on business rates. Business rate bills for trusts in England are set to rise by £322 million over the next five years, which is equivalent to a 21% increase.[69] All estimates presented here will need to be revised as result.

Criterion 4: Is inclusion of business rates in the MFF consistent with positive incentives?

Yes, it is possible to include an adjustment for business rates in the MFF in such a way that is consistent with positive incentives. An index could be created which is based on local area rateable value figures released by the VOA. Providers would be unable to influence these values. This reduces the scope for potential distortionary behaviour.

We will consider incentive effects of specific calculation options in **Chapter 7**.

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[67]   The equivalent figure for a 95:5 comparison is 359%.

[68]   Using data from 2015 rather than 2008 the 90:10 ratio becomes 311% rather than 286%.

[69]   http://www.cvsuk.com/news-resources/news/nhs-funding-crisis-set-worsen-we-reveal-rates-hikes-hospitals-across-england

Criterion 5: Is it broadly practical to include business rates within the MFF?

Yes, it is practical to adjust for variation in business rates payments via the MFF. As mentioned above the VOA's rateable value data could be used to create a local area index which could then be mapped to providers. Providers' spending on business rates would serve as the weight of the index.

Alternative calculation options will present their own implementation issues which we will consider in **Chapter 7.**

4.4 Summary

A summary of our recommendations is contained above in **Figure 7**. Overall, we recommend that all aspects of the current MFF (buildings, land and staff) are retained. In addition, we propose that an adjustment for business rates is included within the MFF. We explore calculation options for all of these elements in **Chapters 6** and **7**

5 CRITERIA FOR ASSESSING CALCULATION OPTIONS

SUMMARY

- This chapter sets out the detailed criteria used to assess calculation options for cost elements that have passed the first five criteria in the framework in **Chapter 3**.

- Calculation options are assessed for their accuracy, simplicity and incentive implications.

- Possible trade-offs between calculation criteria are recognised.

Figure 17   Criteria used to assess calculation options

Accuracy	- How much unavoidable variation does the method capture? - How consistent is the calculation approach with economic theory? - How consistent are the results over time? - Is the method adaptable to potential changes in funding mechanisms?
Simplicity	- Will the method appear transparent to sector stakeholders? - How easy is it to replicate the method?
Incentive Implications	- Will providers and commissioners be able to reasonably influence their index value? - What are the likely changes in behaviour? - How strong are the incentives involved?

Source: Frontier Economics

5.1 Accuracy

We desire the calculation method to be accurate and we consider this from four different perspectives:

- Ability of calculation approach to capture the extent of unavoidable variation;

- Consistency of calculation approach with economic theory;

- Consistency of results from calculation method over time; and
- Ability of calculation method to adapt to changes in funding mechanisms in future.

We consider that accurate methods of calculation allow for a high level of granularity. Specifically, we do not consider a method accurate if it fails to capture the extent of the observed unavoidable variation. As noted in the materiality criterion in the framework in **Chapter 3**, in some cases, there will be a direct link between the accuracy of a method and its materiality. For some cost elements, it may be reasonable to set a lower threshold for materiality if the method for reimbursement is highly accurate and not unduly complex (covered below).

We also consider the accuracy of a method with respect to the economic theory in which it is grounded. Providers may operate from different sites each of which have their own level of unavoidable costs. Calculation methods should be flexible enough to account for this. Therefore if a provider opens a new site in a different area their trust level value can be updated. Methods with a solid theoretical foundation and supporting (if not specific) evidence base as well as their use in other sectors or jurisdictions are considered to be more accurate.

We will judge methods which produce wildly different values from year to year as inaccurate.[70]

Finally, we will consider if a particular method is likely to be accurate in the future, if, for example, there is a move away from provider specific reimbursement.

It is also important to note that any method's accuracy will be impacted by the quality of underlying data. Even the most sophisticated econometric method will produce inaccurate estimates if the underlying data source is unreliable.

5.2 Simplicity

We also desire simplicity to be a feature of the calculation method and we consider this from two main perspectives:

- The transparency of the method to sector stakeholders; and
- The ease with which sector stakeholders can replicate the method (including the ease of accessing data required to replicate calculations).

Simple calculation options will be efficient to administer and transparent to sector stakeholders. Methods we recommend should be replicable where possible and ideally rely on publicly available inputs.

This criterion ensures that recalculating the MFF does not impose an undue burden on NHS Improvement and NHS England and helps a provider understand why their index values differ from another provider. There can be an interaction between materiality and simplicity. We will not recommend calculation options which are very complex to calculate for indices which are of borderline significance.

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[70] Assuming that these changes are not justified by changes in market forces, for example.

5.3 Incentives

Our last criterion explores whether calculation options could result in harmful, distortionary behaviour. The MFF should redistribute resources without affecting provider or commissioner incentives in a negative way. We consider whether calculation methodologies could lead to affected organisations altering their behaviour with a view to influencing their index value. Incentive implications are relevant here because providers can still influence the total costs of elements that we have judged to be, in part, unavoidable. For example, some elements of staff costs are unavoidable due to variation in regional wage rates (unit cost) but providers can still influence their overall pay bill by changing the total number of staff they take on (total cost). We want to avoid methods which would incentivise providers to reduce their quality of care or increase costs beyond an efficient level.

Whether the likely changes in behaviour will be positive[71] or negative and the scale of the incentives will be important.

5.4 Trade-offs

There will likely be trade-offs between the three criteria above in some circumstances. A calculation option that we judge to be highly accurate may be less transparent than alternative simpler options.

In some cases there will not be one dominant option and our interpretation of the trade-offs involved will not necessarily match those of NHS England or NHS Improvement. In those cases we highlight our preferred option as well as the associated potential risks or negative implications

When we make recommendations for the calculation of each sub-index we also undertake a final loop in our thinking to consider how other sub-indices are calculated to ensure consistency across the overall MFF.

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[71] In our view the MFF should be consistent with incentives for organisations to provide the best possible care at an efficient cost.

6 METHODOLOGY FOR CALCULATING STAFF MFF COMPONENTS

SUMMARY

- In this chapter we assess the calculation options available for adjusting for unavoidable differences in staff costs. This assessment has two stages.

- The first stage involves creating appropriate groupings of staff that reflect the unavoidable direct and indirect costs faced by providers and hence indicate the appropriate high level mechanisms for accurately reflecting these costs.

- Three recommended staff groupings result from our analysis:

1. **Non-clinical staff** (estates and ancillary and administrative and clerical)

2. **Non-M&D clinical staff** (nursing and midwifery, additional clinical services, healthcare scientists, additional professional scientific and technical staff, allied health professionals and students)

3. **Medical and dental staff** (medical and dental staff)

- The second stage of work considers the alternative calculation methods available to capture private sector benchmarks for the first two groups. This stage of work considers each calculation method against the accuracy, simplicity and incentives criteria set out in the previous chapter.

- We recommend adopting a simplified version of the current approach, which estimates geographic variation in private pay at Travel to Work Area (TTWA) level. Like the current approach, this method relies on econometric estimates obtained from worker-level data under restricted access. Unlike the current method, the TTWA-level approach would require a considerably lower amount of manipulation of the econometric estimates to construct the non-M&D staff index.

- Alternative calculation options would also provide a reasonably accurate assessment of variation in private wages, and could be considered to achieve a different balance between accuracy and simplicity compared to the recommended method.

Our assessment of labour market pressures in **Chapter 4** concluded that there was unavoidable variation in staff pay, that it was appropriate to capture the variation using MFF and that the impact was substantial. It was also possible to conceive of calculation options that are compatible with desired incentive properties and are practical to implement.

The assessment in **Chapter 4** was done at a relatively high level, although it recognised that there are different groups of staff, for which trusts may face different direct and indirect costs.

In this chapter we undertake a two stage process for assessing calculation options for capturing unavoidable variation in staff-related components within the MFF:

- The first stage of the process divides staff into groupings that reflect the unavoidable costs that the calculation methodology needs to accurately capture. Different staff groups have a different mix of unavoidable direct and indirect costs and hence calculation options will vary depending on the mix that the method is looking to adjust for. This stage of work results in a recommendation of which unavoidable direct and indirect staff costs the method should be seeking to accurately capture.

- The second stage considers the alternative detailed calculation methods available to capture the required direct and indirect staff costs for each staff grouping. At this point a full consideration of the accuracy, simplicity and incentives associated with different calculation methods is considered.

6.1 Grouping staff according to the unavoidable costs that should be captured by MFF

RECOMMENDED GROUPINGS AND CALCULATION METHODS

Three recommended staff groupings result from our analysis:

Non-clinical staff (estates and ancillary, and administrative and clerical) pay is heavily influenced by private labour market conditions. We observe regional variation in direct costs over and above NHS regional pay adjustments. Private sector benchmarks are recommended as the most appropriate way of compensating providers for unavoidable local variation in costs associated with these groups. This is because, in general, providers are forced by local market conditions to approximately pay the local going rate for staff in this group.

Non-M&D clinical staff (nursing and midwifery, additional clinical services, healthcare scientists, additional professional scientific and technical staff, and allied health professionals) pay seems to follow NHS regional pay adjustments. However, there is some evidence of additional non-pay costs in high wage areas for this group of staff. Compensating providers on the basis of the uplifts they are obliged to pay would not capture these indirect costs. To account for these costs, private sector benchmarks are recommended as the most appropriate way of compensating providers.

Medical and dental staff pay is not heavily influenced by local labour market conditions. Medical and dental staff are not entitled to the same regional pay adjustments as other staff. We observe little significant variation in average earnings for this group across the country. There is some evidence of higher turnover in London, but conversely we also observe that London-based trusts are less reliant on agency staff for this category. Adjusting funding for specific direct costs associated with the London weighting is recommended as these costs are not reflected elsewhere. Therefore, we recommend that the current approach to calculating the MFF index is retained and simply updated with more recent data.

Economic theory tells us that private sector labour markets will result in a set of prices. These prices will be the going wage rate for each group of workers with a certain set of skills within that market. These prices may vary regionally from one labour market to the next to reflect differences in the demand and supply of each labour type within that market. Labour markets are generally defined geographically on the basis of how far employees are willing to travel to work.

Public sector labour markets may additionally feature certain market constraints.[72] These constraints could include collective pay bargaining. For example, the NHS has national pay scales for staff. These pay scales include specific regional uplifts which are discussed below. In addition, due to the specialised nature of certain roles within the NHS, some employees may find it difficult to find an equivalent role in the private sector.

The extent to which the price in public sector wage markets equals the private sector wage market in the same area depends on whether the constraints mentioned above are binding. If there are national pay scales which do not perfectly mimic the variation in private wage rates and public sector employers cannot circumvent these, then the public sector wage rate for a given type of employee may deviate from the private sector rate.

Where public sector employers are forced to pay a wage rate that is less competitive than the private sector wage rate, they may have to offer some alternative compensation or they could face higher indirect costs. These could manifest themselves in a number of different ways including higher turnover or lower productivity.

Absent of any constraints, the private sector wage rate will provide a good guide to public sector wage rates. If binding constraints are in place the public providers who are not paying the going rate may incur additional indirect costs. Basing providers' compensation on private sector benchmarks may still therefore be appropriate when the indirect costs cannot be readily measured. This will ensure that areas which are likely to experience the highest levels of indirect costs will receive the largest relative uplift.

6.1.1 Staff groupings considered

We consider each of the nine major staff groups shown in **Figure 18** separately in our assessment of the extent of unavoidable direct and indirect costs associated with staffing. All of the staff groups with the exception of medical and dental staff will be covered by AfC pay scales. Medical and dental staff are subject to separate national bands. As discussed above both of these national pay arrangements contain separate specific regional uplifts:

■ **HCAS adjustments:** all AfC staff who are working for a provider located inside or close to London are entitled to uplifts in pay (i.e. HCAS). Providers in Inner London are required to pay AfC staff an additional 20% of base pay. The equivalent figures for Outer London and Fringe are 15% and 5% of basic pay (NHS Staff Council, 2016). Maximum and minimum absolute payments

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[72] These constraints are additional to the constraints that we see in every labour market, such as the minimum wage.

also apply for each zone. For example in Inner London the maximum payment is £6,405. Therefore an employee earning more than £32,025 in Inner London will receive a top-up of less than 20%.

- **London weighting:** each medical and dental employee working for a provider based in London is entitled to an additional £2,162 per year.[73]

The most obvious compensation mechanism would be to pay providers the uplifts they are obliged to pay their staff. However, this direct compensation will be inaccurate if:

- We see variation in direct costs which exceeds or is lower than these regional uplifts; or
- We find evidence of additional indirect costs which affect providers in high cost areas.

If we find evidence for either or both of these factors an alternative option is to use a private sector benchmark, which represents the local market clearing wage rate. This will account for the actual variation in direct costs if the constraints unique to the NHS do not bind. If the constraints do bind, leading to indirect costs, the private sector benchmark method will not calculate these indirect costs, but it will award providers operating in the areas where there is likely to be greatest additional compensation.

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[73] Providers in the Fringe zone are obliged to pay non-resident medical and dental staff an additional £149 per year.

Figure 18   Staff groups

Staff Group	Definition	Example Job Roles
Additional clinical services	Staff directly supporting those in clinical roles. Support to nursing, allied health professionals, healthcare scientists and other scientific staff are included. Have significant patient contact as part of their role.	Call operator, emergency care assistant, healthcare assistant, nursery nurse
Additional professional scientific & technical	Scientific staff, including registered pharmacists, psychologists, social workers and other roles such as technicians and psychological therapists.	Pharmacist, chaplain, social worker, osteopath
Administrative & clerical	Non-clinical staff, including non-clinical managers, administration officers, executive board members who do not have significant patient contact as part of their role.	Accountant, chief executive, clerical worker, receptionist
Allied health professionals	Registered clinical staff providing diagnostic, technical and therapeutic patient care, including dieticians, radiographers and physiotherapists. Includes qualified ambulance staff such as paramedics.	Dietician, physiotherapist, paramedic, specialist practitioner
Estates & ancillary	Non-clinical support and maintenance staff, including gardeners, plumbers, cooks and housekeepers who do not have significant patient contact as part of their role.	Electrician, housekeeper, telephonist
Healthcare scientists	Registered qualified and other staff working in a defined healthcare scientist role, including clinical scientists and biomedical scientists and technicians working in healthcare science.	Healthcare scientist, consultant healthcare scientist, healthcare science practitioner
Medical & dental	Registered doctors and dentists	Consultant, foundation year doctor, clinical assistant, dental officer
Nursing midwifery registered	Registered nurses and midwives	Staff nurse, modern matron
Students	Directly employed staff undertaking formal education, including student nurses and midwives	Student midwife, student dietician

Source: Reproduced from Clarke (2014)

Nurses and midwives are the largest single group of staff (30% of Whole Time Equivalents (WTEs)) followed by administrative and clerical staff (21% of WTEs), additional clinical services (19% of WTEs) and medical and dental staff (11% of WTEs). The remaining five groups each account for less than 10% of the total contracted WTEs.

6.1.2 Evidence on direct staff costs for each grouping

We ran a series of regressions (looking at each staff group individually[74]) to explore the extent to which trust level variation in total WTE earnings could be explained by location[75] once other relevant factors were taken into account.[76] The purpose of these regressions was to help us to determine the extent to which there is regional variation in pay and whether or not this regional variation goes beyond any specific regional uplifts provided. The specific details of the data, the analytical approach and detailed regression results are contained within **Annex A.1**.

Our analysis suggests that estate and ancillary, and administrative and clerical staff, which we describe collectively as **non-clinical staff group**, have their pay influenced by local labour market conditions. This is because we observed:

- Statistically significant evidence that total pay is higher in the areas where trusts are obliged to pay AfC HCAS uplifts;[77] and

- Statistically significant evidence that non-clinical staff groups exhibit regional variation in pay that goes beyond the HCAS pay uplifts meaning that, on average, trusts in certain high cost areas pay above the mandated increases.[78]

This suggests that direct pay costs are adjusted beyond HCAS uplifts to ensure appropriate staff are attracted to the roles in light of the prevailing local labour market pay rate. This could be because providers in London hire equivalent staff at higher grades on average.

In **Figure 19** we plot average annual earnings of administrative and clerical staff for each trust against an index of relative average private sector wages in the provider's local area.[79] We see that, in general, trusts that are located in higher cost areas pay their administrative and clerical staff more on average. Specifically, the observed correlation coefficient is 0.73 which indicates a very strong relationship. This supports our recommended method.

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[74]   Trusts are only included if they have at least 50 WTE in the relevant staff group.

[75]   We use HCAS zones and GORs as our primary geographic variables. We present a geographical breakdown on trusts in **Annex A.** Using a sample of ESR data we determined the percentage of each trust's staff in each HCAS zone. Each trust was then assigned a zone depending on where the majority of its staff were located.

[76]   Exploring average earnings per WTE allows us to focus on the variation that exists after we strip out scale effects.

[77]   **Figure 42.**

[78]   **Figure 43.**

[79]   These index values are based on national variation in wages of similar workers and are discussed in detail in **Section 6.2**. Each trust's value is based on the TTWA in which it is located. Approximately 30 trusts all have the highest TTWA value as they are based in the London TTWA.

Figure 19 **Earnings of administrative staff relative to local area wage levels**
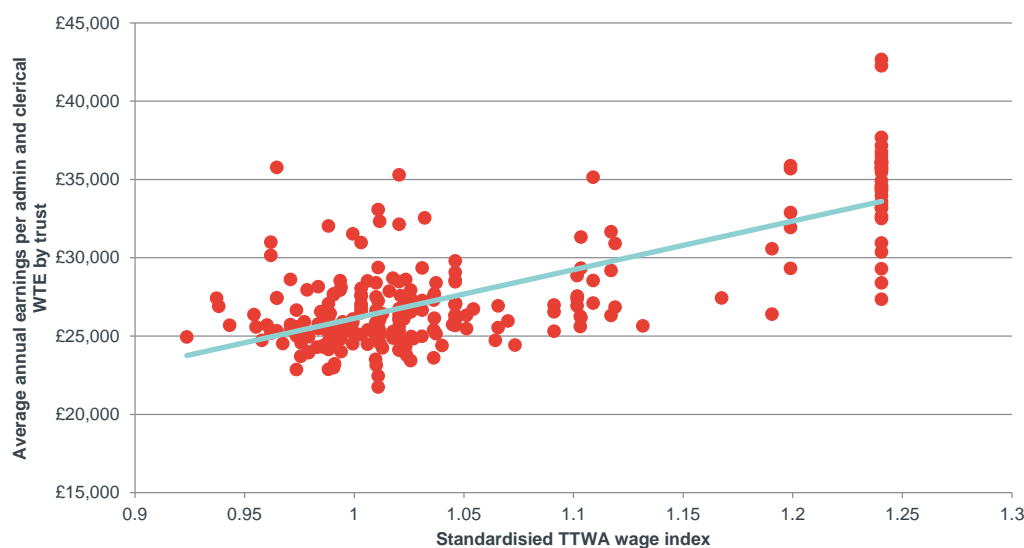
Our direct cost analysis suggests that for the remaining AfC groups, which we describe collectively as the **clinical non-M&D staff group** (nursing and midwifery, additional clinical services, healthcare scientists, additional professional scientific and technical staff, and allied health professionals),[80] the direct cost pattern is different. Our analysis for this group indicates that the HCAS regional pay adjustments explain the observed variation in wages. This is again because for this group of staff we find evidence that total pay is higher in the areas where trusts are obliged to pay AfC HCAS uplifts.[81] However, in contrast with non-clinical staff, those HCAS payments explain the majority of the variation in like-for-like earnings.[82] We observe no significant differences in earning at all once we remove the HCAS uplifts from the earnings of the nursing and midwifery group and the additional clinical services group.[83] For the remaining three groups (healthcare scientists, additional professional scientific and technical staff, and allied health professionals) we see that trusts in some of the high cost areas pay their staff slightly less on average when we remove the HCAS uplifts.[84] This could imply that providers are actually reducing base salaries for these staff compared to the rest of the country such that base salary plus HCAS uplift is equalised across the country. However, for reasons we explain in more detail in **Annex A.1**, it is also possible that the differences observed are the result of limitations in the

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[80] Due to sample size limitations, it was not possible to model the earnings of students in the same way as the other groups. However, it seems most logical to us to include students in the clinical non-M&D group.

[81] This pattern also holds if we examine specific AfC bands within larger staff groups such as band 5 nurses.

[82] **Figure 43.** This is in keeping with previous analysis which found that nurses in London were not on higher pay points than nurses outside of London on average. If this was not the case we may see variation over and above HCAS uplifts **http://www.frontier-economics.com/documents/2014/09/review-of-high-costs-area-suplements.pdf**

[83] Unsurprisingly, the proportion of variation explained by these models falls when the dependent variable is adjusted versus unadjusted earnings.

[84] This difference is significant for trusts in Inner London for healthcare scientists and allied health professionals. For additional professionals, scientific and technical staff this difference is significant for both Inner and Outer London versus the rest of England.

data that mean we have to use estimated uplifts in our calculation method rather than actual uplifts. All in all, given that the absolute variation, after we remove HCAS payments, is small for this group, we conclude that regional pay adjustments explain the observed variation in wages. Our recommendation on calculation method will depend on the observed pattern of indirect costs. If we find no evidence of indirect costs for providers in high cost areas it would seem natural to simply compensate providers according to the HCAS uplifts they are obligated to pay.

Finally, our analysis indicates that, on balance, **medical and dental** pay seems to be unrelated to local labour market conditions. We find some evidence that trusts outside London may not pay their medical and dental staff any less than trusts within London who receive a specific uplift.[85] This could imply that the base salaries of London medical and dental staff are being reduced relative to the base salaries of staff in other parts of the country[86] or that providers outside London have to increase their salaries to attract staff.[87] However, statistically, this evidence is insufficient to confidently reject the hypothesis that trusts in London incur more direct costs than those outside as a result of the London weighting. This is because the actual uplift amount that trusts in London are obliged to pay is within the confidence interval for the London region in our Government Office Region (GOR) specification.

Our analysis also considered the potential impact of unattractive location on direct staffing costs. We found no evidence that unattractive areas (proxied by measures of deprivation) were forced to pay their staff more.[88] It is also possible that a provider's reputation will influence how attractive a place it is to work from an employee's point of view. In some cases providers with a poor reputation may be forced to pay above the going rate to attract staff.[89] It is not immediately obvious how to quantify reputation objectively across all providers. It is also likely to be at least partially controllable over a reasonable time horizon.

6.1.3 Evidence on indirect staff costs for each grouping

As noted in **Chapter 4**, indirect staff costs arise in cases where providers are unable to vary wages sufficiently to reflect the going market rate. To attempt to attract and retain staff, providers may offer non-pay related benefits e.g. training or subsidised food. Alternatively, they may possibly have to accept that they are unable to offer the market rate. This could impact on vacancy and turnover rates.[90] Finally, it is also possible that the quality of staff that a provider can

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[85] There is significant regional variation for certain roles within the medical group. However, this falls away when we consider the group as a whole. Specifically, we found that consultants outside of London earned significantly more than consultants within London. We saw no significant regional differences for the specialist registrar role.

[86] This could be because there is a greater supply of medical and dental staff in London relative to the rest of the country.

[87] **Figure 44** and **Figure 45.**

[88] **Figure 51.**

[89] Further work would be needed to determine whether this is case.

[90] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/499490/Guide_to_the_market_forces_factor.pdf

attract at the rate they are able to pay will be lower, leading to reduced productivity and potentially more staff for any given grade or simply a lower overall quality of service.

In this section, we examine two empirical measures of indirect costs: staff turnover and agency spend as these are metrics for indirect costs for which we have some available data.[91] We also considered exploring the variation in vacancy rates. However, the ESR data we accessed appeared to be unreliable as vacancy rates appeared unrealistically high across all trusts. Other indirect costs such as inferior service delivery or use of wider non-pay related benefits may be important but are difficult to measure. The purpose of this analysis is to determine whether there is a consistent geographic pattern of higher indirect costs (as captured by staff turnover and agency spend) in certain areas.

Staff turnover

Our evidence suggests that for all staff groups with the exception of estates and ancillary staff there is a clear pattern that trusts within London experience additional turnover compared with other trusts.[92] There is also some evidence that a similar issue is true for the East of England for a number of staff groups and the Midlands for the medical and dental group. These higher rates of turnover in London could be the result of the HCAS uplifts for these areas insufficiently reflecting the prevailing local labour market rate of pay. As a result, trusts in these higher cost areas experience greater turnover of staff despite paying the uplifts. However, it could also be the case that London staff have a relatively large number of providers within close proximity to choose from, resulting in additional turnover. If that is the driver, as opposed to local labour market pressures, increasing the HCAS uplifts would not necessarily eliminate this discrepancy between London and the rest of the country.[93]

In **Figure 20**, below, we plot turnover of nursing staff in each trust against a measure of relative average private sector wages in their local area.[94] We see that, in general, trusts located in higher cost areas experience higher levels of turnover. However, there is variation around this trend. The observed correlation coefficient is 0.40 which indicates a weak but positive relationship between local area wage rates and turnover. However, there are certainly other factors that will influence indirect costs.

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[91] Turnover is examined via a multivariate approach as we outline in **Annex A.1**. Due to data limitations, agency costs were examined descriptively; see **Figure 21**.

[92] **Figure 46** and **Figure 47**.

[93] Our analysis indicates that no other region experiences significantly more turnover than London. However, there will be significant differences between the other regions. Therefore an appropriate calculation method for this group needs to not only compensate London providers relative to the rest of the country but also differentiate between providers in other regions. We have examined turnover by HCAS zone and by GOR. This is not exhaustive and several other options could be considered as there will be variation within these regions. A preliminary analysis of turnover rates by Sustainability and Transformation Plan footprint was in keeping with the GOR level analysis.

[94] This is known as a SSWD as is discussed further in **Section 6.2.**

Figure 20 Turnover of nursing staff relative to local area wage levels
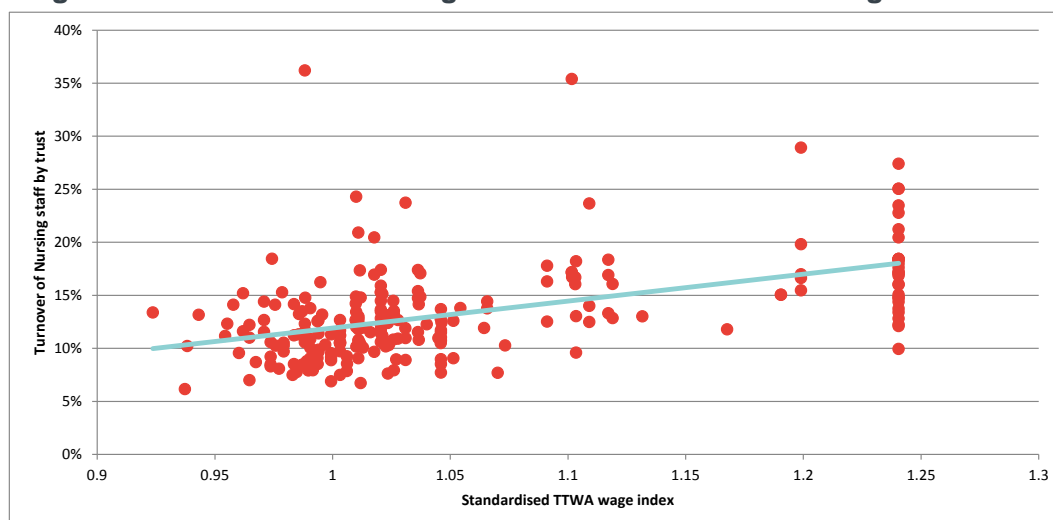
Source: ESR 2015, ASHE 2013-15. Frontier Economics analysis

Note: Local area wage index is based on the TTWA in which a trust is located

We also looked at turnover rates for trusts located in two other cities (Manchester and Birmingham) to see if the London pattern was repeated elsewhere.[95] When we compared the turnover rates of trusts located in these two areas relative to the rest of the country (excluding London) we did not observe any consistent pattern.

Our analysis also considered the potential impact of unattractive location on indirect staffing costs. We found no evidence that unattractive areas (proxied by measures of deprivation) experienced more turnover (**Figure 52**). It is also possible that a provider's reputation will influence indirect costs. A hospital with a particularly bad reputation may experience more turnover.[96]

Agency spend

Our evidence on agency spend is more limited due to data issues, but nevertheless it suggests that London trusts spend more on agency staff as a proportion of total pay than do trusts in any other region. Trusts located in the North of England spend the lowest proportion on agency staff.[97]

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[95]   **Figure 48**   Effect of location on turnover rates (hotspots)

[96]   Further work is needed to determine whether that is the case.

[97]   A certain proportion of agency spend across all regions will be due to avoidable inefficiencies. We are primarily interested in examining the relative pattern across regions rather than exploring the absolute proportions. Further details on the agency spending controls NHS Improvement have implemented can be found here: https://improvement.nhs.uk/resources/reducing-expenditure-on-nhs-agency-staff-rules-and-price-caps/

Figure 21   Agency staff spend as a proportion of total staff pay
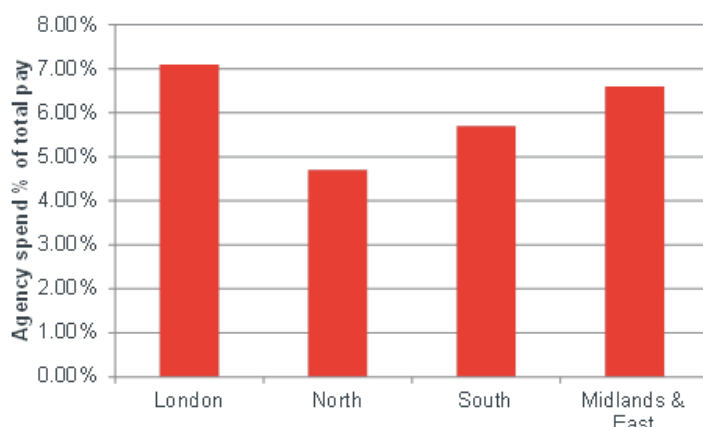
Source: National Agency Cost Information Database, November 2016

There is an interesting pattern of how agency spend varies around the country, broken down by broad staff groupings. Our separate analysis of trusts located in the HCAS zones relative to trusts in the rest of the country indicates that London trusts spent a higher proportion of their overall pay bill on agency staff over the July-December 2016 period (also using the National Agency Cost Information Database). This is driven by the nursing, administrative and other categories. However, London trusts spend a lower proportion on medical and dental agency staff. We cannot isolate the unavoidable element of agency expenditure. However, this analysis provides some additional support for the hypothesis that there are additional indirect costs associated with clinical non-M&D staff that warrant reimbursement via the MFF. The national labour market approach is likely to continue to be the best suited for medical and dental staff.

6.1.4   Previous work

The above results are consistent with previous work by Frontier, commissioned by the NHS Staff Council, reviewing HCAS.[98] This work found some evidence of higher indirect costs amongst providers in higher cost areas. Looking specifically at turnover and agency costs, the results were weaker but consistent with our current findings. The report suggested that providers may employ different mechanisms to respond to local labour market pressures: some will employ more agency staff, some will use recruitment and retention premia, while others will suffer higher staff turnover and vacancies. The report concluded that because the evidence is limited and the mechanisms complex, it would not have been appropriate to amend the HCAS system.

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[98]   http://www.frontier-economics.com/documents/2014/09/review-of-high-costs-area-suplements.pdf

6.1.5 Recommended groupings

Figure 22   Staff categories and recommended calculation method

Staff Group	Category	Calculation Method
Additional clinical services	Non-M&D clinical	GLM
Additional professional scientific & technical		
Nursing midwifery registered		
Allied health professionals		
Healthcare scientists		
Students		
Administrative & clerical	Non-clinical staff	GLM
Estates & ancillary		
Medical & dental	M&D staff	Uplift for London trusts to reflect London weighting

Source: Frontier Economics

Non-clinical staff

We recommend that non-clinical staff (estates and ancillary and administrative and clerical) costs are best compensated using a private sector benchmark approach. We have seen that their pay is heavily influenced by local private labour market conditions. As a result, we see variation in direct costs over and above the mandated HCAS uplifts. For this group, reimbursing providers according to their prevailing local wage rate is appropriate. Using private sector benchmarks[99] is the most accurate way of compensating providers for local variation in costs associated with these groups and ensuring consistency with the desired incentive properties of any MFF reimbursement. This is in keeping with the current calculation method. Using private sector benchmarks also ensures that providers still have the incentive to keep their costs down. We consider specific variants of private sector benchmark options below. The simplicity of calculation method will depend on the specific variant chosen.

Non-M&D clinical staff

We recommend that the non-M&D clinical staff (nursing and midwifery, additional clinical services, healthcare scientists, additional professional scientific and technical staff, and allied health professionals) are also compensated using private sector benchmarks. Our direct cost analysis showed limited evidence of significant differences in earnings once we remove HCAS uplifts. However, our analysis of indirect costs found evidence to support the hypothesis that trusts in high cost areas incur higher additional non-pay indirect costs for these groups (**Figure 20**).

Therefore while it may be appealing from a simplicity point of view to simply reimburse providers on the basis of the HCAS payments that they are obliged to pay, this approach could miss an important additional unavoidable cost. It is very

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[99]   Via GLM, for example.

difficult to know how significant these indirect costs are in reality. Further research may be needed to accurately quantify the expenditure impact of indirect costs and also to explore the possibility that other areas outside of London also face considerable challenges.[100] This is beyond the scope of the current report. However, it is our view that it would be inaccurate to ignore them and simply focus on direct cost differentials.

We have seen that one proxy of indirect costs (turnover rates) are generally higher in high cost areas. This does not guarantee that using a private sector benchmark approach will accurately measure all indirect costs. However, the market clearing wage rate that prevails in an area is likely to provide a reasonably good starting point.[101] In summary, variation in direct costs for this group approximately matches HCAS uplifts, but indirect costs are also higher in high costs areas. To account for both of these factors we recommend that the private sector benchmark approach is retained for this group.

We consider specific variants of private sector benchmark options below. The simplicity of calculation method will depend on the specific variant chosen.

Medical and dental staff

We recommend that the current approach to medical and dental staff is maintained. Medical and dental staff pay is not strongly influenced by local labour market conditions. Medical and dental staff are paid smaller regional uplifts than all other staff.[102] We observed very little regional variation in average earnings for medical and dental staff. Our best point estimate indicates that London trusts pay their medical and dental staff marginally less than trusts outside of London. However, due to a lack of precision in the estimates, our analysis could not definitely rule out the hypothesis that London trusts were paying higher total wages in line with the London weighting.

In terms of indirect costs the pattern was mixed. London trusts did experience more turnover of medical and dental staff than trusts in the rest of the country.[103] However, London trusts also spent a lower proportion of total medical and dental pay on agency staff than other providers.

The current index is calculated using data on the average pay bill for hospital doctors across the country in 2008/09. London weighting payments were calculated as a proportion of this total pay bill – 2.24%. London trusts were then assigned an index value of (1.0224) to reflect these higher costs while all other trusts are assigned a value of 1.[104] On balance, we recommend that this method is retained with updated data. We know that providers in London are obliged to

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[100] For example, trusts in certain peripheral areas may struggle to attract staff even if wages are relatively low in the local private labour market.

[101] Currently the GLM method awards Inner London trusts an additional 5% above HCAS top-ups. This is the implied indirect cost adjustment.

[102] Each medical and dental employee working for a provider based in London is entitled to an additional £2,162 per year.

[103] We have only examined turnover for the medical and dental group as a whole. The observed finding is likely to be at least partially driven by a higher proportion of junior medical staff in London who will rotate between organisations more regularly than more senior medical staff. This type of turnover will not be as costly from providers' point of view as permanent members of staff leaving.

[104] See Monitor's MFF guide (2016) for more details.

pay uplifts. This uplift should be reflected in their income, and currently this is done via the MFF. We do not have sufficient evidence to recommend eliminating this adjustment.[105]

This method will reflect the actual payments the London providers are obligated to make as the index values are based on the top-ups providers are obliged to pay. It is also straightforward to implement and does not have any major negative incentive implications as it relies on data averaged across all trusts.

6.2 Detailed private sector benchmark calculation options

RECOMMENDED PRIVATE SECTOR BENCHMARK CALCULATIONS

- We considered four possible options for calculating a single index, based on private sector benchmarks, which would compensate for non-clinical and clinical non-M&D staff. The four options include the current method developed by researchers at the University of Aberdeen (UoA).
- Each option strikes a different balance between accuracy and simplicity, and between providing granular estimates or limiting the amount of variation between NHS providers.
- We recommend adopting a simplified version of the current approach, which estimates geographic variation in private pay at TTWA level.
- Like the current approach, this method relies on econometric estimates obtained from worker-level data under restricted access. Unlike the UoA method, the TTWA-level approach would require considerably less manipulation of the econometric estimates to construct the non-M&D staff index.
- Other calculation options would also provide a reasonably accurate assessment of variation in private wages, and could be adopted to achieve a different balance between accuracy and simplicity compared to the recommended method.

This section describes options for calculating a single index, based on private sector benchmarks, which would compensate for non-clinical and clinical non-M&D staff. We refer to this index throughout the section as the "non-M&D index". The current method compensating for non-M&D staff costs has been developed and implemented by researchers at the Health Economics Research Unit of the University of Aberdeen. In the rest of this section, we refer to this method as "the UoA method". The UoA method assigns a distinct value of the index to each provider. The index is based on econometric estimates of geographic variation in private pay, smoothed to mitigate large differences between neighbouring areas, and interpolated from the CCG area level to provider site level.

We considered three possible alternatives to the UoA method:

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[105] Currently the medical and dental index has only two possible values – 1 and 1.0224. It is worth considering the addition of a third band which would cover fringe providers who are obliged to pay a smaller uplift.

- A **TTWA-level adjustment**: relying on econometric estimates of variation in private pay at TTWA level, with no smoothing or interpolation;

- **Allowing for "hotspots"** with worker-level data:

  □ relying on econometric estimates of variation in private pay, as in the TTWA-level adjustment

  □ simplifying the resulting estimates so that only providers in a limited number of areas are compensated more or less than the average; and

- A **region-local authority level adjustment**:

  □ estimating from publicly available data how much pay varies by region once differences in the occupational composition of the local workforce are accounted for

  □ using publicly available local authority level data to estimate how pay varies within region.

In **Section 6.2.1**, we illustrate how we applied our assessment criteria to this aspect of the MFF. Specifically what accuracy, simplicity and incentives mean in the context of private sector benchmark calculations and how those considerations have driven our choice of alternative calculation options. In **Section 6.2.2** we describe the possible alternative calculation methods in detail. In **Section 6.2.3** we evaluate the alternatives against the assessment criteria.

6.2.1 Defining the assessment criteria and choosing alternative options

Given the potentially complex nature of private sector benchmark calculations and their statistical underpinnings, we set out in some detail the specifics of how we consider accuracy, simplicity and incentives for staff pay benchmarks.

Accuracy

All the methods considered in this section are essentially estimates of geographic differences in private pay. We consider these methods to be accurate if they are consistent with the relevant economic theory and reasonably precise in predicting private wage variation, while also achieving reasonable robustness (limited sensitivity to assumptions) and stability (relatively limited variation over time).

For the method to be consistent with economic theory, we require three key characteristics:

- The method should isolate, as well as is possible, variation in private sector pay due to variation in local amenities or cost of living and labour demand and supply;

- Differences in values across adjacent geographies should not be very large, in general (that is, the index should avoid cliff edges between areas); and

- Only differences between areas that can be estimated with a reasonable degree of confidence should be reflected in the index values.

Achieving the first desired feature is not straightforward. Differences in private pay between areas can depend on a large range of factors other than local amenities or cost of living. For example, an area with a greater proportion of older workers would likely pay higher wages (all things being equal). A method that is consistent with theory should control as much as possible for these factors when comparing wages across areas. The UoA method achieves this standard, controlling as well as is possible given the available data for relevant factors influencing geographic differences in pay. Therefore, we did not consider alternative methods that would differ from the UoA method in this respect.

The UoA method controls for the role of geographical differences in age and gender, as well as part-time working and the industrial and occupational composition of the local workforce. Moreover, it also aims to account for differences in the level of responsibility across regions that would not be reflected in standard occupational coding. Occupations that are classified under the same standard code, e.g. 1211 – "chief executives" – can involve considerably different levels of responsibility depending on whether they are performed in the national headquarters of a firm or in a local unit.

There are other drivers of wages that one might want to control for, but this is not feasible with the available data without sacrificing robustness and stability:

- Education is likely to be an important driver, but no data on workers' education are included in the main data set available for the estimation, the Annual Survey of Hours and Earnings (ASHE). The Labour Force Survey (LFS) includes relevant information, but relying on LFS would involve sacrificing robustness and stability, as well as accuracy in the measurement of wages.

- The characteristics of the employer, e.g. its size, productivity, or other characteristics. However:

  □ including firm size in the estimated equation had no material impact on the estimates;

  □ productivity is difficult to measure. Even using a simple metric, Gross Value Added (GVA) per worker, is unlikely to be feasible, as this could only be done by matching workers in ASHE to information on their employers from the Annual Business Survey (ABS).[106] A successful match would only be possible for a relatively small subset of workers.[107]

  □ including information on other firm characteristics would also require relying on other data sets, chiefly the ABS, with resulting limitations in sample size.

Moreover, for the method to be consistent with theory, geographic boundaries should only matter to the extent that there are differences in cost of living and

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[106] The ABS is an annual survey of businesses covering the production, construction, distribution and service industries. Source: https://discover.ukdataservice.ac.uk/catalogue/?sn=7451

[107] The ABS includes information on around 62,000 non-financial enterprises, compared to around 2.4 million enterprises in the UK (source: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation). While these 62,000 include a large majority of large (250+ employees) enterprises, only a small proportion of small and medium enterprises (SMEs) are found in ABS. Therefore, there is a relatively low probability of finding in ABS a SME which employs workers included in ASHE (1% of working population).

amenities between areas. If cost of living and amenities typically do not vary sharply between areas that are close by, then we would expect an appropriate method to not estimate very large differences in pay between those areas. Nevertheless, some cliff edges may in fact reflect genuine differences across locations. This may happen in particular where small straight-line distances hide relatively long travel times. For example, travelling between the Isle of Wight NHS Trust Headquarters and the Southampton General Hospital is likely to take considerably longer than covering a similar straight-line distance between Southampton and Portsmouth. Moreover, cliff edges at the boundaries of urban transport networks may also reflect true differences in the local cost of living. Prices just outside the reach of the London underground network, for example, may be significantly lower than in areas at the outer edge of the network, particularly where no fast alternative rail connections are available.

The UoA method produces index values that vary relatively smoothly, once the values have been smoothed and interpolated, as intended. However, we considered whether it would be possible to achieve a similar result by using a different geography compared to the current choice of CCG areas. Specifically, we considered whether using TTWAs, that are designed to approximate self-contained labour markets, would reduce the need for smoothing.[108] This is the key idea underlying a potential **TTWA-level adjustment**.

Finally, providers in different areas across which there are no statistically significant differences in pay should receive similar compensation for their relevant staff costs. This is achieved by the current method by smoothing estimated pay differentials across CCG areas and assigning lower importance to differentials estimated with less precision. We considered whether the uncertainty in estimating pay differentials could be taken into account in a different way. An alternative would be only assigning different index values to different providers where there is a sufficiently large difference in private pay between the areas where they are located. This could be achieved through an adjustment based on TTWA-level estimates (as above) but only **allowing for hotspots in private pay** across England.

Simplicity

There are two key issues that may limit the simplicity of proposed calculation methods:

- The requirement of specialist skills, in terms of knowledge of econometrics or statistics (and related software) for the estimation of private pay differentials, and mapping skills for the smoothing or interpolation of the estimates; and

- Restrictions to data access, which apply to worker-level data sets with detailed geographical information (ASHE, LFS).

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[108] TTWAs are designed so that there is little commuting going in or out of the area – specifically, so that 75% of the resident population in the area also works in that area, and 75% of those who work in the area also live there. The Office for National Statistics (ONS) provides a detailed description of the estimation of TTWAs at https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/traveltoworkareaanalysisingreatbritain/2016.

The current calculation method is affected by both issues. For this reason, we considered an alternative method that would only require publicly available data, which can be downloaded freely from the website of the ONS, and basic knowledge of statistics and of Microsoft Excel or equivalent software. This is the **region-local authority level adjustment**.

Incentive implications

All calculation methods considered in this section rely on private pay data from official statistics sources. The information used in the calculation cannot be controlled or influenced by NHS providers. None of the methods considered here would therefore have any material implications for the behaviour of NHS providers.

6.2.2 Alternative options

The UoA method

The current method consists of the following steps:

- Estimating standardised differences in hourly wages between CCG areas[109] (or standardised spatial wage differentials (SSWDs)) through an econometric regression on worker-level data from the ASHE data. SSWDs are expressed as a proportion of average hourly earnings in Britain. For example, the estimated SSWD in areas where pay is exactly equal to the average is 100%.

- Estimating a "high responsibility adjustment": using a similar regression on data from the LFS to account for differences in the responsibility content of occupations across regions. This adjustment has the effect of decreasing slightly the index values of providers located in the London GOR.

- "Smoothing": each CCG area is assigned a value which is a weighted average of SSWDs from the regression in the first step above (raw SSWDs), including its own SSWD. Weights depend on distance (closer areas are assigned a greater weight) and on the precision of the raw SSWD (greater precision implies greater weight).

- "Interpolating": assigning a value to each provider site, as a weighted average of the smoothed SSWDs of neighbouring CCG. Weights depend again on distance and on the population of the area (CCGs with greater population receive greater weight).

Figure 23 below maps the smoothed CCG values, before they are interpolated down to provider site level.

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[109] This method has also been used to produce values based on Local Authority District areas (LADs). As the values implemented in past iterations of the MFF index were based on Primary Care Trust (PCT) areas, which preceded CCGs, in this section we refer to CCGs for simplicity. However, the same method can be applied to different geographies, including LADs.

Figure 23   Smoothed CCG values from UoA adjustment, 2013-15
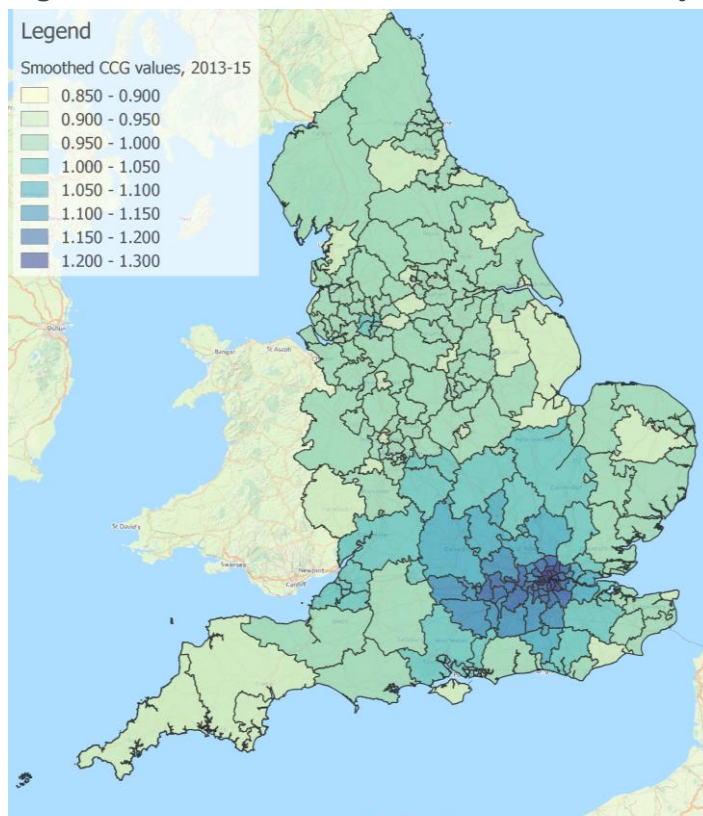
Source: Frontier Economics analysis of ASHE data

TTWA-level adjustment

Past work undertaken by the Health Economics Research Unit[110] concluded that using PCT (now CCG) areas, local authorities, or TTWAs in the econometric estimation of wage differentials made little difference to the precision of the estimates. This is confirmed by our estimates, which suggest that the in-sample prediction error in the estimation of wage differentials is very similar across the three cases.[111] However, using TTWAs leads to considerably smoother variation between neighbouring areas compared to local authorities or CCGs. This suggests that, as expected, TTWAs provide a more accurate approximation of boundaries between different local labour markets. If two locations are within the same TTWA, this means that people tend to commute across those locations. If the cost of living is higher in the Central London (Westminster) CCG than in the West London CCG, it is not clear that employers in the former need to (fully) compensate for this, as workers can easily commute in from the West London CCG or indeed much farther within the London TTWA. Large differences in pay

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[110]   Health Economics Research Unit (2010). .

[111]   Note: for almost all areas, TTWA adjustments are estimated with greater precision than CCG adjustments, as TTWAs typically include larger samples of workers. This is not the case for a small number of TTWAs, where the standard error of the estimated adjustment is relatively large.

across close areas within the same TTWA are unlikely to reflect differences in local amenities or cost of living. Indeed, the current method levels to a large extent differences between close areas (cliff edges), through smoothing and interpolation procedures. Raw TTWA SSWDs are more comparable to smoothed CCG-level SSWDs than to raw CCG-level SSWDs in terms of the cliff-edge issue.

This suggests potential simplification of the calculation method, removing some of the steps that follow the econometric estimation. Therefore, we consider an alternative calculation method which would consist of:

- Estimating standardised differences in hourly wages between TTWAs (or SSWDs through an econometric regression on worker-level data from ASHE.

- Assigning a value to each provider based on the TTWA where the majority of its staff are likely to be based. This assessment is likely to be best based on floor area of each provider site, although alternative solutions are available – we discuss these in detail below.

This method would not include a high responsibility adjustment. Computing the adjustment requires accessing an additional dataset – the LFS – increasing significantly the complexity of the method, while having only a limited impact on the final values – reducing index values for providers in the London GOR by 2% or less.[112]

This adjustment would produce a provider level index, rather than a site-level measure as under the current method. Producing a site-level index would require either of the following:

- Applying interpolation methods, the econometric estimation of wage differentials in itself is not powerful enough to pick up differences across so many fine-grained areas.
- Applying to each site the SSWD of the TTWA it falls in.

The use of interpolation would increase the complexity and opacity of the calculation considerably, while not necessarily improving its accuracy – as discussed above, we would not expect to observe material differences across close sites. Allocating SSWDs to sites based on a simple assignment would also imply an additional step in the calculation of final provider-level values, although this would be a relatively simple operation (e.g. computing the provider-level value as a weighted average of site-level values, with weights based on floor area or other measures).

There is currently limited available information on the location of NHS staff at site level – and indeed many members of staff may work across different sites. As a proxy, it would be possible to use one of the three following metrics:

- The location of provider headquarters (HQs);

- The number of beds in each site; and

- The floor surface area of each site.

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[112] Note, however, that it would be feasible to add any of the three steps involved in the UoA method (responsibility adjustment, smoothing, interpolation) to this method. Adding all three would mean using the UoA method with TTWAs rather than CCGs as the chosen geography.

We would recommend relying on floor surface area, as for other components of the MFF.

Provider HQs would provide the simplest calculation method, but their location may not reflect where most non-M&D staff are based. Moreover, using HQs may create an incentive to move HQs to high cost areas, where possible.

The number of beds has been used in the current calculation method. This would provide a reasonable proxy for staff location for most providers, but may not be appropriate in some cases, particularly for ambulance providers. Moreover, the location of some functions (e.g. administrative, some of the associate professional, scientific and technical) is not necessarily linked to beds.

Floor area is also not a perfect measure – not all areas will host staff with the same density – but if this is measured accurately, it can be applied to all provider types relatively easily, and implies a considerably lower risk of setting perverse incentives compared to a HQ-based calculation.[113]

Index values at TTWA level resulting from this calculation method using data from 2013 to 2015 are shown in **Figure 24**.

Figure 24   TTWA-level method non-M&D index values, 2013-15
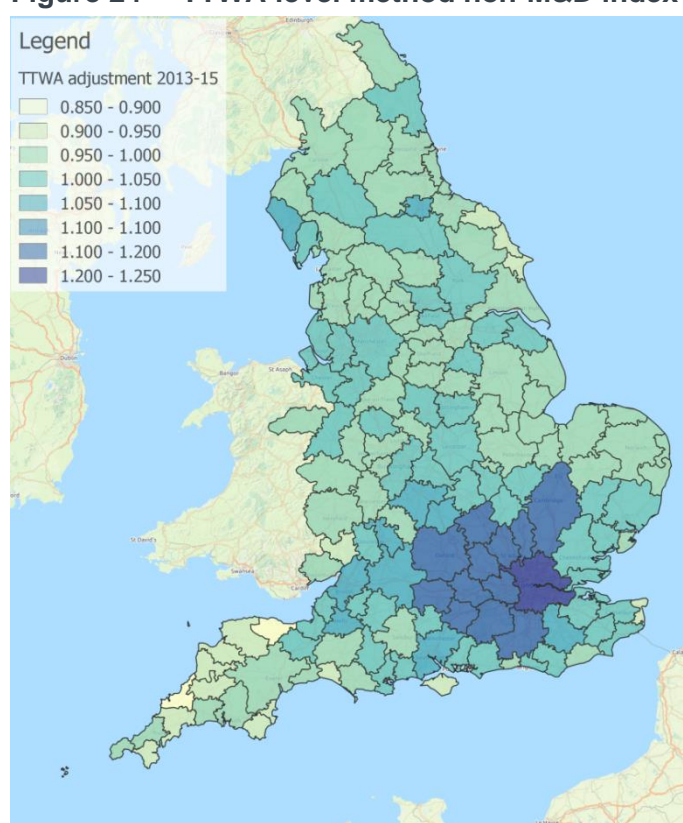
Source: Frontier Economics analysis of ASHE data

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[113] To attract a higher staff MFF, trusts would have to acquire or build large new sites in high cost areas, while keeping their staff in low cost areas. Note that areas with high labour costs are typically also areas where land values are higher.

Allowing for hotspots

Around 80% of raw SSWDs estimated through the UoA method are statistically different from 100% (the value for areas where hourly earnings are equal to the average in Britain, after controlling for covariates) with 99% confidence.[114] The estimation is then sufficiently precise to pick up differences from the average even in cases where they are relatively small – two or three percentage points on the minus or plus side (e.g. raw SSWDs of 97% or 103%). However:

- Not all SSWDs are statistically different from 100%; and
- Any pair of SSWDs (for example, 102% and 104%) may or may not be statistically different from each other.

The UoA method, in its first step, treats all areas as having a specific SSWD different from other areas. At the smoothing stage, however, differences between neighbouring areas are smoothed out, so that – simplifying – two close areas with raw SSWDs of 102% and 104% respectively are both assigned a smoothed SSWD of 103%.

An alternative approach could involve recognising explicitly that, in most cases, we can only have limited confidence that two SSWDs that are relatively close to each other are indeed different. Such an approach could be based on three simple rules:

- Areas with SSWDs that are not statistically different from 1 should be treated as paying the same wages as the average in Britain;
- Where the difference in SSWDs between two areas is not sufficiently large, the two areas should be treated as paying the same wages; and
- In the presence of uncertainty, the adjustment mechanism needs to provide higher funding to areas with higher pay (while avoiding significant overpayment) and lower funding to areas with lower pay (while avoiding any underpayment).

The second rule needs to be specified to be practical: what minimum difference between the raw SSWD of two areas is required to be confident that they are indeed different? The exact answer would be different for each pairwise comparison between areas. However, the typical width of a confidence interval around a raw SSWD could be used to obtain a reasonably robust general rule. For TTWA-level estimates, the average width of the confidence interval is around 5 percentage points.[115] For example, a raw SSWD of 105% would be included within a confidence interval of 102.5% to 107.5%. Therefore, typically, the difference between a 105% raw SSWD and raw SSWDs up to 110% may not be statistically significant.

Moreover, to simplify the application of the method, one may want the calculation to produce a limited number of values. This can be achieved by rounding the estimated wage differentials. Given the range of variation of the SSWDs,

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[114] In this section, we use 99% as the threshold for statistical significance. Using 90% or 95% would not change materially the figures presented and our conclusions.

[115] Specifically, 0.056 for a 99% confidence interval and 0.041 for a 95% confidence interval. Confidence intervals constructed using standard errors clustered at worker level.

rounding to the nearest 5 percentage points would yield an index taking on five to ten values.

Based on these considerations, we suggest an alternative calculation method as follows:

- Compute raw SSWDs, ideally from a TTWA-level analysis;

- Assign a value of 100% to areas where the raw SSWD is not statistically different from 1;

- If the raw SSWD is statistically larger than 100%, assign to the area the lower threshold of its confidence interval, rounded to the nearest 5 percentage points;

- If the raw SSWD is statistically lower than 100%, assign to the area the upper threshold of its confidence interval, rounded to the nearest 5 percentage points; and

- Assign a value to each provider based on which TTWA its headquarters or a dominant proportion of its activity fall in – this could be assessed as in the TTWA adjustment outlined in the previous section.

These steps determine a particularly conservative approach, which only assigns uplifts to areas that are statistically different from the average *and* sufficiently far from it, due to rounding.[116] Moreover, the method uses very conservative estimates of local pay differentials – lower thresholds for high pay areas, and upper thresholds for low pay areas.

The resulting adjustment, presented here using provider headquarters location, presents seven possible distinct values:

- 95% for four providers in the South and South West;

- 100% for a large majority of providers (153 out of 234);

- 105% for a small number of cities in the Midlands and South;

- 110%, 115% or 120% (18, five, and three providers respectively) for providers around the Fringe of London and Outer London, and to the north of London; and

- 125% for providers in the London TTWA (33 providers in total).

Resulting values for the 2013-15 period are shown in **Figure 25**.

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[116] Note that as a result this method may underestimate differences between areas that are relatively close to 100%. For example, if area A has a value of 97%, area B has a value of 103%, and both are not statistically different from 100%, both areas will be assigned a value of 100%, although the value of area A may be statistically different from the value of area B.

Figure 25   Hotspots adjustment method non-M&D index values, 2013-15
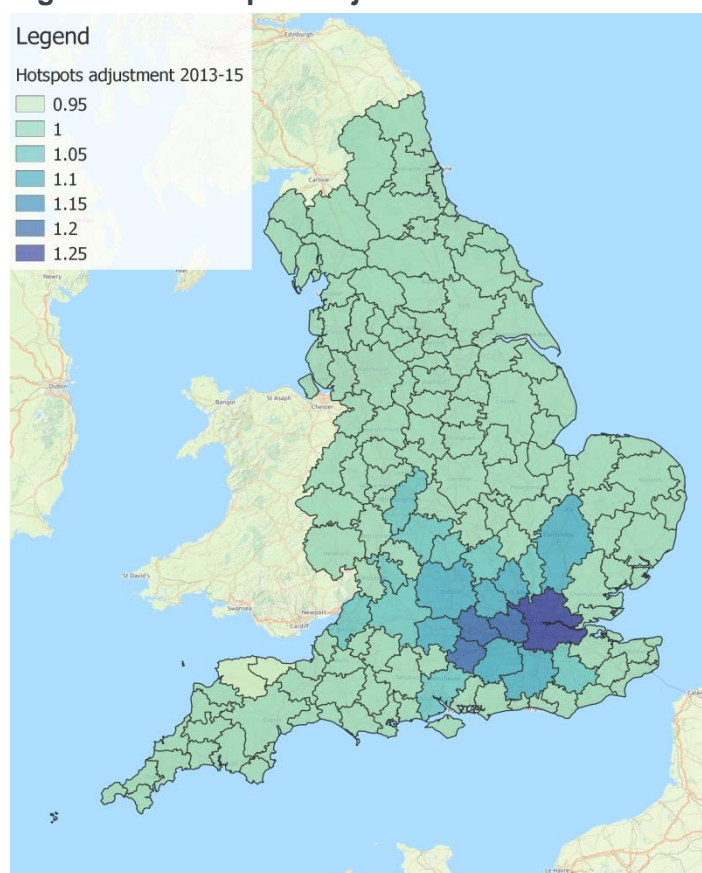
Source: Frontier Economics analysis of ASHE data

This is one of the possible approaches which would simplify the non-M&D index to a point where the index only takes on a few different values. We considered two potential alternatives but quickly ruled them out:

- Pure rounding based on the point estimates of SSWDs – but this would greatly exacerbate the cliff-edge issue discussed below; and

- Using ad hoc geographies, e.g. using GORs for the North of England and the Midlands, and splitting East of England, South West and South East into two or three areas (e.g. separating the South West into its east side – e.g. Bristol and Bath – and west side – Devon and Cornwall). However the ad hoc nature of this adjustment would make values very sensitive to the definition of areas, and there would be limited guidance from the literature, existing evidence, or available data on the best exact possible definition.

Region-local authority level adjustment

The ONS publishes data on mean hourly earnings from ASHE by workers' location:

- At local authority level, differentiating by gender and full-time versus part-time; and

- At region level, also differentiating by occupation.

We have investigated what a regional adjustment using only publicly available data would look like. A pure regional comparison of averages would most likely be too crude and risk overpaying London significantly: under an adjustment of this type, London would have a 140% index, compared to typically 115%-120% under the current method.

Using public data, it is possible to go one step further and compare regional means controlling for differences in occupational composition. It is also possible to interpolate values to take better account of the actual location of a provider.

A region-occupation adjustment performs well on average, compared to the UoA method, as shown in **Figure 26** below.

Figure 26   Comparison of 2007-09 non-M&D values under UoA method and alternative region-occupation adjustment
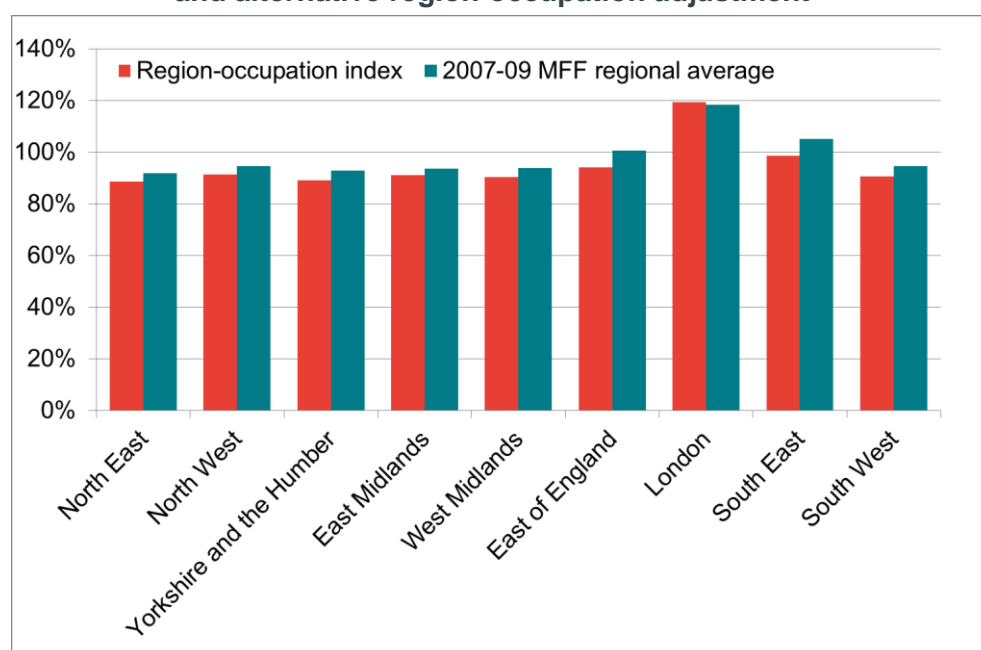
Source: Frontier Economics analysis of 2007-09 MFF values and ASHE data

However, as shown in previous sections, hourly wages vary significantly around regional averages, particularly in the South and East of England. A pure regional adjustment would appropriately compensate providers in areas that pay similarly to the regional average, but over- or under-compensate others. Specifically, providers located in Cornwall and Devon or on the south-east coast, areas that pay less than their regional average, could be over-compensated under a regional adjustment.

The ONS also publish data from ASHE on local authority- (LA-) and TTWA-level hourly wages. At this geographical level, published data do not include any information on differences in the occupational or industrial composition of the workforce. Relying purely on these data would significantly overstate geographical variation in wages due to differences in amenities or cost of living.

However, it is possible to use in combination region-occupation level data with LA- or TTWA-level data to generate an index which is more accurate than a

purely region-occupation one, and more conservative than a purely LA- or TTWA-level adjustment. The objective is to introduce some within-region variation in the index, while recognising that unadjusted LA-level variation overestimates the extent to which pay varies due to geographic difference in local amenities or cost of living.

This can be achieved by assigning higher (lower) index values to areas whose pay is significantly higher (lower) than the regional average. The extent to which the index can vary within a region can be constrained to limit the risk of significantly over- or under-paying NHS providers due to limitations in the data.

The resulting region-LA index would present the following regional variation:

- North East, North West, Yorkshire and the Humber, East and West Midlands: 90%;
- East of England and South West: 95%;
- South East: 100%; and
- London: 115%.

The lowest value assigned to the North of England as well as the Midlands is consistent both with the current approach (see regional averages of non-M&D index values from the current method in **Figure 26** above) and with descriptive evidence on regional variation in pay. East of England and South West regions would also present significant intra-region variation, particularly in the South West where eight out of 26 providers would actually receive a value of 90%.

Figure 27 below counts the number of NHS trusts in each region according to the value they would receive under this possible calculation method, and maps shows the values generated by this method at local authority level.[117]

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[117] Note: there will be differences between the number of LAs allocated a given index value (e.g. 85%) and the number of providers because some LAs do not host any provider headquarters, and other LAs host more than one provider.

Figure 27   Number of NHS trusts by region and region-LA index values

Region	85%	90%	95%	100%	105%	110%	115%	125%
North East	0	11	0	0	0	0	0	0
North West	3	37	0	0	0	0	0	0
Yorkshire and The Humber	1	21	0	0	0	0	0	0
East Midlands	1	13	2	0	0	0	0	0
West Midlands	6	23	0	0	0	0	0	0
East	0	2	22	3	0	0	0	0
London	0	0	0	0	2	8	15	2
South East	0	0	6	24	1	0	0	0
South West	0	8	17	1	0	0	0	0
All	11	115	47	28	3	8	15	2

Source: Frontier Economics analysis of ONS data

Figure 28   Region-occupation adjustment, 2013-15
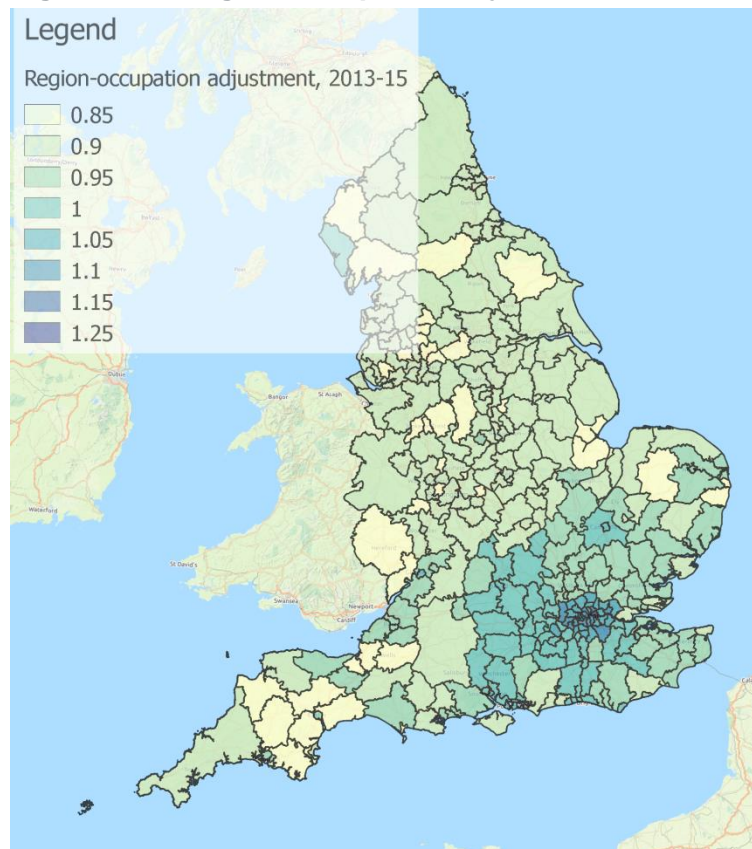
Source: Frontier Economics analysis of ASHE data (publicly available files)

6.2.3 Assessment of options

Accuracy

Ability to predict variation in private wages

As discussed previously, our analysis suggests that the UoA method controls for relevant factors determining geographical differences in wages as well as possible given the available data. Indeed, including additional control variables in the econometric estimation of wage differentials would have no material impact. We tested how estimates would vary by adding controls for the size of employer firms (measured as number of employees) and for whether workers are subject to collective agreements. This has virtually no impact on the ability of the model to predict private wages.[118]

As a result, three of our four alternative calculation options follow the UoA specification of the regression estimating private wage differentials, when it comes to controlling for factors other than local amenities or cost of living. However, the alternative options do not include a high responsibility adjustment, which would add significant complexity to the calculation method while only marginally improving the accuracy of the estimates for London providers.

The fourth option, a region-local authority adjustment, only controls for differences in occupational composition at a regional level. This is sufficient to approximate well differences between regions in private pay, but it is considerably less precise in approximating within-region variation.

Avoiding large differences between neighbouring areas (cliff edges)

If local cost of living and amenities typically do not vary sharply between most close areas, we would expect an accurate calculation method to generally avoid cliff edges – that is, large differences in private wages between neighbouring areas. Some cliff edges may reflect genuine differences, as discussed in **Section 6.2.1**. In **Figure 29** below, cliff edges are measured as the largest absolute difference in percentage points between a NHS trust's index value and the value of any other trust within a 50-km radius. This analysis uses values based on 2007-09 data for ease of comparison across methods. Using more recent 2013-15 data would lead to lower estimated cliff edges, particularly for the TTWA-based adjustments. The maximum cliff edge under the TTWA adjustment, 24 percentage points, applies to six trusts in East and South East London. For example, the TTWA non-M&D index value assigned to the Barking, Havering and Redbridge University Hospitals NHS Trust is 124%, which is 24 percentage points larger than 101%, the value assigned to the Kent Community Health NHS Foundation Trust, 30 km east of London. For the UoA method, the maximum cliff edge of 16 percentage points also affects the same area: this is the difference between the value assigned to the Oxleas NHS Foundation Trust, 115%, and the value of the Kent Community Health NHS Foundation Trust, 99%.

All alternative adjustments generate considerably larger cliff edges. However, particularly under the TTWA adjustment, these are concentrated around London.

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[118] The root mean squared error (RMSE) from a regression on 2013-15 data with expanded controls is 0.3325, compared to RMSE of 0.3364 from a regression following the UoA specification on the same data

Under the TTWA adjustment, there are only seven trust pairs with cliff edges of over 10 percentage points where neither trust is in the London TTWA. All these cases are still in the vicinity of London.

Further detail on the cliff-edge issue is presented in **Annex A.2**.

Figure 29   Percentage point differences in non-M&D index values between neighbouring trusts, 2007-09 (%)

	UoA method	TTWA adjustment	Hotspots adjustment	Region-LA adjustment
Maximum	16	24	30	30
90th percentile	11	20	10	25
Median	3	7	5	5
10th percentile	1	3	0	0

Source: Frontier Economics analysis of ASHE data and 2007-09 staff MFF values

Note: TTWA and region-LA values based on location of trust headquarters.

Taking into account uncertainty in the estimation of wage differentials

Applying raw estimates of wage differentials (raw SSWDs) from the UoA method directly would overestimate the extent of geographical variation, as it would assign different values to providers in areas that are not necessarily statistically different in terms of their private wages. Smoothing and interpolation dampen the variation in the index, and assign lower weights to areas where private wages are estimated less precisely, mitigating this issue.

In the TTWA adjustment as proposed here, no smoothing or interpolation take place, but raw SSWDs are estimated more precisely for almost all areas in England,[119] as there are only 149 TTWAs in England, compared to 209 CCGs.

The hotspots and region-LA adjustment take a more conservative approach, by assigning different values to providers only where there is strong evidence that private pay differs between areas. These two adjustments give up significant granularity compared to the UoA and TTWA approaches, but with the benefit of limiting substantially the risk of compensating providers differently where differences in estimated pay between their areas may be due purely to chance.[120]

This cautious approach could, in principle, materially under- or over-compensate providers in areas with relatively small populations. A small local population increases uncertainty in the estimation of local pay. Pay in these areas may be estimated as not statistically different from the average in Great Britain, even where differences are potentially relatively large.[121] In practice, only over-compensation would pose a material risk: high-paying areas are typically densely populated areas, where pay differences can be estimated precisely. To avoid over-compensation, ad hoc adjustments could be added to further refine both the

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[119]   There are a small number of cases where CCG areas are actually larger than corresponding TTWAs. We list in **Annex A.2** where using TTWAs implies a loss of precision.

[120]The UoA and TTWA approaches yield broadly consistent geographical patterns over time, comparing the 2007-09 and 2013-15 values, providing reassurance that the differences estimated by these methods are indeed reflecting real differences in wages. However, where the difference between two areas is relatively small, there is still a risk that this difference is not statistically different from zero.

[121]   For example, the hotspots adjustment would assign a value of 100% (equal to Britain average) to the Whitby TTWA, although it is estimated to pay 92.5% of the Britain average, because of the wide confidence interval around the estimate (86% to 99%, at the 95% confidence level).

hotspots and region-LA approaches. This would reduce the transparency and simplicity of the methods. We consider possible adjustments in **Annex A.2**.

Robustness and stability

The UoA method is very robust to changes in underlying data preparation and selection. To test this, we compared how results for the 2013-15 values would change depending on whether private sector medical and dental staff are excluded from the calculation of raw SSWDs (as in the UoA method), or included. This change has very little impact on the final smoothed and interpolated values, which typically vary only by 1/100 of a percentage point as a result. The TTWA-level and hotspots adjustment are also not materially impacted by the inclusion of medical and dental staff in the calculation. The region-LA adjustment relies on publicly available cuts of data published by the ONS, and it is therefore not possible to test how its values would change depending on data selection choices.

The hotspots and region-LA adjustments, however, are sensitive to choices around:

- The statistical significance level adopted when comparing pay differential estimates to the average in Britain (in the first case) or to the relevant regional average (in the latter).

- The desired granularity of final values. Based on the evidence available, we considered a variation of 5 percentage points across values to be the best choice; however, one could choose a higher or lower granularity. For example, the hotspots adjustment could take on 12 values between 93% and 126% (93%, 96%,...), rather than 7 values between 95% and 125%.

The UoA and TTWA-level methods, on the other hand, are less stable than the hotspots and region-LA adjustments, where reliance on confidence intervals and rounding may dampen some actual changes. **Figure 30** and **Figure 31** below report the distribution of the absolute value of percentage point changes between the 2007-09 and 2013-15 periods for the two calculation methods.

Figure 30   Distribution of changes (% points) in non-M&D index values under the UoA method
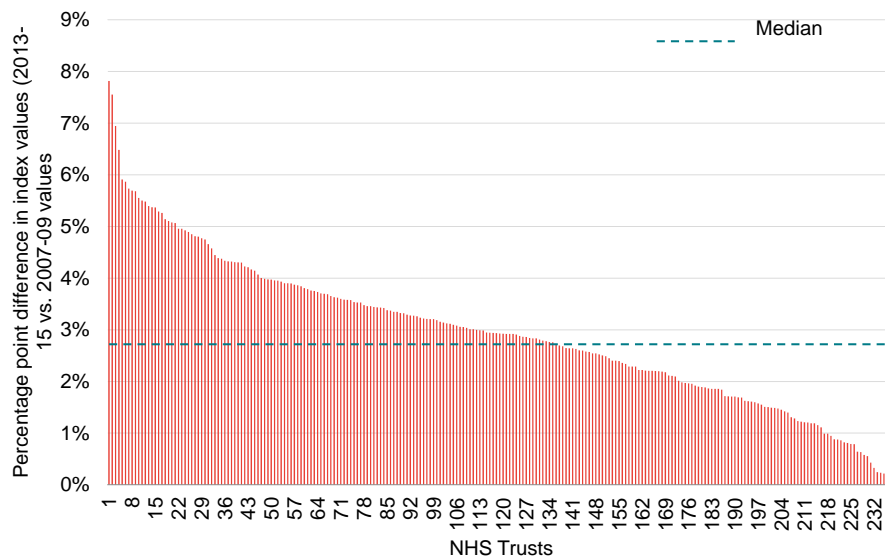
Source: *Frontier Economics analysis of 2007-09 MFF values and 2013-15 ASHE data*

Figure 31   Distribution of changes (% points) in non-M&D index values under the TTWA-level adjustment method
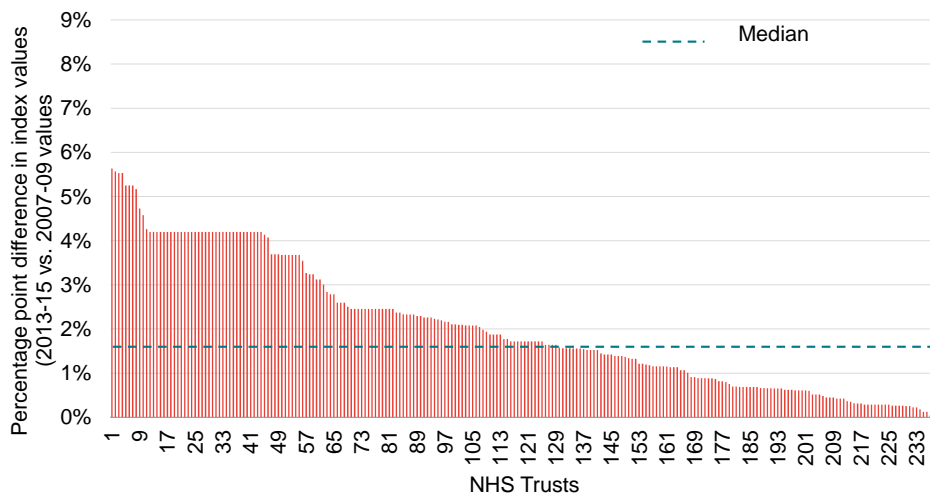
Source: *Frontier Economics analysis of ASHE data*

It is important to note that the comparability of UoA values over time is limited by the changes in the underlying geography, as PCTs (used for the 2007-09 values) have been replaced by CCGs.. However, comparing **Figure 30** to **Figure 31** at least shows no evidence that the TTWA-level adjustment is less stable than the UoA method.

Both the TTWA-level and UoA methods are less stable than the other two adjustments for most providers. Under the hotspots adjustment, 158 out of 241 providers keep the same non-M&D index between 2007-09 and 2013-15; where a change does occur, this is never larger than 5 percentage points (in absolute

value). If anything, adopting the hotspots and the region-LA approaches might raise a concern that non-M&D index values may not vary enough over time. Again, the hotspots approach is typically very conservative, and most changes originate from relatively large differences in the underlying TTWA values, and/or changes in large urban areas, where wage differentials are estimated with greater precision. However, due to the rounding involved in this approach, there is also some instability at the margin – relatively large changes (of 5 percentage points) can occur as a result of smaller differences in the underlying TTWA values (e.g. where a value shifts from 97.2% - rounded to 95% - to 98% - rounded to 100%).

Simplicity

The current UoA method is considerably more complex than the three alternatives considered here, as it requires:

- Knowledge of econometrics and at least a basic knowledge of mapping tools;

- Access to a restricted worker-level data set (ASHE) through the Virtual Microdata Laboratory at the ONS or secure access through the UK Data Service (for academic institutions);

- Estimation of two separate econometric models (the main one, on ASHE data, and an ancillary one, on LFS data); and

- Two separate weighting calculations after estimating raw wage differentials (one for smoothing values across CCG areas, and one for interpolating to provider site or postcode sector level).

The alternative TTWA adjustment and hotspots adjustment would also require knowledge of econometrics and access to restricted data, but only limited manipulation of the econometric estimates would be necessary. Moreover, the hotspots adjustment only generates a limited number of distinct values (seven, varying with five percentage point intervals between 0.95 and 1.25).

Summary

Our overall assessment of the four options is presented in Table 1 below. Considering the two criteria of accuracy and simplicity in combination, no method emerges as a clearly superior alternative. The current method scores highly in terms of accuracy, but requires access to confidential data, specialist econometric skills, and at least a basic knowledge of mapping software to be implemented. Other alternatives that also rely on econometric analysis could, however, be implemented without requiring a formal smoothing and interpolation process, and therefore with no or limited access to mapping skills. In the case of the TTWA adjustment, this significant simplification of the implementation process would not lead to a material loss in accuracy for most providers. Noticeable differences between the TTWA adjustment and the current CCG-based method arise in and around large city areas, chiefly London. Here, it is not clear which method has an advantage on accuracy grounds. The TTWA method would assign the same value to all providers whose sites are mainly located

within the city TTWA boundaries.[122] The current method is more granular, assigning a different value to each provider site, and it is less prone to generating cliff edges – relatively large differences between neighbouring providers. Higher granularity does not necessarily imply greater accuracy. Values based on the TTWA method consider cities as one labour market, consistent with evidence from commuting patterns, rather than estimating wage differentials for each CCG.[123] Larger cliff edges between close areas are less likely to be consistent with theory, although little guidance can be gathered from available literature and data on how large is "too large". At first sight, the UoA method may be considered more accurate due to a lower incidence of cliff edges. However, the larger cliff edges generated by the TTWA method may be plausible, where they are linked to sudden changes in travel times from and to the city centre[124] (as may be the case around East and South London), or where areas close in straight-line distance are actually separated by relatively long travel times (as between Southampton and the Isle of Wight).

Greater simplification could be achieved by relying on publicly available data, analysed with no requirement of econometric knowledge. However, this would come at the cost of a significant loss in accuracy – in terms both of the consistency of the method with theory and of the robustness and stability of the estimates.

On balance, the TTWA-level approach achieves simplification compared to the current method, with losses in accuracy likely to be small. On balance, we would recommend adopting this approach in the future implementation of the MFF. However, other approaches may also be appropriate, striking a different balance between accuracy and simplicity, and between granularity and conservativeness of the calculation:

- The current method would be based on identical econometric analysis as the recommended method, but it would provide a different non-M&D index value for each provider site in England, and smoother variation across sites.

- The hotspots adjustment is considerably more conservative in the assessment of local differences in pay. Only where the econometric analysis provides very strong evidence that pay in a given area is significantly above or below the average in Britain does this approach imply awarding additional resources to providers located in that area.

- The region-local authority adjustment would provide lower confidence that higher or lower values of the non-M&D index reflect differences in underlying local costs or amenities. However, this adjustment would be significantly easier to implement and replicate.

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[122] For example, all London trusts are assigned a value of 124.5%.

[123] Evidence from commuting patterns is embedded in the design of the TTWAs.

[124] For example, moving 5 km north-east (in straight-line distance) from Debden to Epping, north-east of Central London, implies a change in travel times to Central London (e.g. Oxford Circus) of six minutes. A further move in the same direction and of the same magnitude from Epping would instead imply at least 10 minutes of additional travel time (if driving to the Epping station, last stop on the north-east end of the London underground Central Line).

Table 1   Overall assessment of non-M&D staff calculation options

	Current Method	TTWA-level Adjustment	Allowing for Hotspots with Full ASHE Data	Region-local authority Adjustment with Publicly available Data
Accuracy				
Consistency with theory	Controls for important worker characteristics	Controls for important worker characteristics; adopts definition of local labour markets based on actual commuting patterns	Controls for important worker characteristics; adopts definition of local labour markets based on actual commuting patterns; limits variation across areas to achieve simplicity	Controls for differences in occupation and gender composition of workforce across regions, but not for other factors
Robustness and stability	Relatively stable and robust	Relatively stable and robust	Underlying estimates are relatively stable and robust; assignment to clusters reduces robustness and stability for areas at the margin between clusters	Relatively sensitive to choices on LA-level adjustment
Cliff edges	Differences between neighbouring providers around 15 percentage points max	Differences between neighbouring providers up to 25% (less than 10% outside of London surroundings)	Differences between neighbouring providers up to 30% (less than 10% outside of London surroundings)	Differences between neighbouring providers up to 30% (less than 10% outside of London surroundings)
Simplicity				
Skills required	Econometrics; basic knowledge of mapping tools	Econometrics; no or very limited knowledge of mapping tools	Econometrics	Basic statistics; Microsoft Excel or equivalent software
Data availability	Secure access to data required	Secure access to data required	Secure access to data required	All data publicly available through ONS
Transparency	Requires understanding of regression output and of interpolation and smoothing; difficult to replicate	Requires understanding of regression output; difficult to replicate without specialist knowledge	Requires understanding of regression output; difficult to replicate without specialist knowledge	Only requires understanding of GLM approach; can easily be replicated
Incentives	No material implications	No material implications	No material implications	No material implications

7 METHODOLOGY FOR CALCULATING NON-STAFF MFF COMPONENTS

SUMMARY

- In this chapter we assess the calculation options available for adjusting for unavoidable differences in non-staff costs.

- For each non-staff factor – buildings, land and business rates – we present alternative calculation options as well as our assessment against the criteria relating to accuracy, simplicity and incentives.

- **Buildings:** we recommend that the current method for reimbursing unavoidable building costs remains appropriate, but with some small refinements to more accurately weight the index to take account of the role of different sites in a provider's overall index.

- **Land:** we recommend that the current method for reimbursing unavoidable land costs is retained. We recommend that further work is done to investigate the potential distortive effects of this index and some additional fail-safe mechanisms to limit potential over-reimbursement of providers in expensive areas are considered.

- **Business rates:** we recommend that a local area approach to calculating a business rates index is adopted (the details of which are set out in the main body of this chapter).

Our assessment in **Chapter 4** concluded that there was unavoidable variation in buildings, land and business rates, that it was appropriate to capture the variation using MFF and that the impact was substantial. It was also possible to conceive of calculation options that had the correct incentive properties and were practical to implement.

In this chapter we set out the alternative detailed calculation methods available to capture the unavoidable cost elements associated with each of buildings, land and business rates in turn. For each possible calculation approach, we provide a full assessment of its accuracy, simplicity and incentives in line with the framework in **Chapter 5**.

7.1 Buildings

Buildings costs are currently included within the MFF formula. It is there to reimburse providers for unavoidable building costs which include financing costs (proxied by PDC payments) and depreciation. The index is based on independent estimates of the cost of erecting buildings in different parts of the country supplied by the Royal Institute of Chartered Surveyors (RICS). This is matched to provider location and a weighted average is calculated for each provider by weighting provider sites using bed numbers as weights. An index is then calculated by dividing the provider specific value by the average for the

country. The current index does not differentiate between buildings PDC payments and depreciation. In our view the current method is appropriate and should be retained, although some small refinements may be desirable. Specifically, in our view it is more appropriate to use a measure of floor space such as gross internal area (rather than bed numbers) to obtain the weighted average buildings index for providers since this measure captures the size of all buildings (including those used predominantly for administration for example) and deals with the issue that some provider types (e.g. ambulance) may have few if any beds. We have carried out a comparison between the two weighting methods and find little difference in the buildings indices (see **Figure 32**).

Figure 32   Building   index   weighting: comparison   of   alternative   methodologies

We have considered a possible alternative method for calculating the index which would involve the use of provider specific buildings' NBV values. However, in our view this method is not robust and should not be adopted going forward.

The weight for the buildings index is the share of expenditure on buildings (including PDC and depreciation) relative to total provider expenditure.

Provider specific approach based on RICS data

The Building Cost Information Service (BCIS) data supplied by RICS contain a building cost index for each region and sub-region (lower-tier and unitary local authorities) of the country. This is matched to NHS sites and aggregated up to provider level using bed numbers as weights. The individual provider value is then divided by the average for the country to obtain a buildings index.

Provider specific approach based on NBV data

A possible alternative to the existing method would involve the use of a normalised measure of buildings value derived from provider accounts and other data that providers have access to. Buildings NBV could be combined with Estates Return Information Collection (ERIC) data to estimate buildings value per square metre and then an index calculated by dividing provider specific values by the average for England.

7.1.1 Evaluation

Accuracy

The current approach relies on independent estimates of building costs by the professional body representing surveyors, the profession which is likely to be at least as knowledgeable about building costs as any other. As such, we believe the data that are currently used are robust and accurate. Data are available for regions and sub-regions and sites are attributed the value for the sub-region their postcode is located in, which means that it can be aggregated up to provider level without difficulty.

In our view, the alternative method of using provider NBV to calculate buildings values is inaccurate and should not be adopted. This is because buildings are likely to incur a significant depreciation charge which means that NBV is reflective of both the value of buildings but also the age of the estate. Creating a buildings value index based on NBV would hence be conflating the two effects, which is inappropriate since the age of the estate is something that is not fully outside the control of the provider. Further, while NBV can be controlled for the size of the building, it cannot be controlled for efficient or inefficient building choices that are within the control of the provider.

Simplicity

The current method relies on data which have to be purchased. As such, it will be less transparent to sector stakeholders unless they are willing to incur the cost associated with purchasing the data. The calculation method is, in itself, simple so any provider should be able to replicate their own index value using only the size and location of their sites and the BCIS data.

The provider specific calculation option is even easier to calculate as providers will have access to all the data that are required and the calculation method is extremely straightforward – however, for the reasons discussed above, we do not think this method is appropriate.

Incentive effects

There are limited incentive properties associated with the current method. Providers will have no control over the prevailing building costs in the areas they are located in. Furthermore, building costs are unlikely to vary significantly intra-regionally so any incentives to erect buildings in sub-optimal locations would be extremely small.

The method using provider NBV would unjustifiably favour providers with relatively new estates, which is inappropriate.

Summary

We recommend that the current method for calculating the buildings index is retained going forward. In our view the method strikes a good balance between accuracy and simplicity while keeping unwanted incentives to a minimum. We recommend that instead of using bed numbers to create the weighted average provider index, gross internal floor area should be used in future. This is a more accurate measure of a building's footprint and is easily available in the ERIC data set.

7.2 Land

Land costs are currently included within the MFF formula. It is there to reimburse providers for unavoidable land costs which include financing costs (proxied by PDC payments). The current land index is based on a provider specific method where the unit value of land (£ per hectare) for each provider is divided by the national average. This is then weighted by the average share of expenditure on land (land PDC payments) as a proportion of total expenditure. In our view the current method is, in general, appropriate, although some refinements to it may be necessary and desirable (see below for discussion). An alternative method which relies on local area land values (rather than provider specific values) is also possible (and preferable) if sufficiently granular data on industrial land values from an independent valuation agency were available.

The weight for the land index is the share of expenditure on land (land PDC) to total provider expenditure.

Provider specific approach

In the current method, a provider specific measure of land value is derived from individual provider accounts which report land NBV. Land area data are obtained from ERIC data. The two data sets are combined and total land value (land NBV) is divided by land area to obtain a measure of unit land value (£ per hectare) for each provider. This is then divided by the average unit land value for England to create a provider specific land index.

An issue with the provider specific approach is that it relies on internal NHS data and so cannot be directly applied to independent healthcare providers. A possible option to address this issue is to compute a weighted average of the land indices of neighbouring providers, using distance from the independent healthcare provider as the weighting factor.

Local area approach

A possible alternative to the provider specific method would involve estimating a unit land value index based on local area data, rather than provider specific data. The VOA publishes information on industrial land values at GOR level (see **Figure 33** below).

**Figure 33   Average industrial land value estimates by region, per hectare
Estimated values of a typical industrial site**
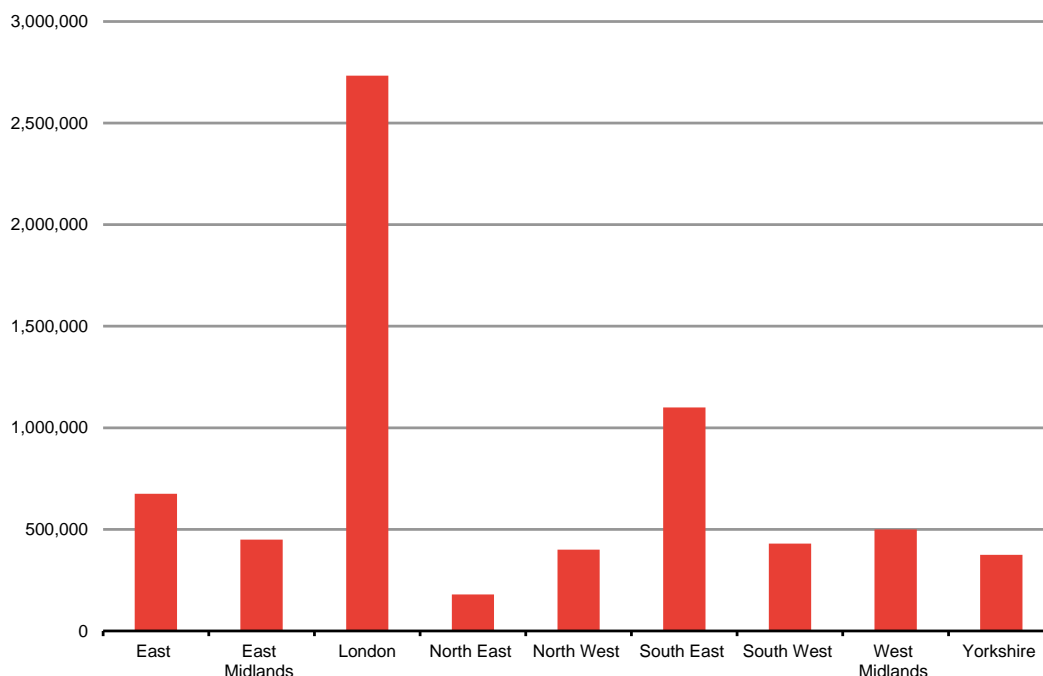
Previously, more granular data (Local Authority District (LAD)) had been available, but we understand this is no longer the case. Nonetheless, if such data could be obtained at sufficiently granular geographical level (in the case of land this would need to be lower than LAD) from reputable independent sources, this could serve as a viable alternative to the current method. Indeed, basing the index on independent valuation data which are updated annually would provide more robust estimates of differences in unit land values across providers compared with the current method which relies on NBV where revaluations may be done at irregular intervals.

Creating a provider level index from local area values would be straightforward. Each provider site would have to be allocated to a specific administrative area. Then a weighted average could be computed for all the areas in which a provider has sites. The floor space of the buildings located on the sites could serve as weights. If a provider only had sites in one area its land index value would simply be the administrative area value.

7.2.1 Evaluation

Accuracy

The site specific data will be accurate if NBV data accurately reflect the value of land across the country. In reality this is unlikely to be the case due to the time

lags involved in the revaluation of land for accounting purposes. Unit land value data derived from the NBV measure in providers' accounts do result in extremely large variation in per unit values across the country. This leads to very significant revenue uplifts for providers with a small footprint which are located in extremely expensive areas such that in some cases providers receive additional revenue (from the land component of the MFF) which may be greater than their total land PDC payments.[125] If the broad structure of the current method is retained, it would be possible to introduce additional fail-safe measures to limit this issue going forward (see **Section 7.4** for a detailed discussion of this issue).

The local area approach may be more appropriate going forward if sufficiently granular data were available for all areas in the country and on a regular basis. The data which are currently publicly available are at the GOR level which is inappropriate as they would mask very considerable variation in land values within region. LAD-level data would be a significant improvement but would still be insufficiently granular for the purposes of this work since land values may vary significantly even within LAD.[126]

Simplicity

Both methods will be transparent to sector stakeholders. The local area calculation method would rely on publicly available data (if such data became available) and hence the values could easily be replicated. Any provider would be able to replicate their own index value using only the size and location of their sites and local area data.

The provider specific calculation option is even easier to calculate as providers will have access to all the data that are required and the calculation method is extremely straightforward.

Incentive effects

Within the current method, providers have, in principle, the incentive not to update the value of their land if this benefits them – for example, if land values have appreciated, providers may prefer not to have their land revalued as that would result in higher PDC payments raising their costs without necessarily allowing them to recoup any additional benefit from an increased land index (if the index is updated on an irregular basis). On the other hand, if the MFF index was updated regularly, providers may have the incentive to hold on to valuable land if this results in additional revenue which more than offsets higher PDC payments. The strength of these incentives can be significant but could be reduced or even eliminated if the MFF index was updated regularly.

The local area approach would have very limited incentives properties attached to it since providers cannot control the value of land in their area. Any incentives

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[125] This occurs because of the fixed weight by which the index is multiplied as well as the very large variation in unit land values.

[126] As previously noted, land values for industrial land are not available below GOR level but data on house prices can be used as a proxy for the variation in land values. Taking one LAD as an example – Wiltshire – we observe significant variation in average house prices between Swindon (£157,000) and Salisbury (£200,000). Source: http://visual.ons.gov.uk/house-prices-in-your-area/

around shifting of activity to areas which may benefit providers in revenue terms are likely to be extremely small.

Summary

In principle we would favour the use of independent land value data to create the land index for individual providers. However, we are not aware of sufficiently granular data being available which would allow for this option to be adopted at present. We recommend that if such data became available, it should be explored as a possible alternative to the current method. We recommend that in the interim the broad structure of the land index is retained but that some additional fail-safe mechanisms are explored to limit potential over-reimbursement of providers located in very expensive areas.

7.3 Business rates

Business rates are currently not included within the MFF. We are proposing an index calculation method based on local area Valuation Office Agency (VOA) rateable value data. A provider specific approach would also be possible.

Regardless of the index method chosen the weight for the index would be the proportion of expenditure on business rates. We highlighted in **Chapter 3** that a sizeable proportion of providers do not report business rates expenditure as a standalone item in their accounts. This is likely because those providers pay a single premises management fee of which business rates are a component. To estimate a weight, the proportion of expenditure reported by those providers that include a separate business rates charge can be applied to the entire sample.[127]

Local area approach

The VOA publishes data on rateable value per square metre for each LAD in England. There are 360 of these areas.[128] Using the 2015 rateable value data[129] we have assigned each local area an index value where the average is 1.

The area with the lowest rateable value has an index value of 0.35 (Forest of Dean) and the area with the highest rateable value has an index value of 5.52 (Westminster). This represents a 15.96-fold difference.

Creating a provider level index from these local area values would be straightforward. Each provider site would have to be allocated to a specific administrative area. Then a weighted average could be computed for all the areas in which a provider has sites. The floor space of the sites could serve as weights. If a provider only had sites in one area their business rates index value would simply be the administrative area value.

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[127] We have examined whether there are any systematic differences between those trusts that do report a separate business rate charge and those that do not. The results of this analysis are contained in **Annex A.**

[128] For example, West Devon or Camden.

[129] Business rates will be based on these values from April 2017.

Provider specific approach

An alternative method would be to look at the total rateable value paid at each site. This is possible using the VOA website.[130] Rateable value per metre squared could be calculated by combining the information on total business rates paid with ERIC data on site area. As above, a provider level rateable value index could then be created by computing a weighted average of providers' sites.

We will consider the relative merits of these two methods below.

7.3.1 Evaluation

Accuracy

The local area data released by the VOA are the basis for business rates payments. Therefore, at the local area level the information is accurate and will precisely mirror variation in total business rates payments.

An index based on local area values will account for the majority of the variation in rateable values across the country. However, although the local areas are relatively small, there will be variations within administrative areas which the local area data will not pick up. For example, using site specific data we have estimated that one provider in central London pays £23 per metre squared in business rates at their site while another pays £43. The two hospitals are both located in the same administrative area. The differential rates could reflect differences in the characteristics of the buildings.

The site specific data will perfectly match actual business rates payments made by providers. However, this may also capture some controllable costs, for example the type of building a provider has chosen to build.

The local area approach may be more appropriate going forward if there is a move away from direct provider compensation and towards capitated budgets for example.

Simplicity

Both methods will be transparent to sector stakeholders. The local area calculation method relies on publicly available data and the values are easily replicated. Any provider could replicate their own index value using only the size and location of their sites and the published VOA data.

The site specific calculation option is more time consuming to calculate. The postcode of every site would potentially have to be entered on the VOA's website, and all relevant payments would then have to be grouped together for each site and divided by the floor area. Alternatively, it might be possible to obtain a full data set with all this information from the VOA.

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[130] If all trusts reported a separate business rates charge the total payments could simply be extracted from their accounts rather than using VOA data.

Incentive effects

The incentive effects are relatively minor across both calculation options. Currently, providers are not compensated at all for variation in business rates. Therefore, creating any sort of adjustment may mean that providers are more likely to open a site in an area with relatively high rents. However, business rates are only one of these costs.

Under the local area approach, providers would have no control over the average rateable value figures in their area.

However, under the provider specific option, providers could influence the total amount they pay (which may be affected by the characteristics of their building), which would in turn affect their MFF value. However, this is likely to be a neutral effect overall as any reduction in their business rate charge would eventually lead to a reduction in their MFF.

Summary

We recommend that the local area approach is employed by NHS Improvement when calculating a business rates index. It will be sufficiently accurate to pick up the majority of observed variation,[131] is future-proofed against possible moves away from direct provider compensation and eliminates any potential negative incentive effects.

7.4 Other methodological issues relating to non-staff MFF components

We have carried out some rudimentary analysis in order to test how the non-staff components of the MFF index reimburse relevant costs in practice. Specifically, we have examined provider expenditure on land, buildings and business rates and compared this against the tariff revenue uplifts associated with the corresponding indices. The purpose of this analysis is to check if the non-staff components of the MFF have a distortionary effect on payments such that certain groups of providers are over- or under-reimbursed.

Motivation

We have estimated the revenue uplifts associated with the non-staff components of the MFF and compared these against the estimated expenditure associated with these components. It is worth noting that the MFF is designed to compensate providers for unavoidable cost differences and as such one would not expect MFF revenue uplifts to be in line with actual costs incurred. Further, given the structure of the MFF index which is based on average expenditure across the country, one would expect some divergence between providers depending on how far away from the average they are. This is best illustrated by means of an example which we provide below focusing on the land index.

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[131] Albeit some further work may be required to assess the extent to which significant variation in rateable values occurs within administrative areas and whether that can disadvantage specific providers.

The land index has the potential to over-reimburse providers with certain characteristics, predominantly those in areas where land is very valuable. The over-reimbursement issue can be driven by two factors: (i) the value of land varies very substantially around the country with the most expensive parts being 20 or even 30 times more valuable than the average and (ii) land usage also varies considerably with providers in central London having a much smaller footprint than the average. We illustrate the issue diagrammatically in **Figure 34**.

Figure 34   Illustration of "over-reimbursement" for a fictional London provider relative to a fictional average provider
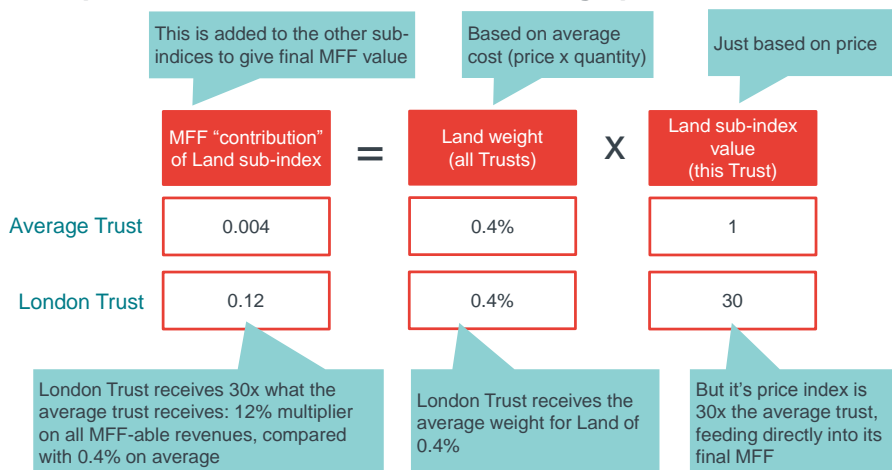
Driver of "over-reimbursement": London Trust low *quantity* of land is not reflected in the MFF, but its high *value* is

Source: Frontier Economics

Indeed, upon examination of the data we can observe that the London providers which have the highest index values have on average a much smaller footprint than the average provider in the country (see **Figure 35**).

Figure 35   Land usage of providers with highest land index values
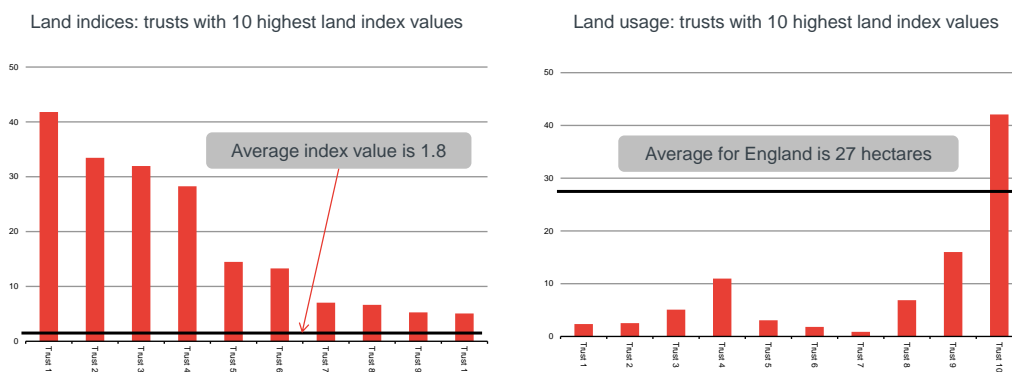
Source: Frontier Economics analysis of accounts data

Approach

We have carried out some initial analysis to test whether the non-staff elements of the MFF lead to over-reimbursement of certain providers. The analysis was

done in several steps (illustration below for land but the same method can be used for other sub-indices):

- Step 1: Obtain revenue (tariff and non-tariff) for each trust;

- Step 2: Calculate pre-MFF tariff revenue for each trust by dividing total tariff revenue by actual MFF payment index values;

- Step 3: Set all trusts' land index to 1 and recalculate MFF new payment index value;

- Step 4: Multiply estimated pre-MFF tariff revenue (obtained in Step 2) by the new payment index value (obtained in Step 3) to obtain new tariff revenue;

- Step 5: Subtract estimated tariff revenue (obtained in Step 4) from actual tariff revenue to obtain estimated revenue uplift associated with the land component of the MFF index; and

- Step 6: Compare revenue uplift with estimated land costs.

Findings

Considering the land index in isolation, it appears that for a number of providers in London it can generate substantial revenue uplifts, exceeding providers' estimated expenditure on land. In total, there are around 24 providers for whom the land revenue uplift exceeds estimated land costs by £1 million and for a handful of providers the estimated uplift exceeds costs by £5 million.

However, when examining this issue it is important to consider the interaction between land and buildings. Buildings are erected on the land providers have access to and the cost of these buildings will depend on the land that is available to providers. For example, a small plot of land in an urban location may require a high rise building while in rural locations buildings may be more spread out. Combining the land and buildings indices together, we observe a different pattern. That is, the buildings index dampens the overpayment effect of the land index such that there are only eight providers for whom revenue uplifts exceed costs. The reason why the buildings index dampens the effect of the land index is because providers with high land index values have larger than average buildings which suggests they may get underpaid by this index relative to the average. Additionally, the buildings index does not vary substantially around the country so the revenue uplifts from this index are relatively small compared to the substantial building costs. Putting all non-staff indices together (land, buildings and business rates) we reach a similar result – an estimated eight providers for whom revenue uplifts exceed costs.

It is worth noting that the analysis we have done is basic in nature and suffers from a number of limitations predominantly driven by data issues. As such, we consider the findings to be indicative and suggest that further work should be carried out in order to obtain more conclusive evidence on this matter. The main shortcomings of the analysis are outlined in the box below.

Limitations of overpayment analysis

- We use PDC payments on land and buildings as a proxy for trust land and buildings financing costs. This means that our estimates of land costs ignore land and buildings purchases which are financed by private loans and hence will understate the true costs borne by trusts in relation to land. The extent to which these costs are underestimated is not clear but the level could be substantial as indicated by Hospital Estates and Facilities Statistics data which show financing costs for NHS providers close to £1.2 billion per year.

- Trust accounts only report one aggregate PDC payment which is not split between land and buildings so these splits have to be estimated. (We have calculated these by multiplying the average of Opening Net Book Value and Closing Net Book Value by 3.5%).

- Not all trusts report business rate payments. Our understanding is that this is due to trusts leasing their properties, in which case we understand business rates are effectively absorbed in the management charges paid by trusts. Because we do not have business rate payments for around a quarter of trusts our estimates of costs will understate the true scale of business rate expenditure by providers.

- For the purposes of this analysis we also need to estimate the land, buildings and business rates expenditure associated with tariff income-generating activity. We have used the revenue shares of tariff income over total income to make this estimation albeit we acknowledge that this is a very crude method to allocate costs.

Summary

This preliminary analysis suggests that certain elements of the non-staff MFF indices (notably land) can generate substantial revenue uplifts for certain providers, predominantly those located in Inner London, which can in some cases exceed the estimated expenditure on land. This is likely a consequence of the extremely large variation in land values across the country and the fact that the MFF indices are based on average land usage which in reality can vary considerably by provider location.

As previously suggested, however, the analysis we have carried out is indicative in nature and the findings here must be treated with caution and regarded as tentative due to the data issues discussed above. This is an area which may warrant further investigation and NHS Improvement and NHS England may wish to carry out a more detailed analysis to explore this issue further. If the findings are confirmed, there are a range of methodological options which NHS Improvement and NHS England may wish to consider for dealing with this apparent overpayment issue. These may include, for example, capping land values, augmenting the index to reflect actual costs incurred or applying a multiplier to the land index to explicitly reflect land usage. Options would need to be carefully evaluated before any changes are put forward.

8 CALCULATION OF OVERALL MFF INDEX INCLUDING WEIGHTING

> **SUMMARY**
>
> - We recommend that the sub-indices of the MFF are weighted in proportion to their share of total provider costs (as per the current MFF).
>
> - We recommend that these weights are calculated separately for different provider types (acute, mental health, community, and ambulance).
>
> - We recommend that each provider is designated a primary type, and given the corresponding weights for that type, so the MFF more accurately reflects variations in cost structures.

8.1 Introduction

The previous chapters have identified:

- The current purpose and application of the MFF;
- The proposed components of the MFF index; and
- The proposed calculation of these individual components.

This chapter brings these things together, and describes the proposed calculation of the overall MFF index. It therefore also considers the weighting of each component in this overall calculation.

8.2 Requirements for proposed MFF index

This section provides a brief summary of the technical requirements for the MFF index, and the "building blocks" for the proposed index which have been identified in previous sections.

Technical requirements for the MFF index

The MFF index needs to meet a number of practical and technical requirements, to be applied within the current system. In particular:

- The MFF must be a single index, with a value for each provider;
- The index must reflect variation in each of the sub-indices (staff, land, etc.) identified above as appropriate for inclusion within the MFF;
- Each of these sub-indices must therefore have a "weight" within the calculation of the overall MFF index;
- The index needs to be relatively simple to calculate and to update;
- If we follow the current MFF index calculation, first we calculate an "underlying index" with mean around 1.00, then subsequently a "payment index" with minimum value of 1.00; and

- The index should be calculated such that it is appropriate for a provider with a payment index value of 1.20 to be reimbursed by 20% more than a provider with a payment index value of 1.00 for comparable activity.

The proposed approach outlined below is based upon meeting these requirements.

Sub-indices to be included

As outlined in previous sections, we propose that the MFF will include the following sub-indices:

- Medical and dental (M&D) staff;
- Clinical (non-M&D) staff;
- Non-clinical staff;
- Land;
- Buildings;
- Business rates; and
- Other (which does not vary between providers).

There are a few options for the precise treatment of each of these sub-indices, as discussed in previous chapters.

Objectives for weighting

There are two main objectives to be met in the weighting of sub-indices within the MFF.

First, the weight of each sub-index should reflect providers' input mix. This is achieved within the current MFF calculation by assigning a weight to each sub-index based on the share of costs it represents in the consolidated accounts of providers.

Second, NHS Improvement and NHS England advised us that there is a desire to more adequately reflect differences in cost structures across types of providers. Different provider types use different combinations of inputs and so have different cost structures. We explore this further in section 8.3. The MFF index could be refined to reflect this variation, making the index more appropriate to each provider type.

8.3 Variation in cost structures across provider types and locations

We analysed variation in cost structures across provider types and also across locations.

Variation in cost structures by provider type

Figure 36 below illustrates the cost structure of different provider types, using average total costs.[132]

Figure 36   Variation in cost structure by provider type

Proportion of Total Costs	All Providers	Acute	Comm-unity	Mental Health	Ambu-lance
Staff	63.6%	61.1%	67.6%	74.6%	69.0%
Land PDC	0.3%	0.2%	0.2%	0.5%	0.3%
Buildings PDC	1.5%	1.6%	0.7%	1.6%	0.5%
Buildings depreciation	1.4%	1.4%	0.7%	1.4%	0.7%
Business rates	0.4%	0.4%	0.4%	0.5%	0.5%
Other	32.8%	35.1%	30.4%	21.4%	29.1%

Source: Frontier Economics analysis of provider accounts

The figure shows significant variation between provider types. For example, acute and mental health providers use a greater proportion of buildings than community and ambulance providers. Mental health and ambulance providers use a greater proportion of staff than acute and community providers.

It would be possible to include other types, or to combine some of the types above. We considered specialist providers as a separate category; however, we found that their cost structures were similar to acute providers, and also that many competing definitions of "specialist" are possible. We also believe that the variation in cost structures shown in **Figure 36** justifies keeping all of the above provider types.

Figure 37 below illustrates the variation across provider types within staff costs, reflecting the different mix of staff used.

Figure 37   Variation in staff costs by provider type

Proportion of Staff Costs	All Providers	Acute	Comm-unity	Mental Health	Ambu-lance
Medical & dental	21%	27%	6%	12%	0%
Clinical (non-M&D)	59%	53%	73%	67%	80%
Non-clinical	20%	20%	22%	21%	20%

Source: Frontier Economics analysis of ESR

The figure shows that M&D cost proportions vary between every provider type. For example, M&D staff account for a quarter of acute staffing costs but virtually

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[132]   Provider types supplied by NHS Improvement. The types used in this analysis reflect NHS Choices' categorisation of providers: http://www.nhs.uk/NHSEngland/thenhs/about/Pages/authoritiesandtrusts.aspx.

zero for ambulance providers. Clinical (non-M&D) costs show the opposite pattern, while non-clinical costs are similar across provider types.

Based on the above analysis, we recommend that the weights for each MFF sub-index should vary by provider type.

Variation in cost structures by provider location

Figure 38 below illustrates the cost structure of providers in different locations (by HCAS zone), using average total costs.

Figure 38   Variation in cost structure by location

Proportion of Total Costs	All Providers	Inner London	Outer London	Fringe	Rest of England
Staff	63.6%	58.2%	65.5%	64.6%	64.4%
Land PDC	0.3%	0.5%	0.5%	0.4%	0.2%
Buildings PDC	1.5%	1.7%	1.4%	1.6%	1.5%
Buildings depreciation	1.4%	1.6%	1.3%	1.3%	1.3%
Business rates	0.4%	0.5%	0.5%	0.4%	0.4%
Other	32.8%	37.5%	30.8%	31.7%	32.1%

Source: Frontier Economics analysis of provider accounts

The figure shows that variation in the structure of costs is relatively small across locations. The notable exception is the proportion of staff costs in Inner London, which is lower than other areas, and is offset by a greater proportion of "other" costs.

Figure 39 below illustrates the variation across provider locations within staff costs, reflecting the different mix of staff used.

Figure 39   Variation in staff costs by location

Proportion of Staff Costs	All Providers	Inner London	Outer London	Fringe	Rest of England
Medical & dental	21%	23%	20%	25%	20%
Clinical (non-M&D)	59%	57%	59%	56%	59%
Non-clinical	20%	20%	21%	19%	20%

Source: Frontier Economics analysis of ESR

The figure shows that variation in the high level structure/mix of staff costs is relatively small across locations (although analysis in the previous chapters demonstrates the variation in unit costs which does exist).

It would be possible to consider variation across different geographical areas. We believe this would further support the analysis presented above.

We recommend that weightings should not vary by provider location, since the observed variation in cost structures is relatively small.

8.4 Proposed MFF index calculation

Based on the above requirements, in this section we propose an approach to calculating the overall MFF index.

In our view, these recommendations provide an element of "future proofing" for the MFF. In particular, under our proposals the MFF would become less specific to a particular NHS provider and more transferrable to whatever organisation is responsible for a given service in a particular location. We believe this will assist NHS Improvement and the sector in the application of the MFF, for example, by:

- Applying the MFF to independent and voluntary sector providers;[133] and
- Applying the MFF to individual contracts being agreed by commissioners and providers.

Below we describe our proposed structure and approach to weighting.

8.4.1 Structure

Our proposed structure for the MFF is shown in **Figure 40** below.

Figure 40   Overview of proposed MFF structure
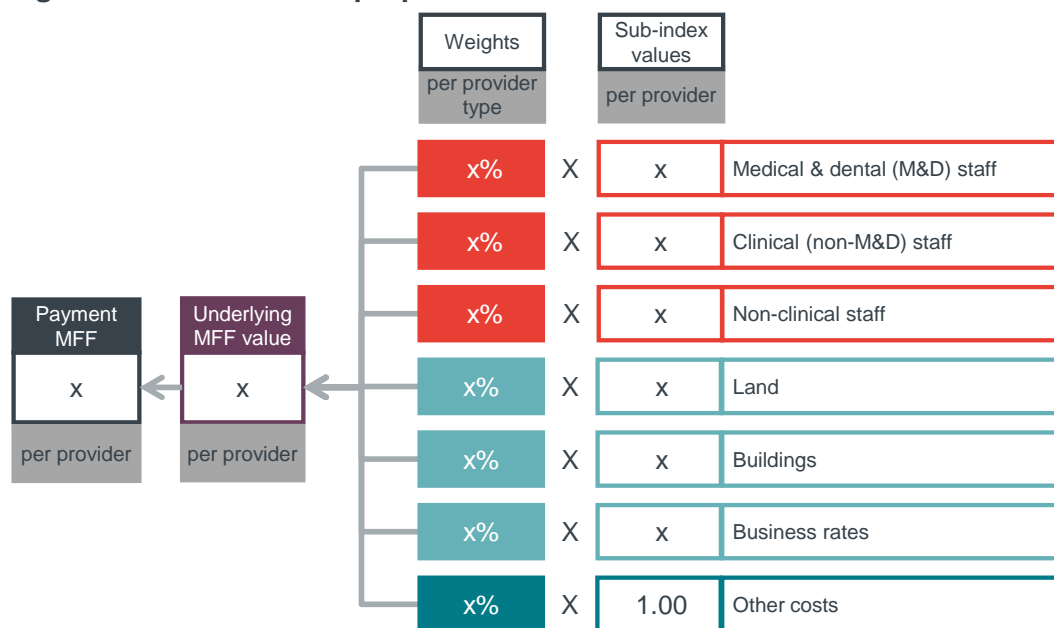
Source: Frontier Economics

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[133]   In the previous chapters we propose using data which are independent and not trust specific wherever possible. This allows indices to be calculated for a given location, which could apply to any provider in that location. In cases where trust specific data remain the most appropriate source, we propose that the values for independent and voluntary sector providers are calculated based on their nearest equivalent NHS trust, as they are currently. NHS Improvement and NHS England could also consider using an average value calculated from multiple local NHS providers.

As shown in **Figure 40**, we propose that there will be a "payment MFF" and an "underlying MFF", exactly as in the current MFF arrangements (and calculated in the same way).

Figure 40 also shows the seven sub-indices which we propose should be included in the MFF, including "other". The values for each of these sub-indices are calculated per provider. The proposed calculation approach is summarised below in **Figure 41** and described in more detail in previous chapters.

Figure 41   Summary of calculation approach to sub-indices

MFF Sub-index	Calculation Approach
Medical & dental (M&D) staff	Value 1.00 for all providers outside London; value in London reflects London weighting uplift.
Clinical (non-M&D) staff	GLM analysis for overall sub-index value. Separate reporting of HCAS uplift and residual which is assumed to reflect indirect costs.
Non-clinical staff	GLM analysis.
Land	Based on NBV of land assets.
Buildings	Based on independent building costs data.
Business rates	Based on local area VOA rateable values.
Other	Value set at 1.00 for all providers.

Source: Frontier Economics

Under the current methodology, each sub-index has a mean of approximately 1. The exception to this is the land sub-index, for which the mean value is approximately 1.6. This is due to the benchmark against which each provider's value is calculated, which is a land-weighted average land area.[134] We propose retaining these calculations, although NHS Improvement and NHS England might consider alternatives.[135]

The values for each sub-index are multiplied by the weight for that sub-index. We discuss these weights in the following section.

8.4.2 Weighting

Informed by the analysis in **Section 8.3**, we propose that weights vary between provider types. This requires:

- Calculating the weights for each sub-index, for each provider type; and

- Assigning a provider type to each individual provider.

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[134]   Calculated using total land area, divided by the number of providers.

[135]   For example, comparing each provider's value with (i) a simple unweighted average or (ii) a revenue-weighted average. This approach could be taken for any or all sub-indices; however it is only the land index which would be likely to change significantly.

Calculating weights

We propose that weights are calculated in broadly the same way as the current system operates. This system uses provider accounts to calculate the proportion of costs accounted for by each area of costs.

For staff costs: in line with the current method, the overall proportion of staff costs is calculated, then there is an additional step of using ESR data to calculate the split between different staff sub-indices. The only change we propose is splitting staff into three categories (rather than two) as described previously.

For land, buildings and "other": the calculation will remain as in the current method. The only change we propose is separating out business rates and considering these independently.

For business rates: as described in **Section 7.3**, the weighting is calculated using the proportion of expenditure reported by those providers that include a separate business rates charge.[136]

The key change we propose is to use individual provider accounts, rather than the consolidated accounts. This is required so that proportions of costs can be calculated on a provider-type basis, as in **Figure 36**. We propose using the aggregation of individual accounts published by NHS Improvement for Foundation trusts and the Department of Health for non-Foundation trusts.[137]

Assigning provider types to individual providers

To inform the aggregation of provider accounts referred to above, and to determine the appropriate weights to apply to any particular provider, it will be necessary to assign a type to each provider.

We propose that the following four provider types are used:

- Acute;
- Community;
- Mental health; and
- Ambulance.

We propose that each provider is assigned a single type. This has the benefit of keeping the weighting process relatively simple. We considered the possibility of each provider being assigned a percentage share of each provider type – for example, a provider could be 70% acute and 30% community. However, our view is that the accurate calculation of these shares could be complex and the additional complexity of the weighting process would be undesirable. We also believe that allocating a "primary type" to each provider will be straightforward in the vast majority of cases. For those providers which do span multiple types, determining their primary type would be largely a one-off exercise. Any provider's type could be reviewed on an ad hoc basis, either centrally as part of an MFF update, or locally as part of a commissioner-provider agreement.

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[136] This approach allows for the fact that some providers do not include a separate business rates charge in their accounts.

[137] https://www.gov.uk/government/collections/foundation-trust-consolidation-ftc-accounts-data
https://www.gov.uk/government/publications/nhs-trusts-accounts-data-for-2015-to-2016

9 LOOKING AHEAD

SUMMARY

- Our work has reviewed the MFF within the context of the current NHS payment system and fundamental changes of the system have not been considered. Yet NHS structures are evolving and the MFF may need to adapt.

- The basic principles and underlying rationale for the MFF and the need to adjust payments to reflect unavoidable cost differences between providers while incentivising the highest quality of care at an efficient cost will remain. Having a provider-based MFF means that the MFF can be re-configured to match the new organisational structures that may emerge as a result of sector reforms.

- Which factors should be included or excluded from the MFF may change over time too so this should be revisited periodically by NHS Improvement and NHS England. The conceptual framework we developed (see **Chapter 3**) will enable such assessments to be carried out in future.

- Every time the MFF is updated, there may be significant winners and losers. NHS Improvement and NHS England should consider the use of transition arrangements to minimise the risk of significant revenue fluctuations for providers. In our view the appropriate frequency for updating the MFF is in line with tariff updates.

Changing landscape

Our review of the MFF has focused on the current system of reimbursement of NHS healthcare providers in line with the terms of reference for this work. That is, we have taken the broad structure of the payment system and the MFF within it as given and not explicitly examined how this may change going forward. In this section we briefly consider some of the key issues that NHS Improvement and NHS England may need to examine in the future given the direction of travel in the sector.

At the same time, we have been mindful of the fact that the NHS is an evolving organisation and that the nature of healthcare provision may change in the future. In this context, we have considered how well the MFF, as it is currently set up, can be adapted to new care models and the corresponding new health economies that may emerge in years to come. Some of the major initiatives which have the potential to alter the landscape significantly include the integration of health and social care, the Sustainability and Transformation Plans, the drive towards moving activity from the acute sector into the community and the emergence of different models of care such as Accountable Care Organisations (ACOs), Integrated Primary and Acute Care Systems (PACs) and Multispecialty Community Providers (MCPs), which are under active development in England. Whether reforms lead to the nature of contracting organisations changing (so they span different geographies to the ones which exist now), or the unit of care for which payments are made being different (e.g. capitation

payments vs. payments for episodes of care), the underlying rationale for the MFF and the need to adjust payments to reflect unavoidable cost differences between providers while incentivising the highest quality of care at an efficient cost will remain. It is therefore important that the building blocks underpinning the MFF can be adapted in future to account for such changes.

The current MFF is provider based – every provider in the country has an associated MFF value. Further, there is no principle reason why one could not calculate an MFF value at sub-trust level (e.g. site) despite some data limitations.[138] This means that whatever new health economies emerge following reforms in the sector, the MFF can be re-configured to match the new organisational structures. It is difficult to be prescriptive about exactly how this would be done in future given the uncertainty about what the future provider landscape would look like, but at the high level the method may follow the broad approach used for calculating MFF values in the case of mergers.

Factors excluded from MFF

One of the key objectives of our work was to create a framework which we can use to judge whether certain costs and cost drivers should be included in the MFF. We regard the framework as a key output of our work as it can help us determine, now and in the future, what should form part of the MFF.

As part of our work, we applied this framework to a list of 18 cost elements (costs and cost drivers) and concluded that only land, buildings, business rates and staff warrant inclusion in the MFF. A number of cost elements were rejected on principle, while for others we concluded that although there is an unavoidable element, the MFF was not the appropriate mechanism to reimburse these costs and that other mechanisms in the payment system are better placed to play that role instead (see **Annex B** for detail). It is worth noting that an assessment of the extent to which other mechanisms in the payment system work effectively was beyond the scope of this project, and we recognise that in cases where this is not the case, NHS Improvement and NHS England may wish to re-consider some of the elements we rejected for inclusion in the MFF in future.

Implementation issues

The MFF is ultimately a zero sum game – this means if costs rise faster in some areas than others, the MFF will push more resource to the higher cost areas and away from the lower cost areas. Hence, any changes, whether driven by changes in methodology or data, will lead to gainers and losers. It is worth noting that the MFF has not been updated for over six years. Over such a timeframe it is entirely realistic to expect legitimate changes in costs which would lead to changes in revenue. In addition to data changes, we have proposed a small number of methodological changes which would lead to additional change.

At the same time, it is important to acknowledge that healthcare providers are currently operating in a challenging financial environment and as such any changes to income, whether driven by data or methodological changes, could

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[138] Notably, it is our understanding that accounting data are not currently available at site level.

have serious consequences for provider finances. We note that a distributional analysis examining in detail the gainers and losers from the update of the MFF was beyond the scope of this project, but we consider such an analysis as fundamentally important. In our view, it is important for NHS Improvement and NHS England to carry out this analysis in future and then consider transitional measures that could be employed to phase in changes particularly where these are significant such that substantial revenue fluctuations are avoided.

A further related point which would need consideration is how regularly the MFF will be updated going forward. There is potentially a tension between carrying out very regular updates (e.g. annual) and the resultant changes in provider revenues these would drive, and the incentive consequences of infrequent updates (e.g. every five years) which may drive inefficient outcomes (e.g. reductions in costs which are not reflected in MFF). Exactly how often the MFF is updated is ultimately for NHS Improvement and NHS England to decide, but in our view it would be logical to align MFF updates with the time periods for which tariff is set. Also, provider specific updates may occasionally be needed outside of the overall MFF update. For example, if two providers merged or one provider opened a significant new site in a different area to their existing sites, their MFF may warrant recalculation. Deciding whether the adjustment should be made immediately or as part of the next MFF update will require an element of judgement.

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ANNEX A DETAILED ANALYTICAL RESULTS

A.1 Staff methodology

A.1.1 Econometric specification

For all staff groups other than medical and dental the direct costs model we fit is as follows:

$$w_{ij} = \beta_0 + \beta_1 HCAS\ Zone_j + \beta_2 Trust\ Type_j + \beta_3 Age_{ij} + \beta_4 AfC\ Band_{ij} + \varepsilon_{ij}$$

where w_{ij} refers to average total annual earnings per WTE of staff group i in trust j, HCAS Zone refers to the location of trust j, Trust Type refers to the category of secondary provider,[139] age refers to the average age of staff group i in trust j, and AfC Band refers to the distribution of staff group[140] i in trust j in terms of seniority.[141] We explored different combinations of independent variables before settling on this final specification. We run this specification on total earnings. Then we remove the estimated HCAS payments and re-run the regressions using adjusted total earnings as the dependent variable.

We apply the same model to medical and dental staff with two exceptions. Firstly, AfC bands are not relevant for medical and dental staff so instead we control for the role mix within each trust[142] and the speciality mix within each trust.[143] Secondly, we explore variation in medical and dental earnings not only by HCAS Zone but also by GOR in separate regressions.[144]

Our stability index is calculated as follows:

$$\frac{(Leavers\ WTEs + Joiners\ WTEs)/2}{Total\ WTEs}$$

For all staff groups other than medical and dental, the model we fit is as follows:

$$T_{ij} = \beta_0 + \beta_1 Location_j + \beta_2 Trust\ Type_j + \beta_3 Age_{ij} + \beta_4 AfC\ Band_{ij} + \varepsilon_{ij}$$

where T_{ij}[145] refers to the turnover of staff group i in trust j. All the control variables can be interpreted in the same way as in the direct cost regression. We use

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[139] The possible trust types are acute, ambulance, community, mental health or specialist. Acute is the base category against which other groups are compared.

[140] Staff group refers to the groups included in **Figure 18.**

[141] We have grouped the bands into three categories 1-5, 6 and 7-9. 1-5 is the base category against which other bands are compared.

[142] This covers the proportion of consultants, foundation year doctors, specialist doctors, specialist registrars and other.

[143] This covers medicine, surgery, general acute, psychiatry and other.

[144] The Annex contains a breakdown of number of trusts by HCAS zone and by GOR

[145] Overall, the turnover rates we report here are slightly higher than those published elsewhere. This is because we include all staff in our calculations while certain categories of staff such as foundation year doctors are excluded elsewhere. Given that we are interested in relativities between trusts in different locations (and we control for trusts type) as opposed to absolute values, this discrepancy is likely to be relatively unimportant.

HCAS Zones and GOR as measures of location. We also separately consider specific hotspots of London, Manchester and Birmingham. As with earnings we apply the same model to medical and dental staff with one exception: AfC bands are not relevant for medical and dental staff so instead we control for the role mix within each trust and the speciality mix within each trust.

A.1.2 Direct cost results

Figure 42   Effect of location on average total earnings

	Nursing & Midwifery (£)	Healthcare Scientists (£)	Estates & Ancillary (£)	Additional Professional Scientific & Technical (£)	Administrative & Clerical (£)	Allied Health Professionals (£)	Additional Clinical Services (£)
Inner	**6,000**	**5,700**	**5,700**	**4,900**	**9,100**	**5,100**	**4,700**
Outer	**5,600**	**4,800**	**7,900**	**4,200**	**6,500**	**4,600**	**4,400**
Fringe	**2,100**	**2,200**	**3,100**	1,100	**2,500**	**1,400**	1,000
n	226	126	198	209	235	228	235
R^2	72%	65%	44%	81%	84%	80%	61%

Source: Frontier Economics analysis of ESR data, 2015

Note: Estimated using Ordinary Least Squares (OLS). Regressions are at the trust level. The dependent variable is unadjusted average total annual earnings per WTE. The base category for the HCAS variable is the rest of England. Coefficients refer to the difference in earnings per WTE for trusts located in the HCAS zones relative to the rest of England in £ terms rounded to the nearest £100. Bold coefficients are statistically significant at the 5% level. Regressions include controls for trust type, proportion of staff in AfC bands 1-6 and average age of the employee group. Trusts are only included in the regression analysis if they have at least 50 WTEs in the relevant staff group. n refers to sample size. R^2 refers to the proportion of variation accounted for by the models.

Figure 43   Effect of location on adjusted average earnings

	Nursing & Midwifery (£)	Healthcare Scientists (£)	Estates & Ancillary (£)	Additional Professional Scientific & Technical (£)	Administrative & Clerical (£)	Allied Health Professionals (£)	Additional Clinical Services (£)
Inner	-600	**-1,500**	1,200	**-2,100**	**3,100**	**-1,400**	300
Outer	400	-900	**4,000**	**-1,200**	**2,200**	-400	900
Fringe	400	300	**1,900**	-700	**1,100**	-200	-100
n	226	126	198	209	235	228	235
R^2	41%	34%	25%	73%	66%	68%	46%

Source: Frontier Economics analysis of ESR data, 2015

Note: Estimated using OLS. Regressions are at the trust level. The dependent variable is average annual earnings per WTE with estimated HCAS uplifts removed. The base category for the HCAS variable is the rest of England. Coefficients refer to the difference in earnings per WTE for trusts located in the HCAS zones relative to the rest of England in £ terms rounded to the nearest £100. Bold coefficients are statistically significant at the 5% level. Regressions include controls for trust type, proportion of staff in AfC bands 1-6 and average age of the employee group. Trusts are only included in the regression analysis if they have at least 50 WTEs in the relevant staff group. n refers to sample size. R^2 refers to the proportion of variation accounted for by the models.

To derive adjusted earnings we remove estimated HCAS uplifts rather than the actual uplifts.[146] Our estimates will be greater than the actual payments in some cases. For example when trusts have the majority of their staff in Inner London

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[146]   Uplifts were estimated on the basis of aggregate average total earnings for each staff group within each trust.

but have some staff located in Outer London. These estimated uplifts will be too large if the maximum absolute payment occurs more often than the minimum absolute payment.

Figure 44   Effect of location on average total unadjusted medical and dental earnings (London specification)

	Medical and Dental (£)
Inner	-1,400
Outer	-1,200
Fringe	-2,200
n	213
R^2	77%

Source: Frontier Economics analysis of ESR data, 2015

Note: *Estimated using OLS. Regressions are at the trust level. The dependent variable is unadjusted average total annual earnings per WTE. The base category for the HCAS variable is the rest of England. Coefficients refer to the difference in earnings per WTE for trusts located in the HCAS zones relative to the rest of England in £ terms rounded to the nearest £100. Bold coefficients are statistically significant at the 5% level. Regressions include controls for trust type, medical and dental speciality proportions within trust, medical and dental roles within trust and average age of medical and dental staff within trust. Trusts are only included in the regression analysis if they have at least 50 medical and dental WTEs. n refers to sample size. R^2 refers to the proportion of variation accounted for by the models.*

Figure 45   Effect of location on average total unadjusted medical and dental earnings (GOR specification)

	Medical and Dental (£)
East	-1,500
East Midlands	-1,000
London	-800
North East	800
South East	-1,100
South West	800
West Midlands	1,400
Yorkshire and the Humber	-2,400
n	213
R^2	78%

Source: Frontier Economics analysis of ESR data, 2015

Note: *Estimated using OLS. Regressions are at the trust level. The dependent variable is unadjusted average total annual earnings per WTE. The base category for the GOR variable is the North West of England. Coefficients refer to the difference in earnings per WTE for trusts located in the GORs relative to North West of England in £ terms rounded to the nearest £100. Bold coefficients are statistically significant at the 5% level. Regressions include controls for trust type, medical and dental speciality proportions within trust, medical and dental roles within trust and average age of medical and dental staff within trust. Trusts are only included in the regression analysis if they have at least 50 medical and dental WTEs. n refers to sample size. R^2 refers to the proportion of variation accounted for by the models.*

A.1.3 Indirect cost results

Figure 46 Effect of location on turnover rates (HCAS zones)

	Medical & Dental (%)	Nursing & Midwifery (%)	Healthcare Scientists (%)	Estates & Ancillary (%)	Additional Professional Scientific & Technical (%)	Administrative & Clerical (%)	Allied Health Professionals (%)	Additional Clinical Services (%)
Inner	**8.0**	**6.0**	**5.5**	-0.2	**4.2**	**3.4**	**4.9**	**4.3**
Outer	**9.1**	**4.8**	**9.5**	-1.7	**7.1**	**2.3**	**7.4**	**5.5**
Fringe	1.4	2.7	2.8	1.4	**4.2**	**3.4**	3.3	**4.4**
n	123	226	126	198	209	235	228	235
R^2	46%	30%	21%	2%	25%	19%	25%	26%

Source: Frontier Economics analysis of ESR data, 2015

Note: Estimated using OLS. Regressions are at the trust level. The dependent variable is a staff group specific stability index. Coefficients refer to the difference in turnover for trusts located in the HCAS zones relative to the rest of England in % terms. Bold coefficients are statistically significant at the 5% level. Regressions include controls for trust type, proportion of staff in AfC bands 1-6 (for AfC groups), role and speciality (for the medical and dental group) and average age of the employee group. Trusts are only included in the regression analysis if they have at least 50 WTE joiners and leavers in the relevant staff group over the past year. n refers to sample size across all of the regression models.

Figure 47 Effect of location on turnover rates (GOR)

	Medical & Dental (%)	Nursing & Midwifery (%)	Healthcare Scientists (%)	Estates & Ancillary (%)	Additional Professional Scientific & Technical (%)	Administrative & Clerical (%)	Allied Health Professionals (%)	Additional Clinical Services (%)
East	**-6.14**	-0.95	**-5.01**	4.12	-2.54	1.70	-0.58	-0.16
East Midlands	1.20	**-7.32**	**-7.45**	-1.95	**-6.36**	**-3.56**	**-8.86**	**-6.22**
North East	**-16.95**	**-8.24**	**-9.69**	6.44	**-7.65**	**-5.84**	**-7.78**	**-7.50**
North West	**-20.24**	**-6.37**	**-4.83**	-1.93	**-5.90**	**-3.93**	**-8.61**	**-6.02**
South East	**-10.06**	**-4.33**	**-6.03**	4.87	**-3.84**	-0.77	**-5.26**	**-2.96**
South West	**-11.19**	**-6.14**	**-7.54**	0.80	**-5.69**	**-2.56**	**-8.78**	**-3.73**
West Midlands	-3.12	**-7.25**	**-7.80**	-0.84	**-5.69**	**-4.41**	**-9.49**	**-7.02**
Yorkshire and the Humber	**-9.99**	**-5.98**	**-8.85**	-1.94	**-5.36**	**-5.13**	**-7.19**	**-7.07**
n	123	226	126	198	209	235	228	235
R^2	59%	40%	25%	9%	26%	35%	38%	34%

Source: Frontier Economics analysis of ESR data, 2015

Note: Estimated using OLS. Regressions are at the trust level. The dependent variable is a staff group specific stability index. Coefficients refer to the difference in turnover for trusts located in London relative to other regions in % terms. Negative coefficients imply that London trusts have higher rates of turnover. Bold coefficients are statistically significant at the 5% level. Regressions include controls for trust type, proportion of staff in AfC bands 1-6 (for AfC groups), role and speciality (for the medical and dental group) and average age of the employee group. Trusts are only included in the regression analysis if they have at least 50 WTE joiners and leavers in the relevant staff group over the past year. n refers to sample size across all of the regression models.

**Figure 48   Effect of location on turnover rates (hotspots)**

	Medical & Dental (%)	Nursing & Midwifery (%)	Healthcare Scientists (%)	Estates & Ancillary (%)	Additional Professional Scientific & Technical (%)	Administrative & Clerical (%)	Allied Health Professionals (%)	Additional Clinical Services (%)
Birmingham	**7.5**	-2.8	0.1	-4.3	-1.5	-0.9	-2.8	**-5.1**
Manchester	-5.9	0.2	2.9	-1.9	-2.3	-0.2	-2.4	-0.4
n	123	226	126	198	209	235	228	235
R^2	47%	29%	20%	3%	22%	17%	24%	26%

Source: *Frontier Economics analysis of ESR data, 2015*

Note: *Estimated using OLS. Regressions are at the trust level. The dependent variable is a staff group specific stability index. Coefficients refer to the difference in turnover for trusts located in Birmingham and Manchester relative to the rest of England (excluding London) in % terms. Bold coefficients are statistically significant at the 5% level. Regressions include controls for trust type, proportion of staff in AfC bands 1-6 (for AfC groups), role and speciality (for the medical and dental group) and average age of the employee group. Trusts are only included in the regression analysis if they have at least 50 WTE joiners and leavers in the relevant staff group over the past year. n refers to sample size across all of the regression models.*

A.1.4   Geographical breakdown of trusts

In **Figure 49** we illustrate the number of trusts[147] in each of the HCAS zones. Trusts were assigned to a particular zone based on the location of their staff. For most trusts the vast majority of staff were located in one of the zones.

Figure 49   Number of trusts by HCAS Zone
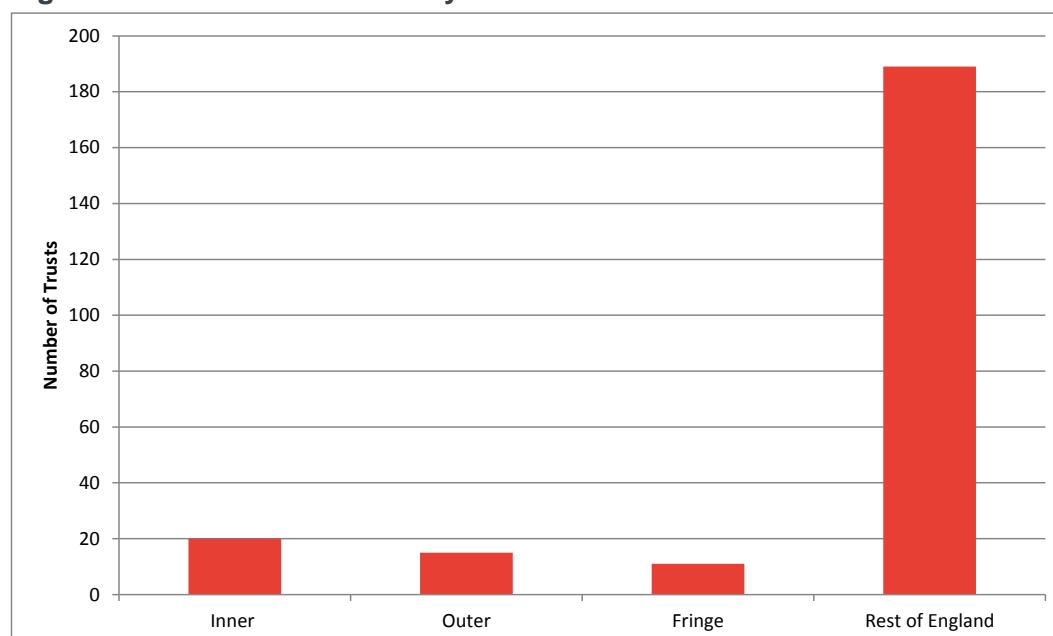
Source: *Frontier Economics analysis of ESR Data, 2015*

Note: *Sample is based on trusts who submit ESR data. Allocation is based on the zone in which a provider undertakes the majority of its activity*

In addition, we present the breakdown of trusts by GOR in **Figure 50** below.

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[147]   Within our overall ESR sample

Figure 50   Number of trusts by Government Office Region
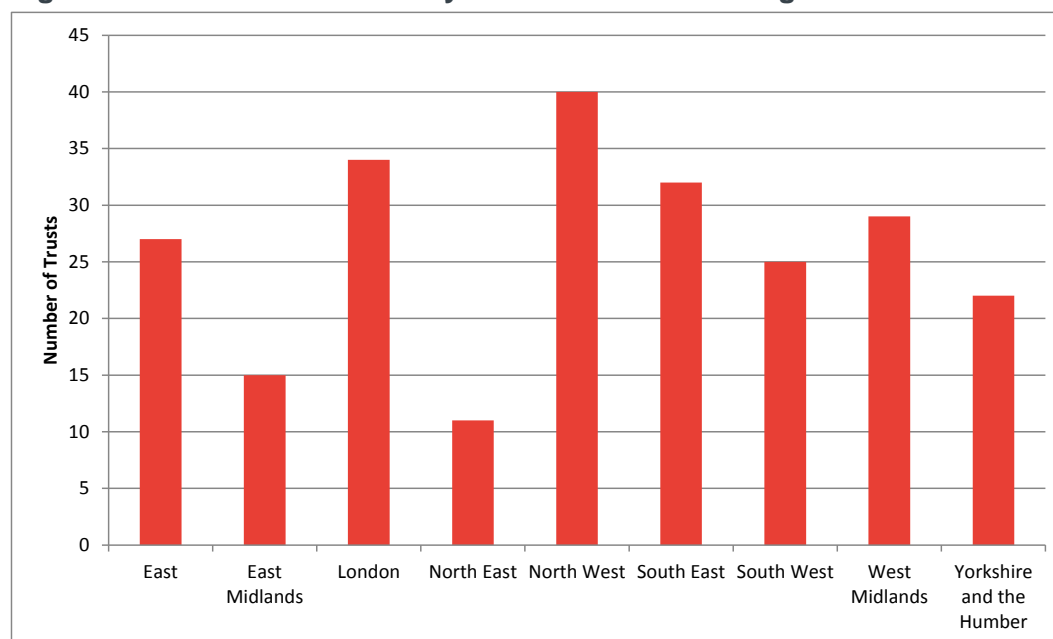
Source: Frontier Economics
Note: Sample is based on trusts who submit ESR data

A.1.5 Impact of unattractive location on earnings and indirect costs

None of our three proxies of unattractive location[148] had a consistent effect on either earnings or turnover. We separately add each of the unattractive location proxies to a regression model covering each of the staff groups. We present the results from each of these three sets of regression in its own row below.

We illustrate the earnings results in **Figure 51** and turnover results in **Figure 52**.

Figure 51   Effect of unattractive location on average total earnings

	Medical & Dental (£)	Nursing & Midwifery (£)	Healthcare Scientists (£)	Estates & Ancillary (£)	Additional Professional Scientific & Technical (£)	Administrative & Clerical (£)	Allied Health Professionals (£)	Additional Clinical Services (£)
IMD	-0.039	0.008	-0.023	0.033	0.014	0.002	-0.011	0.014
Barriers to housing and services	0.008	-0.020	0.009	0.013	-0.002	-0.019	-0.011	-0.007
Living environment	-0.013	0.001	-0.004	0.010	0.020	**-0.029**	**-0.021**	-0.008
n	123	226	126	198	209	235	228	235

Source: Frontier Economics analysis of ESR data, 2015

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[148]   Multiple deprivation, barriers to housing and services, living environment

Note: *Estimated using OLS. Regressions are at the trust level. The dependent variable is unadjusted average total earnings. Each row refers to a separate regression including one proxy of unattractive location. Coefficients refer to the impact of a one place increase in the deprivation ranking of the local area in £ terms (the area ranked 1 is the most deprived). Bold coefficients are statistically significant at the 5% level. Regressions include controls for HCAS zones, trust type, proportion of staff in AfC bands 1-6 and average age of the employee group. Trusts are only included in the regression analysis if they have at least 50 WTEs in the relevant staff group. n refers to sample size across all of the regression models.*

Figure 52   Effect of unattractive location on turnover

	Medical & Dental (%)	Nursing & Midwifery (%)	Healthcare Scientists (%)	Estates & Ancillary (%)	Additional Professional Scientific & Technical (%)	Administrative & Clerical (%)	Allied Health Professionals (%)	Additional Clinical Services (%)
IMD	0.0002	0.0001	0	0	0.0001	0	0.0001	**0.0001**
Barriers to housing and services	0	0	0	-0.0001	0	0	0	0
Living environment	0.0001	0	0	0.0001	0	0	0.0001	0.0001
n	213	226	126	198	209	235	228	235

Source: Frontier Economics analysis of ESR data, 2015

Note: Estimated using OLS. Regressions are at the trust level. The dependent variable is the relevant staff group's stability index. Each row refers to a separate regression including one proxy of unattractive location. Coefficients refer to the impact of a one place increase in the deprivation ranking of the local area in % terms (the area ranked 1 is the most deprived). Bold coefficients are statistically significant at the 5% level. Regressions include controls for HCAS zones, trust type, proportion of staff in AfC bands 1-6 (for AfC groups), role and speciality (for the medical and dental group) and average age of the employee group. Trusts are only included in the regression analysis if they have at least 50 WTE joiners and 50 WTE leavers in the relevant staff group over the last year. n refers to sample size across all of the regression models.

A.2 Modelling non-medical and dental staff costs using General Labour Market methods

A.2.1 Theory and econometric estimation

The staff element of the MFF index should compensate providers for unavoidable variation in their direct (pay) and indirect labour costs (non-pay, e.g. recruitment and retention costs). As discussed in **Chapter 6** and **Annex A.1** of this report, we find evidence of unavoidable variation as follows:

■ For non-clinical non-M&D staff, pay varies geographically not only due to the HCAS but also over and above the HCAS adjustments; and

■ For non-M&D clinical staff, we find evidence of higher indirect costs in HCAS areas.

To compensate for this variation in staff costs, both the current calculation method of the non-M&D staff index and our suggested alternative method, described in **Section 6** rely on the GLM hypothesis. In other words, unavoidable variation in costs across NHS providers is estimated using geographical variation in private wages. According to the GLM hypothesis, wages vary geographically because workers need to be compensated for the higher cost of living or for worse amenities in certain areas. Private sector pay would reflect this – some

areas would pay more than others for the same job, performed by a person with the same characteristics, due to *compensating differences*. Where compensating differences lead to higher local pay, NHS providers would incur higher non-M&D staff costs: either direct (through HCAS or even above HCAS) or indirect (where they cannot pay sufficiently high wages to attract or retain staff of sufficient quality).

It is therefore possible to estimate unavoidable geographic variation in pay for non-M&D staff by estimating how private sector pay varies due to compensating differences. To achieve this, it is necessary to control for other sources of variation – in particular, differences in the composition of the local workforce. Average pay is likely to be higher in cities than in surrounding areas not just because of differences in cost of living or amenities, but also because jobs located in cities may be in higher-paying occupations (e.g. chief executive officers) and/or in higher-paying industries (e.g. finance). Using data on individual pay from the Annual Survey of Hours and Earnings (ASHE), it is possible to estimate standardised spatial wage differentials (SSWDs), that is, local differences in wages that are not influenced by a number of worker and job characteristics. This can be done estimating the following equation through an Ordinary Least Squares (OLS) regression:

$$log(y_i) = \alpha + \sum_{a=1}^{N} \delta_a A_a + \beta age + \gamma age^2 + x'\theta + \epsilon_i$$

where y_i is the hourly wage of individual i; A is a set of dummies variables for each area *a* of *N* (for example, each Government Office Region, Travel to Work Area, or Clinical Commissioning Group area); x is a vector of the following characteristics: gender; occupation (separate dummies for each 3-digit Standard Occupational Classification); industry (separate dummies for each 2-digit Standard Industry Code); a dummy for part-time workers; and a dummy for each year in the data. Coefficients δ_a estimate how much higher or lower pay in each area *a* is, compared to a benchmark area.

Age and variables in x control for sources of variation other than cost of living and amenities. We tested the inclusion of other variables available in the ASHE data (presence of a collective agreement, employer size in terms of employees), but these did not have any material impact on the explanatory power of the regression model. A key control variable missing from the estimation is a measure of workers' education, which is not included in the ASHE data set. Therefore, there is a risk that some of the SSWDs estimated through this model may be due to geographic differences in the education of the local working population. However, differences in education will be reflected at least in part in occupational codes, which are defined so that occupations typically requiring different levels of skill are assigned different codes.

A.2.2 Choice of comparator groups

The econometric estimation described above, which is the basis for both the current non-M&D index calculation method and for our suggested alternative method, uses data on all private sector workers excluding doctors and dentists. An alternative approach could involve choosing specific comparator groups for different types of non-M&D staff. For example, there could be a specific

regression for administrative staff, separate from a regression for nurses, clerical staff and other categories. This approach could, in principle, provide more accurate estimates of compensating wage differences for each group:

- Allowing to better control for demographic and job characteristics: the role of age in determining pay, for example, could be different in different occupations.

- Allowing for differences in the valuation of local cost of living and amenities across groups of workers: for example, working in London may be very attractive for administrative staff but not as attractive for nurses, or vice versa.

- Allowing for different definitions of areas for different groups: evidence from the 2011 Census suggests that workers in higher-skilled occupations tend to commute longer distances.[149]

However, gains in accuracy from the greater flexibility of the method are likely to be at least partly offset by the decrease in sample size available for each regression, particularly for higher-skilled occupations. Moreover, particularly for some occupations (e.g. nurses), there may be considerable uncertainty in the definition of an appropriate benchmark group. The selection of benchmark groups may materially reduce the transparency and simplicity of the method, as each choice would have to be justified based on available or additional evidence. Even having selected appropriate benchmarks, there would still be a considerable increase in complexity, as different indices would be produced for different staff categories. We have therefore not included a method separating out non-M&D staff among those considered in **Section 6** of this report.

A.2.3 Differences between neighbouring areas

Tables 53 to 57 below report the largest 15 percentage point differences between a trust's non-M&D value and the value of a different trust within a 50-km radius for the four alternative calculation options.

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[149]
https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/traveltoworkareaanalysisingreatbritain/2016#alternative-travel-to-work-areas

Figure 53 Top-15 differences in TTWA method non-M&D index values between neighbouring trusts, 2007-09

Trust 1	Trust 2	Distance between Trusts (km)	Difference between Trusts (percentage points)	Is any of the two located in the London TTWA?
Southend University Hospital	Dartford and Gravesham	50	24.17	Yes
North East London	Basildon and Thurrock University Hospitals	38	24.17	Yes
Basildon and Thurrock University Hospitals	Oxleas	38	24.17	Yes
Barking, Havering and Redbridge University Hospitals	Basildon and Thurrock University Hospitals	30	24.17	Yes
Dartford and Gravesham	Basildon and Thurrock University Hospitals	50	24.17	Yes
Medway	Oxleas	46	23.25	Yes
Maidstone and Tunbridge Wells	Oxleas	47	23.25	Yes
Kent and Medway	Oxleas	46	23.25	Yes
Kent Community Health	Oxleas	46	23.25	Yes
Mid Essex Hospital Services	Oxleas	50	22.06	Yes
North Essex Partnership University	Oxleas	46	22.06	Yes
South Essex Partnership University	Oxleas	48	22.06	Yes
Barts Health	Hertfordshire Community	48	19.58	Yes
London North West Healthcare	Hertfordshire Community	41	19.58	Yes
Royal Free London	Hertfordshire Community	42	19.58	Yes

Source: Frontier Economics analysis of ASHE data

Note: Distances are straight-line distances between trust headquarters

Figure 54 Top-15 differences in TTWA method non-M&D index values between neighbouring trusts, 2013-15

Trust 1	Trust 2	Distance between Trusts (km)	Difference between Trusts (percentage points)	Is any of the two located in the London TTWA?
Southend University Hospital	Dartford and Gravesham	50	21.27	Yes
North East London	Basildon and Thurrock University Hospitals	38	21.27	Yes
Basildon and Thurrock University Hospitals	Oxleas	38	21.27	Yes
Barking, Havering and Redbridge University Hospitals	Basildon and Thurrock University Hospitals	30	21.27	Yes
Dartford and Gravesham	Basildon and Thurrock University Hospitals	50	21.27	Yes
Oxleas	Basildon and Thurrock University Hospitals	33	21.27	Yes
Mid Essex Hospital Services	Oxleas	50	20.95	Yes
North Essex Partnership University	Oxleas	46	20.95	Yes
South Essex Partnership University	Oxleas	48	20.95	Yes
Medway	Oxleas	46	20.43	Yes
Maidstone and Tunbridge Wells	Oxleas	47	20.43	Yes
Kent and Medway	Oxleas	46	20.43	Yes
Solent	Isle Of Wight	29	15.39	No
University Hospital Southampton	Isle Of Wight	29	15.39	No
Southern Health	Isle Of Wight	35	15.39	No

Source: Frontier Economics analysis of ASHE data

Note: Distances are straight-line distances between trust headquarters

Figure 55 Top-15 differences in UoA method non-M&D index values between neighbouring trusts, 2007-09

Trust 1	Trust 2	Distance between Trusts (km)	Difference between Trusts (percentage points)	Is any of the two located in the London TTWA?
Oxleas	Kent Community Health	38	16.52	Yes
Sussex Community	Surrey and Sussex Healthcare	43	16.09	No
Barking, Havering and Redbridge University Hospitals	Kent Community Health	46	15.91	Yes
Brighton and Sussex University Hospitals	Surrey and Sussex Healthcare	45	15.54	No
Tavistock and Portman	Hertfordshire Community	28	14.84	Yes
North Essex Partnership University	Oxleas	46	14.72	Yes
East and North Hertfordshire	Tavistock and Portman	42	14.33	Yes
North East London	North Essex Partnership University	43	14.18	Yes
Royal Surrey County Hospital	Sussex Partnership	50	13.32	No
Southend University Hospital	Dartford and Gravesham	50	12.79	Yes
Mid Essex Hospital Services	Oxleas	50	12.71	Yes
Queen Victoria Hospital	Tavistock and Portman	50	12.57	Yes
Kent and Medway	Oxleas	30	12.48	Yes
South East Coast Ambulance Service	Surrey and Sussex Healthcare	43	12.38	No
Medway	Oxleas	41	12.29	Yes

Source: Frontier Economics analysis of 2007-09 non-M&D staff MFF values

Note: Distances are straight-line distances between trust headquarters

Figure 56 Top-15 differences in hotspots method non-M&D index values between neighbouring trusts, 2007-09

Trust 1	Trust 2	Distance between Trusts (km)	Difference between Trusts (percentage points)	Is any of the two located in the London TTWA?
Southend University Hospital	Dartford and Gravesham	30	50	Yes
North East London	Basildon and Thurrock University Hospitals	30	38	Yes
Basildon and Thurrock University Hospitals	Oxleas	30	38	Yes
Barking, Havering and Redbridge University Hospitals	Basildon and Thurrock University Hospitals	30	30	Yes
Barts Health	Hertfordshire Community	25	48	Yes
London North West Healthcare	Hertfordshire Community	25	41	Yes
Royal Free London	Hertfordshire Community	25	42	Yes
Royal National Orthopaedic Hospital	Hertfordshire Community	25	34	Yes
North Middlesex University Hospital	Hertfordshire Community	25	38	Yes
Guy's and St Thomas'	Hertfordshire Community	25	49	Yes
Lewisham and Greenwich	Hertfordshire Community	25	43	Yes
Croydon Health Services	Hertfordshire Community	25	47	Yes
St George's University Hospitals	Hertfordshire Community	25	42	Yes
Luton and Dunstable University Hospital	Royal National Orthopaedic Hospital	20	39	Yes
Royal Surrey County Hospital	Sussex Partnership	15	50	No

Source: Frontier Economics analysis of ASHE data

Note: Distances are straight-line distances between trust headquarters

Figure 57 Top-15 differences in region-LA method non-M&D index values between neighbouring trusts, 2015

Trust 1	Trust 2	Distance between Trusts (km)	Difference between Trusts (percentage points)	Is any of the two located in the London TTWA?
Barts Health	Hertfordshire Community	48	30	Yes
The Princess Alexandra Hospital	East London	33	30	Yes
West Hertfordshire Hospitals	East London	41	30	Yes
East and North Hertfordshire	East London	48	30	Yes
East London	Hertfordshire Community	48	30	Yes
Hertfordshire Partnership University	East London	42	30	Yes
Dartford and Gravesham	East London	38	25	Yes
Queen Victoria Hospital	East London	43	25	Yes
Oxleas	East London	29	25	Yes
Surrey and Sussex Healthcare	East London	35	25	Yes
Surrey and Borders Partnership	East London	39	25	Yes
London North West Healthcare	East London	30	20	Yes
Royal Free London	Hertfordshire Community	42	20	Yes
Royal National Orthopaedic Hospital	East London	30	20	Yes
North Middlesex University Hospital	East London	11	20	Yes

Source: Frontier Economics analysis of ONS data

Note: Distances are straight-line distances between trust headquarters

A.3 Business rates methodology

A.3.1 Weighting

We acknowledged in **Section 7.3** that some trusts do not report a business rates charge in their accounts. This is likely because they are paying a single premises management fee which includes business rates as one component.

To estimate an average weight, the proportion of expenditure reported by those trusts that include a business rates charge would have to be applied to all trusts. This assumes that the group of trusts that do report a business rates charge is equivalent to those that do not.

We have compared the two groups of trusts[150] by location (**Figure 58**) and trust type (**Figure 59**).

London trusts are significantly over-represented in the group that do not report business rates. These trusts are likely to spend more on business rates than other trusts due to the higher rental values in London. Therefore as they are excluded from the sample when calculating the weight, the resulting estimate may be artificially depressed.

One option to overcome this issue is to calculate regional proportions and assign those providers that do not report any business rates expenditure their appropriate value. Then an overall proportion could be calculated which would take into account that London trusts are less likely to report a business rate charge.

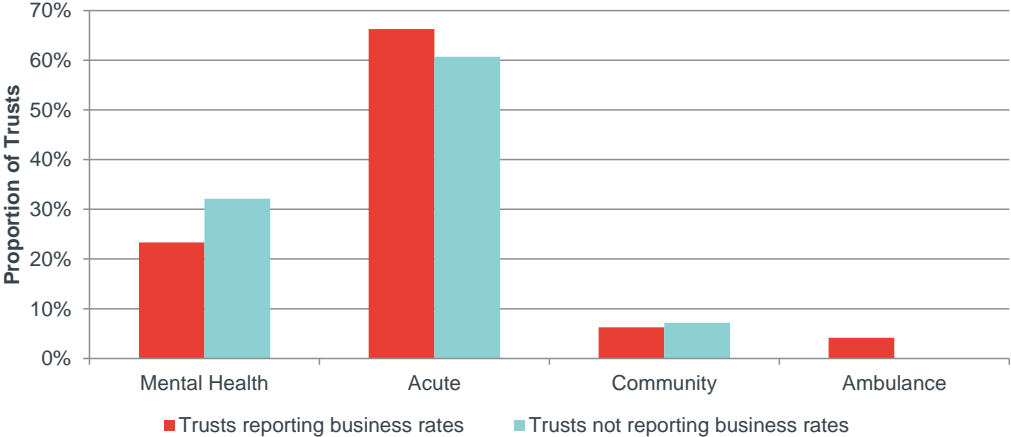There is no meaningful pattern by trust type.

Figure 58   Trusts reporting business rate charges by location
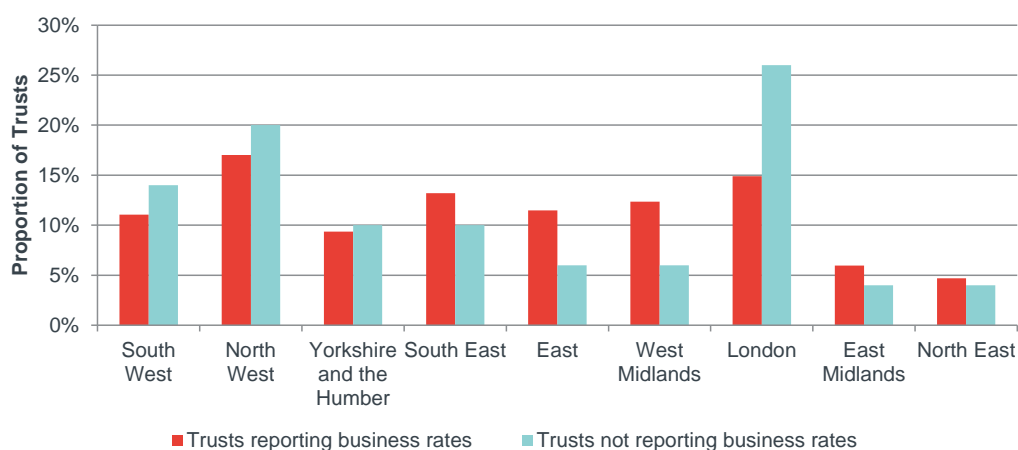
Source: *NHS Trust Accounts 14/15, Foundation Trust Accounts 14/15*

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[150]   Those who report business rates and those who do not.

Figure 59   Trusts reporting business rate charges by type

Source: NHS Trust Accounts 14/15, Foundation Trust Accounts 14/15

ANNEX B COST ELEMENTS UNSUITABLE FOR MFF

B.1 Introduction

In the following section we present our detailed assessment of cost drivers and expenditure items that did not pass the framework criteria.

The full list of costs and cost drivers considered and a summary of our recommendations are contained in **Figure 7** in the main body of the report. The list of costs and cost drivers we have recommended are not included in MFF are:

- Cost of purchasing supplies;
- Asset renewal costs;
- Capital financing structure;
- Inefficient estate set-up;
- Multi-site costs;
- Cost of utilities;
- Complexity of casemix;
- Rurality/remoteness;
- Travel time;
- Fragile local health economy;
- Clinical Negligence Scheme for Trusts (CNST) payments; and
- Training costs.

B.1.1 Cost of purchasing supplies

This section describes our approach to applying the framework to the cost of purchasing supplies.

RECOMMENDATION

We recommend that no adjustment is made for unavoidable variation in the cost of purchasing supplies via the MFF.

Criterion 1: Are the costs of purchasing supplies unavoidably higher for some providers?

No, in our view the cost differences arising from purchasing supplies are likely to reflect fixable inefficiencies rather than intrinsic differences.

NHS Supply Chain is responsible for providing patient-focused healthcare products and supply chain services to the NHS. Their existence should eliminate a lot of the variation in supply cost amongst NHS providers.[151] However, the

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[151] https://www.supplychain.nhs.uk/about-us/what-we-do/

Carter Review (2016) illustrated that unwanted variability in procurement persists. For example, the average price paid for a hip prosthesis varied from £788-£1,590 amongst a sample of trusts. More generally Carter (2016) concluded that there appears to be considerable variation between trusts on the value they extract from non-pay spend.

This variation is largely unwarranted. Some trusts are simply better at procurement than others. The Carter Review estimated that providers could save £700 million through better procurement practices (Carter, 2016). This implies that the different levels of observed efficiency are not the result of unavoidably different circumstances.

Currently NHS Supply Chain is working with the NHS Business Services Authority to deliver the procurement efficiencies that were highlighted in the Carter Review.[152] In addition, NHS England is introducing a new system for buying and supplying high cost medical devices in specialised services.[153]

University of York research (Mason et al., 2009) highlighted that private providers may therefore be at a disadvantage as they cannot access NHS Supply Chain. However, the authors conclude that it is not apparent that the ability to benefit from collective purchasing represents a competitive advantage that requires correction.

B.1.2 Asset renewal costs

This section describes our approach to applying the framework to asset renewal costs.

RECOMMENDATION

We recommend that no adjustment is made for asset renewal costs via the MFF.

Criterion 1: Are asset renewal costs of purchasing supplies unavoidably higher for some providers?

No, asset renewal costs will generally not vary unavoidably from provider to provider; therefore there is no need to include a compensating adjustment.

The necessary renewal of potentially expensive and long-lived assets may impose costs on providers that are outside the control of the current management; for example, certain groups of providers will necessarily have more expensive equipment than others due to the type of services they offer. However, providers who offer a particular service associated with this expensive equipment will include these costs in their reference cost submissions. Therefore, the tariff prices for those procedures will compensate those providers on average.

Importantly, there is no compelling reason why the cost of replacing the same piece of equipment should unavoidably vary from provider to provider in a material manner. A National Audit Office report (2011) highlighted that value for money was not achieved across all trusts in the planning, procurement and use

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[152] https://www.supplychain.nhs.uk/about-us/what-we-do/
[153] https://www.england.nhs.uk/commissioning/spec-services/key-docs/medical-devices/

of high value equipment. Trusts purchased equipment outside of existing framework agreements and failed to group together requirements for new machines. Therefore, there are clearly steps that trusts can take to reduce their asset renewal costs.[154]

B.1.3 Repayment of capital expenditure interest payments

This section describes our approach to applying the framework to the repayment of capital expenditure interest payments

RECOMMENDATION

We recommend that no adjustment is made for repayment of capital expenditure interest payments via the MFF.

Criterion 1: Are capital expenditure repayment costs unavoidably higher for some providers?

Yes, there is an unavoidable element to some capital expenditure repayment costs even if they are not wholly unavoidable. Some financing arrangements such as DH Loans and PFIs may be long term in nature. Therefore the current management of some providers will not have full control over the current and future levels of some payments. It would be very difficult to draw the line between legacy and current financing arrangements given that trusts are obviously continuing to engage in capital expenditure.

Additionally, just because a long-term arrangement is in place does not mean that the current management will have no ability to restructure. For example, in 2014 Northumbria Healthcare terminated the PFI contract which originally enabled the construction of Hexham General Hospital. This buy-out was facilitated by a loan from Northumberland County Council and will reportedly save approximately £3 million per year.[155]

Finally, just because the cost of repayment is partially outside the control of current management does not imply that the provider needs any compensation. Some loans or PFI's will have funded successful projects that will have increased provider efficiency or opened up additional revenue opportunities. Importantly, all PFI projects need to be supported by a preliminary Strategic Outline Case, an Outline Business Case and a Full Business Case, all of which are subject to scrutiny by the Treasury and DH.[156]

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[154] The report also highlighted that trusts did not always have the means to know if they are making best use of their high-value equipment.

[155] https://www.northumbria.nhs.uk/news/northumberland-hospital-changes-hands-pfi-pay-out-deal-finalised

[156] See, for example:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/489227/DH_PF2_Tracker_-_Updated_18th_Dec_2015.pdf

Criterion 2: Is MFF the best way to adjust for the variation in capital expenditure repayment costs?

No, we do not recommend that capital expenditure repayment costs including PFIs are compensated via the MFF. This is primarily because each financing arrangement is unique and therefore requires individual attention rather than inclusion within a national activity based system.

PFIs and other loan contracts will have their own repayment plans and rates of interest. Some will have been in place for a relatively longer period of time while others will be more recent and may therefore be controllable.

Capital financing arrangements will negatively impact some providers. In our view it is logical to compensate those providers in lump sum amounts on a case-by-case basis. This is already taking place. In 2012 the DH made £1.5 billion available over the next 25 years to seven hospital trusts struggling with PFI debts.[157]

B.1.4 Costs stemming from inefficient estate set-up

This section describes our approach to applying the framework to the costs stemming from inefficient estate set-up

RECOMMENDATION

We recommend that no adjustment is made for costs stemming from inefficient estate set-up via the MFF.

Criterion 1: Are costs resulting from inefficient estate set-up unavoidably higher for some providers?

Yes, the layout and the characteristics of a provider's estate will impact their efficiency and will be partially unavoidable at least in the short and medium term.

An old or poorly laid out estate could lead to higher maintenance costs or reduced utilisation. The King's Fund highlighted that the NHS has many under-utilised properties and a significant amount of its estate is in poor condition or not fit for its current purpose (Edwards, 2013).

These estate issues will vary by trust and will lead to variations in cost. For example the Carter Review found that average running costs for a hospital (£ per square metre) vary from £105 at one trust to as high as £970 at another. The layout of those providers' estates will influence those figures. In addition, Lord Carter highlighted variation in the use of floor space as one trust uses 12% of its estate for non-clinical purposes and another uses as much as 69% (Carter, 2016).

A provider's estate configuration will not always necessarily be outside its control. A provider could in theory make use of capital financing to replace or upgrade part of its estate. Numerous trusts took on PFIs for this reason. However, the

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157 https://www.theguardian.com/society/2012/feb/03/hospital-trusts-emergency-fund-pfi

current system makes it difficult for all but the largest organisations to make major changes to their estate (Edwards, 2013).

Additionally, certain providers may be constrained by reasons outside of the availability of finance; for example, a trust occupying a listed building will be restricted in making certain changes.

Criterion 2: Is MFF the best way to adjust for inefficient estate set-up?

No, in our view adjusting for estate inefficiencies does not fit within the MFF. The most obvious way for trusts to overcome an inefficient estate is via capital investment to improve efficiency.[158]

Specific trusts may not be able to access the necessary finance for a variety of reasons and they may require compensation using a mechanism which is not based on activity. The extent of unavoidable inefficiencies will be unique to each trust. Addressing these issues directly on a case-by-case basis is more appropriate than attempting to create a national index based on activity.

B.1.5 Multi-site costs

This section describes our approach to applying the framework to the costs stemming from operating multiple sites

RECOMMENDATION

We recommend that no adjustment is made for multi-site costs via the MFF.

Criterion 1: Are costs resulting from operating multiple sites unavoidably higher for some providers?

No, generally trusts will be able to determine the number of sites from which they operate.[159] According to ERIC data (**Figure 60**) the vast majority of trusts operate more than one site (the average is over five) and only 18% of trusts report a single site.

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[158] However, it is important to note that this process is by no means straightforward. Some of the newer estate developed to deal with the previous maintained backlog has created new problems. This could be because there has been investment in buildings in the wrong place or the new sites are over-specified and inflexible (Edwards, 2013).

[159] Although it is possible that in some cases a provider's CCG may influence how many sites that provider operates from.

Figure 60   Number of sites by trust
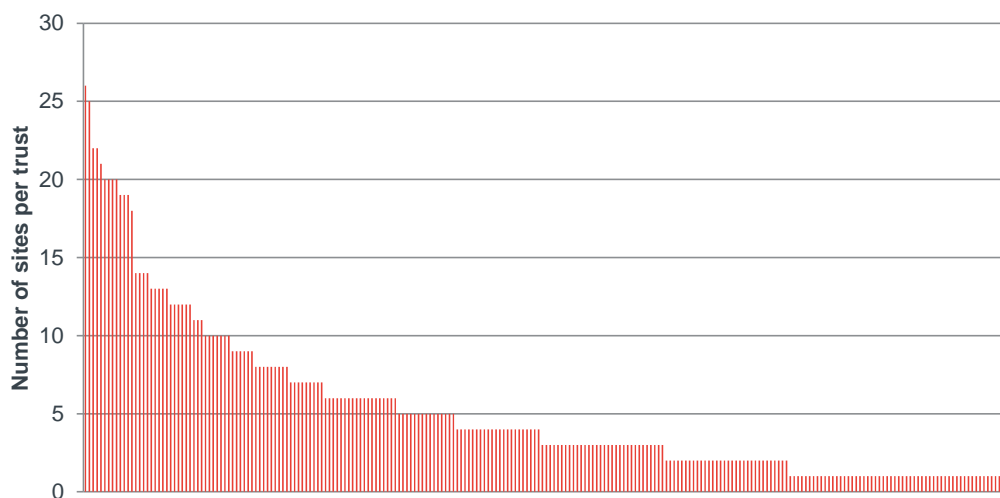
Source: ERIC Facilities Data 2014/15

Running multiple sites could increase costs for a provider due to increased staff travel time or a higher administrative burden, for example. It is also possible that adding a second site could reduce costs. This could happen, for example, if the first site was overcrowded. Providers should be able to determine the optimal number of sites to operate and behave accordingly. However, there may be considerable practical barriers to major reconfiguration at least in the short term.

It is important to note that empirically determining whether there are on average additional costs due to operating multiple sites in a robust manner is likely to be extremely difficult. Precisely isolating the effect of running multiple sites would be challenging.

It is possible that multi-site providers have a relatively high cost base if they are operating dispersed services across a number of sites and these sites have sub-optimal levels of activity. This could result in unavoidable duplication of costs when commissioners request sites remain open to serve geographic distribution of need. We consider this issue when we examine remoteness as a cost driver.

B.1.6 Cost of utilities

This section describes our approach to applying the framework to the cost of utilities.

RECOMMENDATION

We recommend that no adjustment is made for utilities costs via the MFF.

Criterion 1: Are costs of utilities unavoidably higher for some providers?

Yes, electricity, gas and water prices are unavoidably higher in certain areas. While providers will be able to influence the quantity of water and energy used, they cannot control regional price variation. Therefore a certain proportion of the

overall utilities costs are unavoidable. We will firstly consider energy costs as one cost item before considering water charges.

In Great Britain, separate gas and electricity networks supply homes and businesses with energy. Final customers pay these network charges indirectly as they are included on the bills issued by suppliers (Ofgem, 2015). On average, these charges make up around 25% of a typical energy bill but this varies by region to reflect the difference in costs faced by the electricity and gas distribution networks. We present the regional breakdowns of average household electricity (**Figure 61**) and gas (**Figure 62**) bills below.

Figure 61   Average annual household electricity bill by region 2015
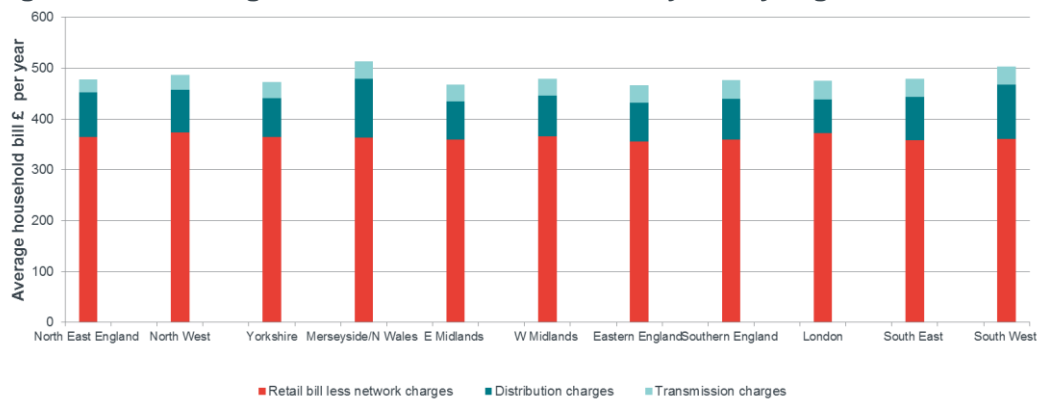
Source: Ofgem (2015)

Figure 62   Average annual household gas bill by region 2015


Source: Ofgem (2015)

Network charges drive the regional variation in both gas and electricity bills. The most expensive region has network charges that are 46% more expensive than the cheapest area for electricity and 26% more expensive for gas. The retail bill less network charges for both electricity and gas do not exhibit considerable regional variation.

Water bills do not contain a comparable network charge. The price of water comprises a wholesale charge and a relatively small retail charge. From April 2017 most non-household customers of supplies based in England will be able to

choose both their water and wastewater retailer.[160] Therefore NHS providers could reduce their retail charge somewhat by switching supplier. However, the vast majority of the water price will remain unavoidable.

We present the average bill by water supplier below (**Figure 63**). The most expensive provider's average household bill is 47% more expensive than the cheapest provider.

Figure 63   Projected average annual household water and sewerage bill 2015/16
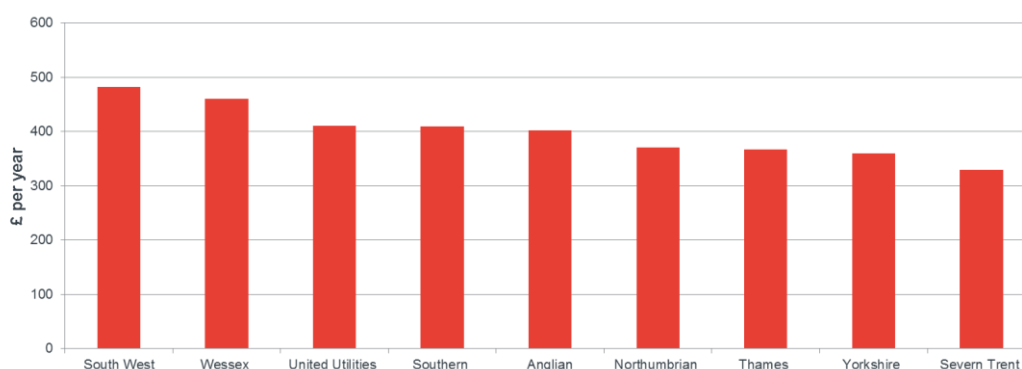
Criterion 2: Is MFF the best way to adjust for the variation in utilities costs?

MFF is the most logical place to make a compensating adjustment for utilities costs. The cost of utilities affects all providers, constitutes a regular annual charge and reflects a consistent pattern in input prices.

Criterion 3: Is the unavoidable portion of utilities costs significant?

When assessing the unavoidable element of energy costs we focus purely on the variation in electricity network charges as they exhibit greater variation relative to gas network charges.

We have seen that electricity network charges account for approximately a quarter of electricity costs and the maximum regional variation is 46%. This implies that the unavoidable share of costs is 11%.

We can then apply this figure to the average proportion of expenditure accounted for by energy spending (**Figure 64**)[161] to derive an unavoidable impact of 0.1%.

[160] http://www.ofwat.gov.uk/nonhouseholds/choosing-your-supplier/
[161] The average was 0.8% in 2014/15

Figure 64   Energy expenditure as a proportion of total costs for all providers
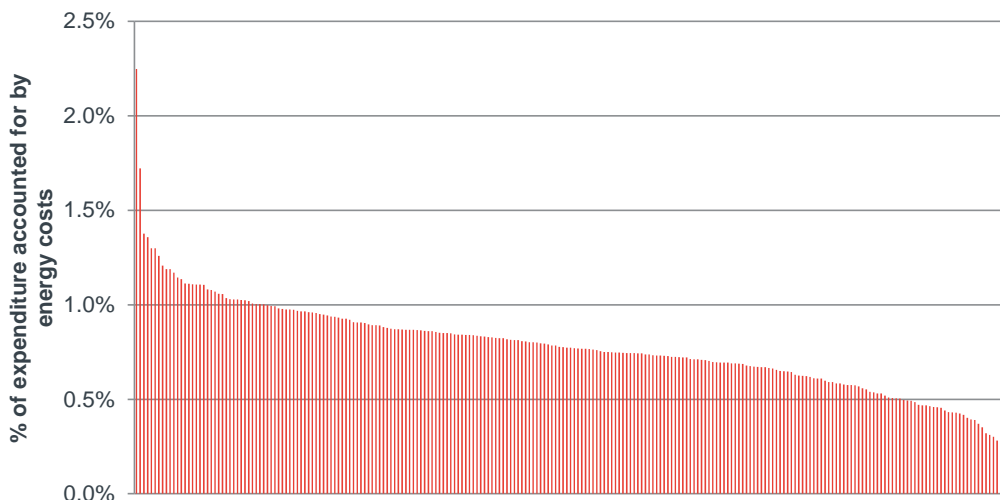
Notes: Total Costs are calculated by adding the PDC dividend to total operating expenditure

For water we have to assume that all of the observed variation in household bills by supplier is unavoidable. Therefore the maximum variation is 47%. When combined with the average proportion of expenditure accounted for by spending on water (**Figure 65**)[162] the unavoidable impact is 0.1%.

Figure 65   Water expenditure as a proportion of total costs for all providers
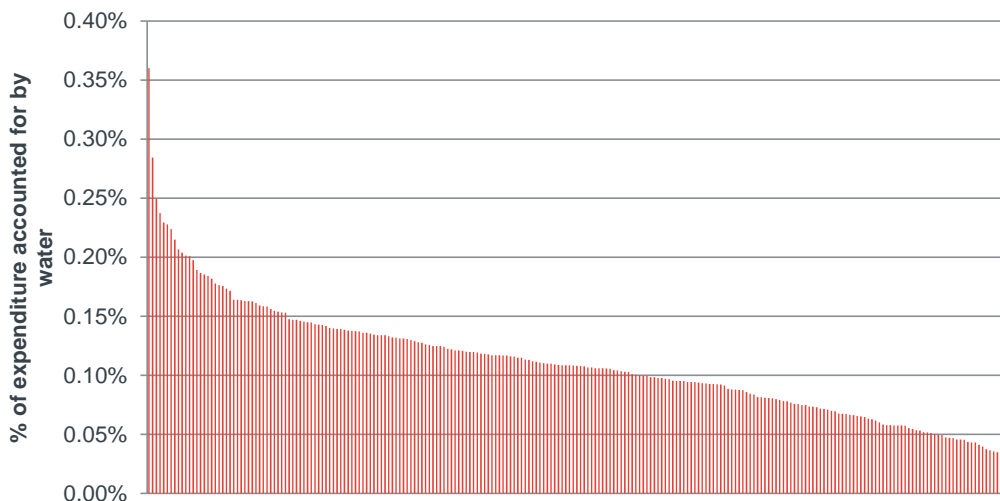
Notes: Total costs are calculated by adding the PDC dividend to total operating expenditure

In our view neither the unavoidable impact of variation in energy costs or water costs is sufficiently large to warrant inclusion within the MFF. Even the combined unavoidable impact is relatively small. In addition, this is likely overstating the unavoidable impact. The region with the highest average water bill is different to

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[162]   The average was 0.1% in 2014/15.

the region with the highest gas bill and the region with the highest electricity bill. Therefore, any unavoidable costs may partially cancel each other out.

Calculation of separate water and energy indices would be relatively straightforward. However, the unavoidable impact of both is substantially lower than any index currently included in the MFF. Therefore, in our view no adjustment should be made in the MFF. Including any new index in the MFF leads to a certain amount of additional complexity. In this case the associated improvement in funding would be minimal.

Our recommendation not to include utility costs in the MFF is driven by our view that the cost items are not sufficiently material. However, if a lower threshold for materiality was applied, utilities costs could potentially be included.

B.1.7 Complexity of casemix

This section describes our approach to applying the framework to casemix complexity

RECOMMENDATION

We recommend that no adjustment is made for casemix via the MFF.

Criterion 1: Are costs resulting from variation in casemix complexity unavoidably higher for some providers?

Yes, providers who see more complex cases on average will have higher costs per patient than providers who offer largely routine procedures. Large teaching hospitals will necessarily see more complex cases than smaller regional hospitals. This variation in casemix will in turn lead to unavoidable per patient cost differences which could manifest itself via longer length of stay for example. Providers in certain rural areas may serve a relatively elderly population which will also have implications for average cost per patient.

Criterion 2: Is MFF the best way to adjust for the casemix complexity costs?

No, the current system reflects casemix variation in the classification of healthcare episodes and/or spells. The number of Healthcare Resource Groups (HRGs) that a trust provides will determine their payment-by-results income. These HRGs are standard groupings of clinically similar treatments which use common levels of healthcare resource.[163] The National Casemix Office designs and develops the HRG system (NCO, 2015).

The latest HRG design[164] includes complexity and complication splits to better reflect variations in severity. The expanded list of HRG codes explicitly account

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[163] http://content.digital.nhs.uk/hrg
[164] http://content.digital.nhs.uk/media/11823/HRG4Companion-v11/pdf/HRG4_Companion_v1.1.pdf

for complications and co-morbidities. In our view these splits, rather than the MFF, should address unavoidable costs related to patient age for example.[165]

Using the MFF to compensate providers for the complexity of their cases would involve estimating future casemix based on the past and therefore include a certain degree of measurement error, whereas realised activity is the basis for HRG splits.

It is unrealistic to expect that any system could completely eliminate all cost variation associated with casemix complexity. Analysis of Patient Level Information and Costing Systems (PLICS) data has uncovered cost variation within certain HRGs (Blunt & Bardsley, 2012). However, this suggests that HRG groups may need further refinement rather than making alterations to the MFF.

In addition to HRG codes, certain specialist providers who will deal with the most complex cases in their field also receive additional top-ups.[166]

B.1.8 Rurality/remoteness

This section describes our approach to applying the framework to remoteness.

RECOMMENDATION

We recommend that no adjustment is made for remoteness via the MFF.

Criterion 1: Are costs resulting from remoteness unavoidably higher for some providers?

Yes, certain remote sites do experience unavoidably higher costs due to remoteness.

NHS England work (2014) for the Advisory Committee on Resource Allocation (ACRA) concluded that rurality is not a defining characteristic leading to unavoidably higher costs. Rural areas will not always have low population densities, and some rural areas may be close to major towns and have good transport links. NHS England concluded that in theory sparsely populated or remote areas potentially have higher costs due to an inability to capture economies of scale.

However, NHS England analysis found no evidence of higher trust level costs due to remoteness. NHS England based this analysis on national data sets such as reference costs, programme budgeting data and the Department for Transport's travel times data.

Further NHS England analysis explored "site-level" implications of remoteness rather than using the "trusts" as the unit of analysis. NHS England identified nine sites[167] that were unavoidably small due to remoteness (Smyth & Chaplin,

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[165]   Elderly people will on average also require care more frequently. Providers will also be compensated for this via a higher volume of activity.

[166]   https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/477498/Top-up_payments_for_specialised_services_finalwithcover.pdf

[167]   The analysis focuses on acute providers with a Type 1 A&E centre. NHS England envisages considering the impact of remoteness on other providers in the next allocation round.

2015).[168] A follow-on report also presented to ACRA found that remote sites have a higher unit cost due to operating at lower scale (Allocations Project Team, 2016). However, remote sites do not have other additional unavoidable costs unrelated to scale.

Criterion 2: Is MFF the best way to adjust for remoteness costs?

No, in our view these costs are best dealt with elsewhere. As a result of NHS England's findings the most recent CCG allocation formula already includes adjustments for higher costs of running unavoidably small acute hospitals within remote areas. The total adjustment amounts to £31 million and covers six CCGs (NHS England, 2016).

This CCG-level adjustment needs to be passed on to the specific sites affected. It is not clear currently how this will happen in practice. One option is for the affected providers to come to a localised agreement with their commissioner. These sorts of agreements may have already been in place prior to additional allocation.

In our view, the MFF is not a suitable mechanism to compensate for unavoidable remoteness costs. This is an issue currently affecting a relatively small number of trusts.[169] In addition, the NHS England analysis produced monetary estimates of remoteness costs. It would be more logical to compensate providers using corresponding lump sum amounts[170] rather than tying compensation to the level of activity undertaken.

To adequately deal with this issue, it may be necessary to mirror the CCG allocations in provider income or possibly consider introducing a new mechanism whereby NHS England can transfer the funding directly to the sites affected.

It would be possible to include an adjustment for remoteness in the MFF. However, in our view, given the relatively small number of sites affected, it is best dealt with elsewhere. If other local mechanisms prove to be ineffective in dealing with this issue it may warrant further consideration for potential inclusion in MFF. In addition, if new evidence indicates that a larger number of trusts are affected by this issue than is currently the case, MFF may seem to be a more appropriate compensation mechanism.

B.1.9 Travel time

This section describes our approach to applying the framework to travel time.

RECOMMENDATION

We recommend that no adjustment is made for travel time variation via the MFF.

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[168] The sites were classified based on their size (based on the catchment for the hospital) and remoteness (based on the proportion of patients served who were more than 60 minutes from their second closest provider). Eight sites were identified using a catchment threshold of 200,000 people; this rose to nine sites if 300,000 was used.

[169] This may increase if NHS England extends its analysis beyond acute providers.

[170] As is currently done at the commissioner level.

Criterion 1: Are costs resulting from variation in travel time unavoidably higher for certain providers?

Yes, even allowing for variation in scheduling efficiency, travel times are likely to be longer in certain areas. This could be due to sparse population or congestion associated with major conurbations. Travel times will only be relevant for certain services such as district nursing where providers' staff travel for home visits. Those providers that are affected will be unable to control the travel time in their area. There could also be some additional costs as a result of staff travelling between sites.

NHS England analysis for the Department of Health uses a travelling salesman approach to model the mean travel time per visit for each local authority in England (DH, 2015). Their findings suggest that for children's public health services there is a 4%[171] increase in cost for the local authority with the 10th highest mean travel time versus the local authority with the 10th lowest driven by differences in travel times.[172] The size of this effect is sensitive to the assumptions made regarding average caseload and the length of visits.

Criterion 2: Is MFF the best way to adjust for travel time variation?

No, the costs stemming from variations in travel time will only materially affect certain providers. Travel times will not be a material consideration for acute trusts due to the nature of the services they provide. For the majority of acute services provided, the patients rather than the providers will incur the travel costs. Therefore, the overall impact of variation in travel costs is likely to be small for most providers. There may be a small number of providers (most likely non-acute providers operating in rural areas and ambulance trusts) who are seriously affected.

For ambulance trusts in particular there is already a mechanism in place which accounts for variation in travel times. Specifically the emergency ambulance cost adjustment (EACA) adjusts CCG allocations to account for unavoidable differences in the costs of providing ambulance services across the country, particularly in areas that are sparsely populated due to longer distances to incidents and conveying patients to hospitals (NHS England, 2016). There is however, no automatic corresponding adjustment to the prices paid to providers.

No such adjustment exists for community or mental health trusts. In our view this adjustment does not fit within MFF. This is because, firstly, only a relatively small number of providers will be affected – specifically community or mental health providers located in very rural areas. Including an additional MFF sub-index would lead to additional complexity for every provider but would not affect the funding received by the vast majority of trusts. Secondly, given that a separate travel time adjustment already exists, it seems logical in our view to extend that mechanism to consider other types of providers (as opposed to just ambulance

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[171] This is based on assumptions regarding the length of home visits and the portion of all visits that take place in the home.

[172] The local authorities with the lowest average travel times were London boroughs while the local authorities with the highest travel times were very rural.

trusts) rather than altering the MFF. However, further work may be needed to ensure the additional allocations are passed onto providers.

There may be a more compelling case for including an adjustment for travel times in the MFF in the future. This could happen if, for example, it becomes apparent that extending the current travel time adjustment to other types of trust is not feasible, or providers are not benefitting from the additional commissioner allocations that result from the travel times' adjustment.

B.1.10 Fragile local health economy

This section describes our approach to applying the framework to the issue of fragile local health economies

RECOMMENDATION

We recommend that no adjustment is made for the fragility of a provider's local health economy via the MFF.

Criterion 1: Are costs resulting from fragility of the local health economy unavoidably higher for certain providers?

Yes, characteristics of a given local health economy are likely to impact on specific providers' efficiency. Secondary providers may be able to exert some influence on other aspects of their local health and social care system. However, there is also likely to be a considerable unavoidable element in most cases. Therefore, from their point of view the resulting costs may be at least partially unavoidable.

One manifestation of a fragile local health economy could be ineffective social care. There is evidence that the quality and extent of social care varies around the country (Humphries et al., 2016). Research by The King's Fund (2015) has found that the proportion of delayed transfers of care attributable to social care has risen recently from 26% at the end of 2014/15 to 31% in the third quarter of 2015/16. This reflects pressures faced by local councils which have seen significant cuts to their budgets in recent years (Humphries et al., 2016).

These delayed transfers of care could lead to opportunity costs and reduced productivity for acute providers who are unable to take on additional elective work due to bed-blocking.

It is important to note that while secondary providers do not have control over other aspects of their local health economy, the development of Sustainability and Transformation Plans[173] should help to mitigate some of these coordination problems. These locally designed plans should give areas the best chance of providing high quality care.

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[173] https://www.england.nhs.uk/stps/about-stps/

Criterion 2: Is MFF the best way to adjust for a fragile local health economy?

No, it is our view that including a fragile health economy adjustment within the MFF would not be appropriate as other measures are in place. If individual providers can evidence a significant unresolved issue they may need additional consideration on a case-by-case basis.

Clearly, the best solution to address a struggling aspect of a health and social care system is to tackle the ineffective or absent service directly. Indirectly compensating secondary providers via the MFF is likely to be inaccurate and unresponsive, as these issues are hard to measure and will not be stable over time.

Other parts of the current system do address these issues. Legislation has been in place to reduce delayed transfers since the Community Care Act 2003 (Bate, 2015). Under the act, if a patient's discharge to social care is delayed the relevant NHS body can claim reimbursement (Bate, 2015).

In addition, the Better Care Fund (BCF) supports the transformation and integration of health and social care services. The BCF is a pooled budget which intended to shift resources into social care and community services for the benefit of the NHS and local government (Bate, 2015).

B.1.11 CNST payments

This section describes our approach to applying the framework to CNST payments.

RECOMMENDATION

We recommend that no adjustment is made for CNST payments via the MFF.

Criterion 1: Are CNST payments unavoidably higher for certain providers?

Yes, some providers will have unavoidably higher CNST payments than others. The CNST is a pay-as-you-go scheme which provides indemnity for clinical negligence claims against members.[174] Every trust is a member of the scheme. The total amount collected in 2014/15 was £1,050 million. Members' contributions are based on three elements:

- A risk-based contribution based on size and activity;
- Past claims experience over five years; and
- Outstanding claims.

The current management of a provider will not have control over past claims but will be able to reduce future contributions by improving the quality of services that they provide.

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[174] http://www.nhsla.com/AboutUs/Documents/Finance%20Q%20and%20A.pdf

In addition, certain services are more likely to result in costly claims than others. For example the King's Fund cited evidence collected by NHS Litigation Authority which estimated that 60% of all payments made related to obstetric cases (O'Neill, 2008). This implies that providers who offer these services will have to pay more on average.

Criterion 2: Is MFF the best way to adjust for CNST payments?

No, in our view the MFF is not a suitable place to adjust for variation in CNST payments. There are already mechanisms in place which account for the fact that certain services are more likely than others to result in claims, any further adjustment would risk interfering with the incentives providers have to minimise claims.

Specifically, Monitor adjusted certain HRG sub-chapters to reflect the anticipated increase of 17% in contributions to the CNST scheme in the coming year.[175] This uplift impacts different prices differently but is equivalent to a 0.7% uplift on national prices.

B.1.12 Training costs

This section describes our approach to applying the framework to training costs.

RECOMMENDATION

We recommend that no adjustment is made for training costs via the MFF.

Criterion 1: Are training costs unavoidably higher for some providers?

Yes, in our view some providers will have unavoidably higher training costs than others. All secondary providers will undertake some teaching/training. This will vary from provider to provider. Providers who deliver larger volumes of training and education will face higher costs as a result. These costs will be both direct, for example contribution to postgraduate trainees' salary costs, and indirect, for example experienced staff taking longer to complete their tasks as they are demonstrating what they are doing to trainees.

Criterion 2: Is MFF the best way to adjust for training costs?

No, the DH introduced transitional tariffs[176] for non-medical placements and undergraduate medical placements in secondary care in 2013. A similar tariff for postgraduate/medical trainees came into effect in 2014 (DH, 2016). The 2016/17

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[175] https://www.gov.uk/government/publications/201617-national-tariff-payment-system-draft-prices/national-tariff-draft-prices-for-201617

[176] This is outside of the general tariff system.

tariff guidance includes specific payments for each type of placement.[177] These payments are then multiplied by MFF as with other tariffs.[178]

These payments support the redistribution of the existing funding budget made available by Health Education England for the payment of training placements. The introduction of these payments in 2013/14 replaced local arrangements which were potentially creating inequities (DH, 2016 A).The guidance explicitly acknowledges that some flexibility is needed and placement payments may need to be adjusted in exceptional circumstances via local arrangements.

Due to this compensation, providers exclude training and education expenditure from the reference costs collection process (DH, 2016 B). However, in practice it is the income that is removed from reference costs as it is assumed that income received for education and training is equivalent to the costs incurred for those services.

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[177] Non-medical, undergraduate medical and postgraduate medical.

[178] It may be more accurate to adjust these national tariffs using only the staff component of the MFF. This will be more closely linked to the costs of delivering training than the overall index.

ANNEX C   QUALITY ASSURANCE

A range of quality assurance (QA) processes were used in this project, to provide confidence in the analysis and all conclusions.

Frontier Economics assured quality within the project through:

- **Immediate QA and error-checking**: In all our analytical work, we build in immediate QA and error-checking to ensure the analysis is as robust as possible.

- **Project manager review**: All outputs are reviewed by the project manager for quality control and assurance. As well as providing an additional sense-check, this ensures consistency across all outputs.

- **Project director oversight**: The project director takes overall responsibility for QA on the project. This includes review of key outputs and stakeholder engagement to test emerging findings.

Working closely with NHS Improvement and NHS England, QA was also provided through:

- **Project team workshops and content review**: A series of (5) detailed, analytical workshops (each 3-5 hours) were held with the core project team, including representatives from NHS England and NHS Improvement. In addition, regular content discussions were held with the same group.

- **Replication of analysis**: NHS Improvement and NHS England analysts have been guided through all the major analytical work undertaken by Frontier to ensure reliability of all the key calculations proposed. This has confirmed that the methodologies proposed are appropriate and practicable.

- **Steering Group**: A group of senior colleagues from NHS Improvement and NHS England was convened to review all the key outputs of the project, including definitions, framework for analysis, analytical findings, conclusions and recommendations.

In addition, independent academic QA was sought. Professor Richard Disney[179] reviewed all key outputs, and provided numerous helpful insights and suggestions. In total, Professor Disney attended five face-to-face meetings with the project team – one at project inception, three during key phases of the work and one to discuss the draft report. In addition to his attendance at meetings and guidance provided during these, Professor Disney reviewed all our outputs and provided feedback in writing.

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[179]   http://www.sussex.ac.uk/profiles/50779