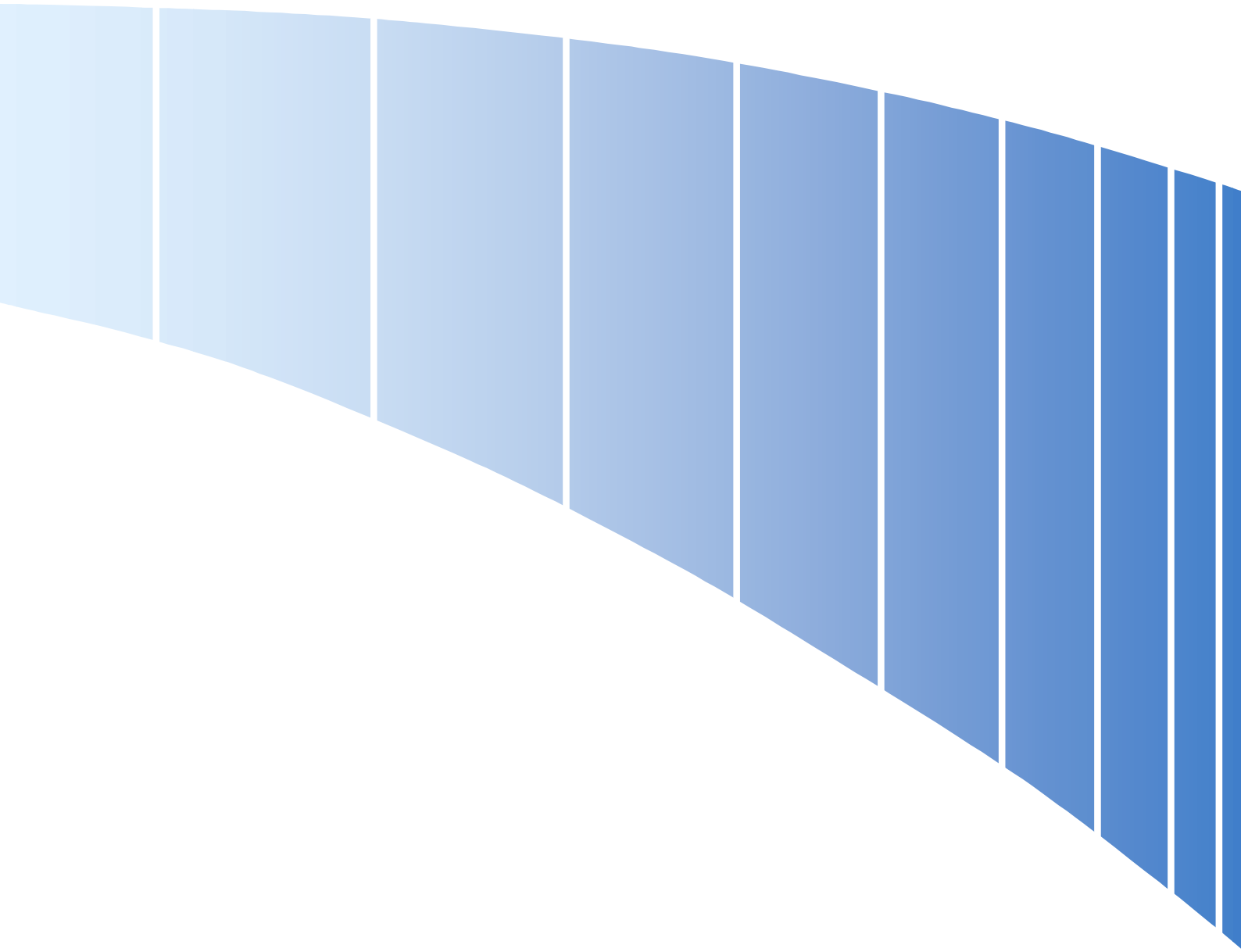
Payment by Results

PbR and the Market Forces Factor (MFF) in 2013-14



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Quick Guide – a brief introduction to the MFF and its use in PbR

1. The purpose of the Market Forces Factor (MFF) is to estimate the unavoidable cost differences[1] of providing healthcare. Within PbR, the MFF directly funds providers for the relative level of unavoidable costs they face. Accounting for unavoidable costs ensures a level basis across the country to provide equal amounts of healthcare per pound.

2. The MFF was initially used in allocating resources to commissioners through the weighted capitation formula. With the introduction of PbR, the MFF also took on the role of reimbursing providers directly for the differences in unavoidable costs they face. In both cases, the MFF is used to adjust funding flows; in higher cost areas, commissioners receive higher levels of funding through the allocation formula so that they are able to meet the higher costs of providers for the same level of healthcare.

3. Each NHS organisation receives an individual MFF value used to establish the level of unavoidable costs they face relative to each other organisation. The relativities between organisations are determined using an index and all organisations are ranked within the index.

4. There are two versions of the MFF index:
   (a) the underlying index is used in the weighted capitation formula.
   (b) the index used in PbR is known as the payment index.

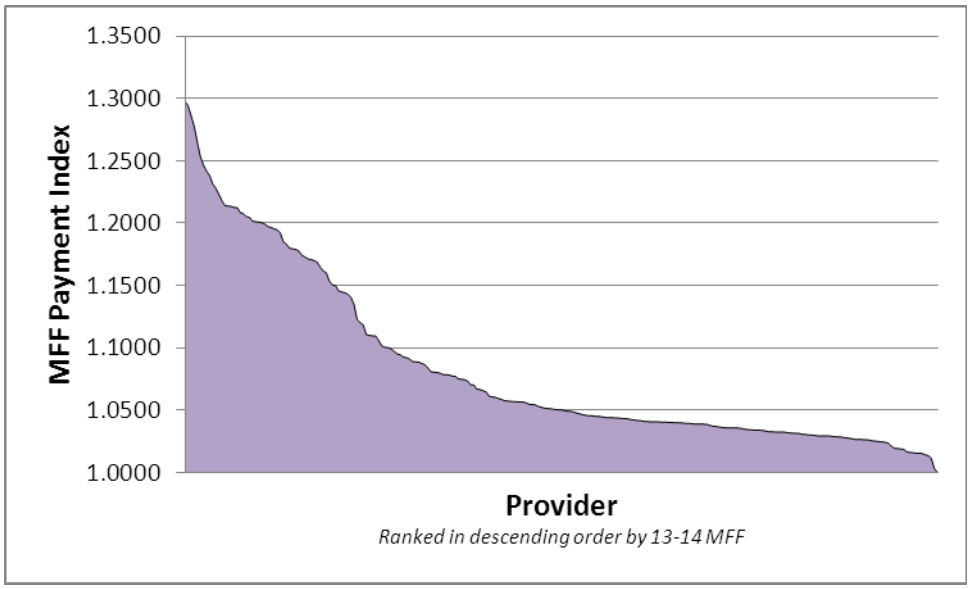
5. In the payment index, the provider facing the lowest level of unavoidable costs – Cornwall Partnership NHS Foundation Trust – has the lowest value. The payment index is set so that the lowest value is 1.0 to ensure that all providers receive non-negative MFF payments.

6. Unless otherwise stated, the index referred to in this document is the payment index.

7. In 2013-14 the MFF index has a range from 1.0 to 1.2976. The range is illustrated in Figure 1 on the next page. The lowest value on the chart of 1.00 is Cornwall Partnership NHS Foundation Trust, and the highest value of 1.2976 belongs to University College London Hospitals NHS Foundation Trust.

[1] 'Unavoidable costs' is the term used to refer to the costs that providers are unable to significantly influence. The level of these costs varies across the country. Land, buildings and staff costs all include unavoidable elements. Please see section on unavoidable costs for more detail.

Figure 1: Range of MFF payment values in 2013-14



8. To use the MFF as a mechanism to reimburse providers, the value for each organisation is multiplied by the tariff price for each unit of activity. As such, the PbR income for each provider can be calculated as follows:

   PbR income = (activity * tariff price) * MFF value

9. As an example, Trust A has an MFF value of 1.20 and undertakes 100 units of activity with a tariff price of £500 per unit. For this activity Trust A receives a total PbR income of £60,000, £10,000 of which is for MFF payments, intended to compensate for the additional unavoidable costs they face compared to Cornwall Partnership NHS Foundation Trust.

   (100 * 500) * 1.20 = £50,000 * 1.20 = £60,000

10. The provider facing the lowest level of unavoidable costs has an index value of one because they require no additional funding through the MFF; the MFF recognises unavoidable cost differences.

11. The MFF accounts for variation in unavoidable costs in several elements of provider running costs. The elements are:
    (a) non-medical staff,
    (b) medical & dental staff,
    (c) land, and
    (d) buildings.

12. The level of cost differences within each element are calculated independently. They are then combined to create an overall index for each organisation.

Background

13. The Market Forces Factor (MFF) was initially used in allocating resources for commissioners to use in commissioning healthcare services for their population. Inclusion of the MFF is intended to ensure commissioners can afford the same level of care for their population, where healthcare costs differ between geographical areas. Accounting for the MFF means that commissioners receive different levels of funding not only dependent on the size and needs of their population but also the varying costs of services in different areas. Commissioners in higher cost areas receive additional funding to ensure they can afford the same level of services relative to need as those in other areas.

14. Commissioners pay a fixed national price for activity within the scope of the national tariff. The price for each unit of activity is intended to cover the cost of service provision. To calculate appropriate prices, the tariff is based on national average costs reported by every NHS trust. However, some elements of costs vary by locality; such variation means that a national price based on national average costs does not fairly reflect the costs of providers in all locations.

15. The costs that vary by location are those subject to high competition, notably from outside the NHS; land is an example. Other costs do not vary by locality; all organisations face the same unit price for costs such as equipment and consumables.

16. Trusts in areas with higher unavoidable costs require greater compensation to undertake activity comparable with a provider operating in a lower cost area. As such, commissioners from higher cost providers need more funding to afford services of equivalent quality and quantity. The approach used to target funding to higher cost areas is the MFF.

17. The Advisory Committee on Resource Allocation (ACRA) oversees the development of the allocation formula, including the MFF element. The application of the MFF to PbR is explicitly considered in any developments.

Unavoidable costs

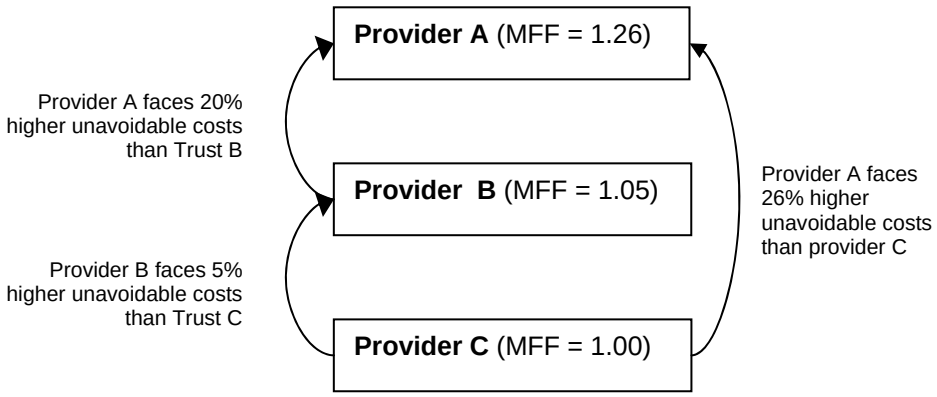
18. ‘Unavoidable costs’ is the term used to refer to the costs that providers are unable to significantly influence. The level of these costs varies across the country. Land, buildings and staff costs all include unavoidable elements.

19. Consider that hospitals are required in certain locations to serve given local populations. Trusts can choose their location within this defined area but are confined within a specific region; they must face the costs associated with this location. For example, hospitals that must be located in central London will face higher unavoidable costs than hospitals located in outer London.

20. The differences in unavoidable costs that hospitals face need to be reflected in funding. A trust facing unavoidable costs 20% greater than a provider located elsewhere should receive 20% additional funding. The MFF is used to determine the differences in unavoidable costs between organisations such that each can be fairly reimbursed.

21. The MFF compares the unavoidable costs between organisations and ranks them according to the relative level of unavoidable costs they face. This is demonstrated diagrammatically in figure 2. Trust C is the lowest cost provider, trust B faces unavoidable costs 5% greater than C and trust A faces costs 26% higher than C. The MFF payment index used in PbR uses values to enable comparison between each provider relative to the lowest cost provider.

Figure 2: Comparison of relative trust MFF values



22. As figure 3 illustrates, given the relativities between trusts A and C, and B and C, the cost variation between providers A and B can be determined: provider A faces unavoidable costs 20% higher than B.

    Difference in unavoidable costs = [(1.26-1.05)/1.05] * 100 = 20%

Application of the MFF within PbR

23. There are two versions of the MFF index:
    (a) underlying index, and
    (b) payment index.

24. Both of these indices are based on the same set of data. To use this data for different purposes it is transformed into different indices. An index is a series of values all relative to the same base value. By having a different base, the index can be used in different ways.

Underlying Index

25. The underlying index is the version first calculated, and used to inform CCG allocations. The underlying version is set so that the base to which all values in the index are relative is the average value. The underlying index has an *average* value of 1.0. Organisations facing higher (lower) unavoidable costs than the average organisation have a value greater (less) than 1.0.

26. The underlying index is also used in the calculation of the Reference Cost Index (RCI). See Annex D for further details and a worked example.

Payment Index

27. The payment index is the version used for the national tariff. This version of the index is set so that the base to which all values are relative is the *minimum* rather than the *average*. The payment index has a minimum value of 1.0. The organisation with the value of 1.0 faces the lowest unavoidable costs. Organisations with a value greater than 1.0 face higher costs than the minimum organisation. For example, an organisation with an index value of 1.02 is estimated to face unavoidable costs 2% greater than the lowest cost provider.

28. The reason for creating an index with a base that is a minimum of 1.0 is to facilitate the PbR funding policy of a single national price. To achieve this, all providers must receive this price and then be compensated separately for the unavoidable costs they face. If the MFF index used in PbR was the underlying version then the tariff price would include the level of unavoidable costs in the middle of the range of all providers. Providers with lower unavoidable costs would be paid less than the tariff price after the application of the MFF.

29. As suggested above, use of the payment index separates avoidable and unavoidable costs. The tariff reimburses the costs that all providers incur and the MFF separately compensates those facing more than the minimum level of unavoidable costs.

30. In practice the payment index is created by transforming the underlying index rather than going back to the base data. The payment index is created by dividing each value in the underlying index by the minimum value. This creates an index with a base of 1.0.

31. Transforming the index means that a single provider has a different value in the underlying and payment index. Despite this, the relativities between providers are the same. For example, consider two trusts A and B. If trust A is estimated to face unavoidable costs 15% higher than trust B then the MFF value of trust A will be 15% higher than that for trust B irrespective of which index is used (see Annex G for a more detailed explanation).

32. To apply the MFF for reimbursement, tariff prices have to be adjusted to account for variation in unavoidable costs. The stages in applying the MFF for PbR are outlined below.

Tariff calculation

33. The MFF is used in the calculation of the national tariff. For each HRG and admission type, the tariff is based on the national average cost of the service. Before determining the national average, each provider's unit costs are divided by their corresponding payment MFF value. This is done for two reasons.

34. Firstly, it removes any bias of providing activity in higher cost areas. For example, suppose 80% of activity of an HRG is provided in a high cost area such as London and the remaining 20% is provided in a relatively low cost area such as Cornwall. Without the removal of the MFF, the tariff price would be biased upwards because of the London activity.

35. Secondly, dividing through by the MFF means that there is one national price (tariff) for services. Providers are compensated separately for the unavoidable costs they incur in providing activity. See the next sub-section for more detail.

36. A worked example of the application of the MFF in tariff calculation is included in Annex C.

MFF for payment

37. As stated above, the tariff price of an HRG is based on the national average of costs reported by hospitals having adjusted for unavoidable cost differences above the minimum. To compensate providers for their unavoidable cost pressures, the MFF is applied as a proportion of the tariff price paid in addition to the tariff on each unit of activity.

38. The tariff price includes the lowest possible level of unavoidable costs that an NHS organisation faces. The lowest cost provider receives no additional funding for their activity. All other providers receive an

additional proportion of the tariff price as compensation for their unavoidable costs.

39. The MFF is applied to a trust for a single HRG as follows:

    Total income = (Activity * Tariff price) * MFF value

40. Example: 100 units of activity for HRG A are undertaken by Trust X. The tariff price of HRG A is £500, the trust has an MFF value of 1.20

    Total income = 100 * £500 * 1.20 = £60,000

    i.e. Trust X receives an extra £10,000 as a result of higher unavoidable costs than the lowest cost provider.

Components of the MFF

41. The components of running costs considered to vary across the country are compensated for using the MFF. The relative differences for each component cost are captured in separate indices. Each component cost index is then aggregated into an overall MFF index to create the underlying index. The components are described below. See Annex A for an overview of the composition of the MFF.

Staff index

42. The staff index applies to all non-medical NHS staff. Unavoidable variation in staff costs arise because national pay scales implemented by the NHS (including regional pay allowances) do not fully reflect the variation in employment costs evident in the broader labour market. If wages do not reflect the going rate for an area then this can lead to indirect costs such as greater use of agency staff and higher vacancy and turnover rates. It can also lead to differences in staff productivity.

43. The staff index is based on variation in wages in the private sector; Annex B provides further information of the reasoning behind this approach. The data source for the index is the Annual Survey of Hours and Earnings (ASHE) produced by the Office for National Statistics. For 2011-12 onwards, updated and more robust earnings data has been used (from the years 2007-2009).[2]

44. The staff index is based on the pattern of wages calculated within defined geographical ares (currently the previous PCT boundaries) and is intended to reflect local labour market conditions. As trusts do not only employ staff from the geographical area in which their sites are located,

[2] For further information please see the HERU report, 'The Staff Market Forces Factor Component of the Resource Allocation Weighted Capitation Formula: New estimates': http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_122621.pdf

the first stage is to smooth[3] the variation in wage levels between areas to take into account the different labour market conditions in the areas. A second stage of smoothing, called interpolation[4], undertaken at trust site level is used to take into account the precise location of trusts' sites within an area, and thus their distance from other areas. Annex B outlines the smoothing and interpolation techniques.

45. Interpolation is not used in the calculation of MFF values for Community Trusts. As these trusts have taken over the services previously provided by PCTs, activity will be spread across the catchment area of the trust, and so it would not be appropriate to attribute all of the unavoidable cost differences to the location of the Head Quarters of the Community Trust. Instead, for newly created Community Trusts (i.e. those that have not merged with acute trusts) the staff MFF is calculated to reflect the full catchment area of the trust, based on the previous PCTs' MFFs.

46. The values of the underlying staff index range between 0.8746 and 1.2340.

Medical & Dental (M&D) London Weighting

47. Analysis determined that medical staff costs do not vary in the same way as those of other staff groups[5] . Medical staff costs are however significantly higher in London than the rest of the country; the M&D London weighting is required to compensate for this difference.

48. The M&D London weighting is applied to trusts in London and is calculated as the ratio of the average paybill per head for hospital doctors in 2008-09 nationally to the average paybill per head excluding London. This ratio is 1.0224, and trusts within what was London SHA receive this value, all other trusts receive an M&D value of 1.0.

Buildings index

49. The cost of buildings includes an unavoidable element because, as an asset, buildings have different worth in different parts of the country. In an area where a building is worth more, the trust will pay more in capital charges on this asset relative to a trust located in a lower cost area.

50. The buildings index remains based on PCT geography. The Building Cost Information Service (BCIS) analysed tender prices for public and private contracts between January 2007 and June 2010 to derive

[3] smoothing is a form of weighted averages
[4] Interpolation is a technique using two or more values to create an intermediate value
[5] Both RARP 31 and 32 draw this conclusion. RARP 31: Review of Specific Cost Approach to Market Forces Factor; RARP 32 Review of the Market Forces Factor following the introduction of Payment by Results (2005): Exploring the General Labour Market Method: http://www.dh.gov.uk/en/Managingyourorganisation/Financeandplanning/Allocations/DH_4108515

location factors. Average location factors for the period are provided for each PCT area. Each trust's buildings value is determined by the PCT area in which they are located. To create the buildings index, the location factors were divided by the mean value, weighted by population. A trust site's buildings index is determined by the PCT area where it is located. An average of the site indices weighted by available bed numbers is used to provide the trust buildings index. For Community Trusts, population rather than bed numbers is used as the basis for averaging across PCT areas.

51. The values of the buildings index range between 0.89 and 1.28.

Land index

52. Land costs include unavoidable costs for two reasons:
    (a) it cost trusts more to acquire land in certain areas of the country relative to others, and
    (b) the capital charges paid on this land will also be higher.

53. The land index, unlike the other indices, is specific to each individual trust. The only exception is Community Trusts, which were formed to take over the provider functions of PCTs. Their land index value is based on the previous PCT index values.

54. A land index based on land value per hectare is calculated for each NHS Trust, using net book value of land at 31 March 2009 as reported in the audited summarisation schedules 2008-09. The land areas for each individual trust were aggregated from the site level data available in the 2008-09 Estates Return Information Collection (ERIC).

55. Whilst it would be possible to use average land values for pre-defined geographic areas, two drawbacks of this approach make the chosen method appropriate. Firstly, land prices are subject to variation within small geographic areas and secondly, trusts have to pay capital charges relating specifically to the land value for the trust.

56. The land index has the biggest range; the lowest value is 0.016, the maximum is 19.550, representing a 1200-fold difference. Given the gap between the lowest and highest values, the land index for providers with high values has a significant impact on their overall MFF value. This is in spite of the small proportion of costs that land accounts for (see creating the MFF section). The land component can often explain differences between index values of organisations.

57. London Trusts that have a significant non-London site have a land index for each site weighted together in proportion to the 2004 VOA value and the share of available beds at each site. The use of available beds recognises that land is typically used more intensively in central London compared to less urban areas.

Other

58. The category of “other” costs is included as an additional factor in the final MFF value. The costs included in this element are all those that are not considered to vary by location. As these costs do not vary by provider, all organisations receive a value of 1 in relation to these costs.

59. It is necessary for non-varying costs to be represented in the overall value as the MFF is applied to the full scope of costs, not just those with elements that vary by area. The MFF is a percentage of the tariff price. As the tariff is based on total running costs per unit of activity the MFF must therefore reflect all components of costs that drive the price.

Changes to the MFF 2013-14

60. There have been no changes to the source data for the MFF for 2013-14, the 2012-13 MFF has been rolled forward.

61. PCTs ceased providing services in 2012-13, and will cease their commissioning functions in 2013-14. For the purposes of PbR, the provider functions of PCTs have transferred to new or existing trusts and MFF values have been affected as follows:
    - Where the provider functions of PCTs have been transferred into new Trusts, the relevant previous PCT MFF values have been used to calculate an appropriate MFF value.
    - Where other acute trusts have taken over PCT provider functions, the MFF value of the acute Trust remains unchanged.

Creating the MFF

62. The overall MFF value for each organisation is a combination of the components outlined above. The elements are combined according to the proportion of total running costs that they account for. This value is determined based on national proportions of expenditure on each component of the MFF reported in NHS accounts. The proportion attributable to each element of the MFF is outlined below:

    - Staff 54.9%
    - M&D London Weighting 13.9%
    - Buildings 2.7%
    - Land 0.4%
    - Other 28.1%

63. To create an overall MFF value for an organisation, the index value for each element of the MFF is multiplied by its proportion of total running costs. This approach applies a weight to each element of the MFF equal to its weight within total costs. The weighted index values are then

summed together to give an overall figure for the organisation[6]. See Annex C for a worked example of the calculation for a trust with multiple sites.

Deriving an MFF value for newly merged trusts

64. Organisations that merge will have a new MFF value calculated in line with the MFF methodology. For organisations merging at the beginning of the financial year this new MFF will apply from the date of the merger. For organisations merging in the middle of the financial year, the new MFF will apply from the beginning of the following financial year (see PbR Guidance for full policy).

65. The methodology means that each site of a merging trust will be treated not as a proportion of the trust to which it previously belonged but as a proportion of the merged organisation as a whole. This is necessary as the staff and buildings components of the MFF are defined at site level. The site index values are combined according to their activity levels, proxied by bed numbers as per the calculation of multiple site organisations (see Annex C for worked example).

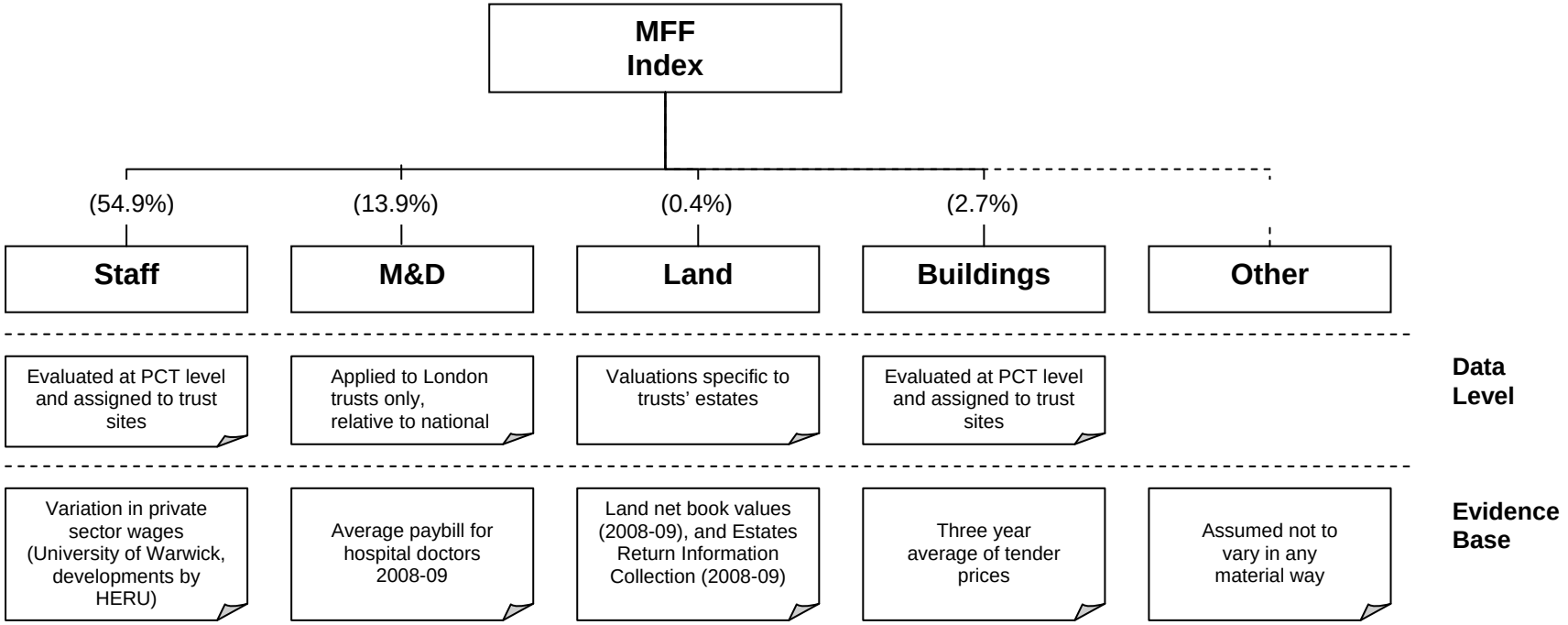
66. In some instances, it may be necessary to make further adjustments to the calculation of the merged land index value. Where merging trusts have very different land index values and also vary significantly in the intensity of land use, the individual land index values will be combined according to trust activity levels (proxied by bed numbers). This is in line with the method used for the staff and buildings components of the MFF and acts as an extension of the adjustments already in place to recognise the differing land use intensities for London trusts with significant sites out of London.

Capping policy

67. A capping policy was introduced in 2009-10 to reduce volatilities in overall PbR income resulting from any changes in the MFF values. It meant that given changes to the tariff, provider's overall income should not change by more than +/-2% as a result of using the updated MFF as opposed to using the previous years MFF. In 2013-14 all organisations will have moved to their target MFF values and are no longer subject to the capping policy. The 2013-14 tariff information spreadsheet includes details of the past capped payment values for each trust.

[6] The impact of a single overall MFF value on an organisations' income is equal to the impact of applying the index value for each element separately to the proportion of costs it represents.

Annex A – Composition of MFF



1. The index values of each of the four component indices (staff, M&D, land and buildings) are multiplied by the corresponding expenditure weight to give the overall MFF value. A worked example is included in Annex C.

Annex B - The Staff Index

1. This annex outlines:
   (a) Rationale for basing the staff index on private sector rather than NHS wages,
   (b) The application of smoothing and interpolation, and
   (c) Rationale for the introduction of the Medical & dental London weighting

Underlying data for the staff index

1. The staff element of the MFF is the largest component. Although the staff index is intended to reflect non-medical NHS staff cost variations, it is based on private sector rather than NHS wages. The rationale for this approach generates many queries.

2. The aim of the MFF is to compensate for unavoidable cost differences between providers in the delivery of services. For staff expenditure, variation can occur directly or indirectly; direct costs are the salaries paid to staff, indirect costs include expenditure incurred through labour turnover, agency staff costs, vacancies and reduced productivity.

3. High indirect costs of employment can arise for NHS providers where the wage rate they offer is below the prevailing wage rate of the area from which they draw their staff. Organisations offering relatively low wages are likely to experience higher vacancy and turnover rates relative to other employers. Lower wages are also associated with lower staff productivity. Research commissioned by DH[7] found evidence of these outcomes in a study into the variation in wages across NHS organisations.

4. Geographical variation in staff costs can be determined in two ways: using NHS employment costs, or private sector wages as is the convention for the MFF. A brief overview of each approach is set out below.

<u>Basing the MFF on NHS staff costs</u>

5. Whilst it would be possible to base the staff index on actual NHS costs, several problems with the approach make its use inappropriate. Research commissioned[8] by DH confirmed the arguments against the use of this method:

[7] RARP 32: Review of the Market Forces Factor following the introduction of Payment by Results (2005): Exploring the General Labour Market method http://www.dh.gov.uk/en/Managingyourorganisation/Financeandplanning/Allocations/DH_4108515

[8] RARP 31: Review of the Specific Cost Approach to Market Forces Factor http://www.dh.gov.uk/en/Managingyourorganisation/Financeandplanning/Allocations/DH_4108515

6. **Lack of national data availability**: Although it is straightforward to obtain information about high level direct employment costs within the NHS, there is currently limited availability of consistent detailed data on employment costs.

7. **Distinguishing between avoidable and unavoidable costs**: Where organisations incur greater than average costs it is almost impossible to distinguish between avoidable and unavoidable components of expenditure. For example, by dividing the MFF range into quintiles of trusts, and controlling for trust type and location, there is 35% variation in the number of nurses needed for the same output between quintile 1 and 5. It is unclear whether the reasons for this variation are caused by drivers of avoidable or unavoidable costs.

8. **Possibility of perverse incentives**: Using actual NHS costs, any relative changes in NHS staff costs would feed directly into the MFF calculation; any trust with higher relative costs would then receive a greater staff index value when the MFF is re-calculated. This issue creates an incentive for trusts to raise their indirect staff costs which would increase the staff component of their MFF (assuming that not all trusts did this thereby leaving relative wage rates unchanged) resulting in greater income from the tariff.

9. **Reduced incentives to improve efficiency**: Trusts using staff more efficiently will face lower staff costs relative to those with less efficiency. When the MFF is next calculated lower staff costs would be reflected in a lower MFF value and therefore a reduced (and relatively lower) tariff income. Using the NHS staff costs approach, the incentives to improve efficiency under PbR would be reduced.

10. In light of these issues the research confirmed that the current approach, using external wage comparisons to determine differences in staff costs, is appropriate.

<u>Basing the MFF on external wage comparisons</u>

11. Basing the staff index on private sector wages was the approach recommended by the University of Warwick. The original argument was conceptual but supporting evidence is now available from work commissioned by DH.

12. The premise of the approach is that the private sector does not implement national pay scales and as such, wages offered reflect the cost of living and amenities in that area. These factors are the key drivers of relative differences in pay.

13. It would not be fair to simply take the actual average private sector wage in each area. This is because occupational mix varies. Some areas have a much higher proportion of staff working in highly paid occupations such as law and banking. These differences need to be taken into account in

the MFF in order to ensure that we are making like for like comparisons across the country. Warwick do this using a statistical technique known as regression analysis. It essentially works out what wages would be in an area if each area had the same mix of occupations. We similarly take account of differences in the age and gender mix of the private sector workforce in different areas.

14. The staff index compensates trusts for the unavoidable variation in direct staff costs and indirect employment costs arising where NHS wages do not reflect the local market rate.

15. To test for evidence of indirect employment costs, the Health Economics Research Unit (HERU), commissioned by DH, determined the relationship between vacancy rates and the gap between NHS and private sector wages for different staff groups. For nurses, the evidence illustrates that vacancy rates are higher where the gap between NHS wages and private sector wages are greater.

16. The Department of Health and the Department of Communities and Local Government have undertaken a number of reviews of the approach to compensating for unavoidable differences in staff costs. Both Departments concluded that this approach to the MFF continues to be the best available methodology.

Smoothing and Interpolation

17. Smoothing and interpolation are two approaches used to refine the staff MFF index values so that the values for each organisation better reflect the local labour markets from which they recruit.

Smoothing

18. The methodology of the staff index creates the cliff edge problem whereby neighbouring PCTs receive markedly different staff cost values because of their geographical boundaries. Cliff edges may lead to an inaccurate representation of staff costs faced by a provider. This problem is particularly evident for providers within different PCTs but in close proximity and facing similar local labour market pressures. Smoothing techniques soften cliff edges to produce a more continuous profile of staff costs across PCTs.

19. HERU recommended that smoothing take into account the relative staff index of every PCT rather than just neighbouring ones as previously. This approach recognises that NHS organisations draw their labour force from a variety of PCT areas. Smoothing adjusts the relative level of staff index in a PCT by accounting for relative staff index in surrounding PCTs. The weights of the relative costs in surrounding areas fall the further the distance from the base PCT. Smoothing brings each PCT's MFF more in line with those of its surrounding PCTs.

Interpolation

20. The smoothed relative costs for PCTs described above still result in cliff edges between trusts. Two trusts operating near the border of neighbouring PCTs might have different relative staff costs but operate in the same labour market. As a result, HERU introduced a further refinement to smoothing: interpolation.

21. Interpolation takes account of the location within a PCT area of the trusts' sites, and thus the distance from other PCT areas. It involves a second stage of smoothing carried out at trust level, after smoothing at PCT level, and further reduces the impact of cliff edges. It works the same way as smoothing in that the staff index of a trust is the distance weighted average of the surrounding PCTs' staff indices.

22. Interpolation is carried out at trust site level. Where a trust has more than one site, the different indices for each site are weighted together in proportion to activity, using bed numbers as a proxy, on each site.

Medical and Dental (M&D) London Weighting

23. The scope of the staff component of the MFF has been progressively expanded and since 2003-4 has included the whole workforce. The research by HERU found no supporting evidence for the application of the staff MFF to doctors. As such, the coverage of the staff index was reduced in 2009-10 and a new element, the Medical and Dental London Weighting is incorporated. The M&D weighting reflects the greater cost of these employees in London relative to the rest of the country.

24. HERU determined that pay setting mechanisms between medical and non-medical staff differ, negating the need to apply the staff index to medical staff. Although there is no national variation in medical staff costs, there is a significant difference in the costs of doctors in London relative to the rest of the country. As such, a weighting for medical and dental staff is applied to trusts in London.

Annex C – Worked example calculation of MFF

1. This worked example shows the calculation of the MFF for Provider A.

Staff Index

2. The staff index for a hospital trust is calculated based the staff index values for individual trusts. There are two sites to Provider A. These are in the locality of PCT Y and PCT Z.

Sites	PCT area	Staff Index	Activity
1	Y	1.0385	89%
2	Z	1.0101	11%

3. Staff MFF for Provider A is thus:

   (0.89*1.0385) + (0.11*0.0101) = 1.0354

Medical and dental (M&D) London weighting

4. This index is calculated as the ratio of the average hospital paybill of these staff groups in 2008-09 including London weighting to the average paybill excluding the London weighting.

5. Provider A has no sites located within London and therefore receives a weighting of 1.00.

Buildings Index

6. The Buildings Index is calculated in the same way as the Staff Index.

Sites	PCT area	Building Index	Activity
1	Y	0.9497	89%
2	Z	0.9693	11%

7. The calculation is thus:

   (0.89*0.9497) + (0.11*0.9693) = 0.9519

Land Index

8. The index value of the Provider A estate is 1.5374.

Overall Index

9. The 4 components are combined using the breakdown of national expenditure between staff, buildings, land and other costs. The latter is assumed not to vary across the country.

Index	HCHS Expenditure (a)	Index Value (b)	Weighted Index (c) = (a)*(b)
Staff	54.9%	1.0354	0.5684
M&D	13.9%	1.0000	0.1390
Buildings	2.7%	0.9519	0.0257
Land	0.4%	1.5374	0.0061
Other	28.1%	1.0000*	0.2810

*index value is the same for all trusts.

10. This gives an overall target MFF value of:
0.5684 + 0.1390 + 0.0257 + 0.0061 + 0.2810 = 1.0203

11. This above value is the underlying index value for Provider A. This index is centred around 1. To ensure that all trusts receive non-negative payment of the MFF, the underlying index is converted to a payment index with a minimum value of 1.

12. To set the minimum of the payment index to 1, the underlying index, with an average of 1, is divided through by the minimum value. In 2013-14 the minimum value is 0.9263. The final MFF value for Provider A to be used for payment is thus:

    1.022/0.9263 = 1.1033

Annex D – Reference Cost Index (RCI)

1. The RCI is an index of the relative cost efficiency of NHS organisations. The RCI is adjusted by the MFF to ensure a fair comparison between organisations across England.

2. For the RCI to be comparable year-on-year the index must have an average of 100. To ensure this, the application of the MFF to reference costs must be cost neutral i.e. the total national value of Reference Costs submitted must be the same whether it includes or excludes the MFF. To obtain cost neutrality the underlying MFF is scaled. The extent of this scaling depends on the percentage difference between the quantum of Reference Costs prior to the application of MFF and after it.

3. The following example shows how the MFF is used to calculate the MFF-adjusted RCI.

Table 1 shows how the underlying MFF is scaled so that the total quantum of Reference Costs is kept constant at £4,500. This is necessary to ensure the national average RCI is 100. The factor used to scale the underlying MFF is the percentage difference between Reference Costs prior to the application of the MFF and after its application (sum of column C divided by sum of column B).

Table 1: Scaled MFF for RCI

	A	B	C = B / A	D = A* sum (C) / sum (B)	E = B / D
	Underlying MFF	Total Reference Costs Quantum (£)	Total RC Quantum adjusted for underlying MFF (£)	Scaled MFF	Total RC Quantum adjusted for scaled MFF (£)
Provider A	1.0249	1,250	1,220	0.9622	1,299
Provider B	1.1021	1,000	907	1.0346	967
Provider C	1.3349	1,000	749	1.2532	798
Provider D	0.9270	1,250	1,348	0.8703	1,436
		4,500	4,225		4,500

4. Table 2 shows that, without the scaling of the MFF, the average of RCI does not equal 100 (compare the averages of columns J and L). Having the average RCI at 100 allows easy comparison of provider's relative efficiency year on year. Irrespective of whether the average is 100 (and any scaling), a provider's index value is always the same relative to the average. For example, Provider D is always 22% above average:

   From column L: [(122 – 100) / 100] * 100% = 22%
   From column J: [(115 – 94) / 94] * 100% = 22%

Table 2: Average RCI kept at 100

	F	G	H = (F / G)*100	I = A	J = H / I	K = D	L = H / K
	Actual Total Cost (£)	Expected Total Cost (£)	Base RCI	Underlying MFF	MFF adjusted RCI (based on underlying MFF)	Scaled MFF	MFF adjusted RCI (based on scaled MFF)
Provider A		1,300	96	1.0249	94	0.9622	100
Provider B	1,250	925	108	1.1021	98	1.0346	104
Provider C	1,000	1,100	91	1.3349	68	1.2532	73
Provider D	1,000	1,175	106	0.9270	115	0.8703	122
Average	1,250		100		94		100

(RCI figures to the nearest integer)

Annex E – Tariff Calculation

1. Table 3 gives an example calculation of the tariff for an HRG. The underlying MFF is rebased so that the minimum value is 1 (column D), by dividing the index through by the 2013-14 minimum value of 0.9263 Total costs are then divided by these MFF values (column E). The income for a provider is then the product of tariff price, activity and rebased MFF (column F).

Table 3: Rebasing MFF for Tariff Calculation

	A	B	C	D = C/ min C	E = B / D	F = Tariff * A * D
	Activity	Total Costs (£)	Underlying MFF	Rebased MFF to 1	Total Costs adjusted for rebased MFF (£)	PbR Income (£)
Provider A	60	1,250	1.0249	1.1064	1,130	1,528
Provider B	50	1,000	1.1021	1.1898	840	1,369
Provider C	20	1,000	1.3349	1.4411	694	663
Provider D	40	1,250	0.9263	1	1,250	921
Total	170	4,500			3,913	4,483

Tariff = Total costs adjusted for MFF / National activity
= sum of column E / sum of column A
= £3,913 / 170
= £23.02

2. Table 4 shows the relative difference between providers A and B, for the underlying and rebased (payment) index. As is shown, irrespective of the index, the MFF of Provider B is always 7.53% greater than that of Provider A. This relationship is true for all providers; the relativities between providers is the same regardless of how the underlying MFF is scaled.

Table 4: Relative differences between providers A & B

	X	Y	Z = (Y / X)-1
MFF Indices	Provider A	Provider B	% Difference
Underlying (col C)	1.0249	1.1021	7.53%
Rebased to 1 (col D)	1.1064	1.1898	7.53%

Annex F – Creating an index

1. An index is a ranking of numbers relative to the same base such that they can be directly compared.

2. In the example below, an index value can be attached to each of the numbers in column A. An index is constructed by dividing each number by the base value of the index. In common with the MFF, the first index created is in column B, which has an average value of 1.0 like the underlying MFF index. This index is constructed by dividing each number by the average of the index, 100.

Values	Index with an average of 1	Index with a minimum of 1
A	B	C
50	0.50	1.00
95	0.95	1.90
125	1.25	2.50
130	1.30	2.60
100	1.00	2.00

Average value: 100
Minimum value: 50

3. The index in column B represents a ranking relative to the average value in the list. The average of the values in column a is 100. The value 50 in column A is half of the average so as a relative value 50 can be expressed as 0.5.

4. Column C represents the transformation of the index to have a minimum value of 1, akin to the payment index. 50 is the lowest of all the values in column A and so in the index in column C it has a value of 1.0.

5. As stated in the guidance, irrespective of the version of the MFF index, the relative unavoidable cost differences between organisations are maintained. In the example above, it can be seen that the relative difference between the values 50 and 100 of column A is the same in both columns B and C i.e. 0.5 is half of 1.0 and 1.0 is half of 2.0 This also holds for every other combination of values. For example, 50 is 0.4 times small than 125. In columns B and C the relative difference in the associated index values is also 0.4 (0.50 / 1.25 = 0.4) and (1.0 / 2.5 = 0.4).