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The Fair Funding Review: Is a fair assessment of councils' spending needs feasible?

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The Fair Funding Review: is a fair assessment of councils' spending needs feasible?

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Preface

This report has been written as part of a major programme of research and analysis supported by IFS's Local Government Finance and Devolution Consortium. Consortium members include Capita, the Chartered Institute of Public Finance and Accountancy (CIPFA), PwC and the Economic and Social Research Council (ESRC). Support provided by the Municipal Journal, and a range of councils across England, including those represented by the Society of County Treasurers, is also gratefully acknowledged.

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Executive summary

The English local government finance system is part way through a series of major changes that will see its focus shift from being based on redistribution according to spending needs, towards more emphasis on providing financial incentives to tackle needs and to boost local revenue-raising capacity. However, this does not mean that redistribution will cease to play any role in the local government finance system: if this were to be abolished completely, there would be very large variations in different councils' ability to fund local services.

It is in this context that the government is undertaking a 'Fair Funding Review' in conjunction with councils. The aim of this review is to devise a new system for allocating funding between councils, which would be based on updated and improved methods for estimating councils' differing abilities to raise revenues themselves and their differing spending needs. The government has stated that it wants the new system to be simpler and more transparent – but robust and evidence-based.

The outcome of a review like this has the potential to have profound effects on the capacity of councils across the country to provide services. There is no single correct answer to the question "how should funding be allocated between councils?".

In this report, we discuss the assessment of councils' spending needs. We focus in particular on the approaches that the Ministry of Housing, Communities and Local Government (MHCLG) has suggested for different service areas. We discuss the benefits and drawbacks of the approaches and whether the drawbacks seem to be an issue in practice. We also highlight the potential sensitivity of the estimates of spending needs for different councils to the specification of spending-needs formulas and the data used in their construction. Companion papers look at measuring revenue-raising capabilities and options for the overall design of the new funding system.

The basic challenge of estimating spending needs

The spending needs of councils cannot be observed directly. Instead, they must be inferred or estimated from something we do observe – such as local socio-economic and geographical characteristics, and councils' actual spending.

For a number of service areas – including environmental, protective and cultural services (EPCS) – the MHCLG proposes to estimate spending-needs formulas based on the relationship between council spending and various needs indicators. The idea is that these relationships – which would be estimated via a statistical approach called regression analysis – reflect the effect of the different needs indicators on councils' spending needs.

The proposed approach has benefits compared with other methods. It is less subjective and potentially more transparent than determining formulas by judgement and negotiation only, and it is much less affected by the decisions of individual councils than when using each council's actual spending. In particular, such an approach does not 'reward' a council with a higher estimate of spending needs just because it chooses to spend more (whether due to preferences, efficiency or the availability of government funding) – what matters is the relationship between spending and needs indicators across all councils.

But the approach still has significant issues.

- **Formulas can be inaccurate or biased if important determinants of spending needs are omitted from the estimation process.**
- **Factors other than needs (e.g. local preferences or efficiency) can distort estimated formulas if they are correlated with the chosen needs indicators.** This is because the formulas would be picking up not only the relationship between the needs indicators and spending needs, but also the relationship between the indicators and these other factors that affect councils' spending.

Past funding policy decisions have changed spending patterns

A particular concern is that spending patterns will depend in part on previous government decisions on how to allocate funding.

These decisions will matter in practice: cuts to government funding for councils since 2009–10 have been accompanied by a reduction in the degree of redistribution. For most of this period, the size of cuts to grants did not (or did not fully) take into account the fact that councils with high assessed spending needs (and/or low revenue-raising capacity) relied on those grants for more of their overall budget. The result was much bigger cuts to funding – and spending – for the most grant-dependent councils.

The tenth of councils most dependent on grant funding reduced spending on services by 31% between 2009–10 and 2016–17, compared to 13% for the tenth of councils least dependent on grant funding.

These policy-driven funding and spending changes have led to significant changes in the relationships between spending and needs indicators. Most notably, the positive relationship between levels of deprivation (as measured by the index of multiple deprivation) and spending has become much weaker.

To illustrate the potential impact of this, we estimate spending-needs formulas for EPCS based on population, deprivation and rurality – the set of needs indicators suggested by the MHCLG for these services – using data from 2009–10 (just prior to the funding cuts), and from 2016–17 (the most recent data available at the time of writing, which is the MHCLG's preferred option).

A formula based on the most recent data could hit deprived areas

The formula based on 2016–17 data provides a lower estimate of needs for deprived and urban councils than the formula based on 2009–10 data, mirroring the particularly large impact of funding cuts on the spending of these councils.

For example, for the tenth of councils with the highest levels of deprivation, the formula based on 2016–17 data produces an average estimate of spending needs per person of 15% above the national average. The formula based on 2009–10 data would suggest they need spending 38% *above* the national average. Conversely, the average estimate for the tenth of councils with the lowest levels of deprivation is 5% and 21% *below* the national average, respectively, for the formulas based on 2016–17 and 2009–10 data. Taking two specific councils as an example:

- The estimate of spending needs per person for Knowsley (one of the most deprived councils) is 13% above the national average when using a formula based on 2016–17 data, but it is 41% above the national average when using a formula based on 2009–10 data. In comparison, its spending need according to the existing formula is 11% above the national average.
- On the other hand, for Wokingham (one of the least deprived councils) the estimates are 6% and 31% *below* the national average using the formulas based on 2016–17 and 2009–10 data, respectively, while the existing formula estimates its spending needs per person to be 17% below the national average.

This begs the question – which formula best reflects spending needs? Unfortunately, with council-level data only, there is no objective way to tell. This is because any attempt to assess needs will be affected by the MHCLG’s funding policy regarding the year of data used to estimate the spending-needs formulas.

Judgement and subjective decisions will therefore have to play a key role in the spending-needs assessment. In which year was the funding system fairest? How, if at all, should estimated formulas be ‘tweaked’ following consultation with local government or technical experts? Different people will have different views on these issues – illustrating the inherently subjective nature of ‘spending needs’ as a concept.

Clearly, one option is simply to use the formula from the most recent year of data available – which is the MHCLG’s preference. It would generally mean the closest match between assessed spending needs and actual spending at the time of implementation – minimising any subsequent funding reallocations. But we should not be under any illusions that this approach represents the most ‘objective’ approach.

It could also hit areas with lots of employment, such as central London

Judgement will also play a very important role when it comes to the selection of needs indicators and the way they enter the spending-needs formulas (e.g. linearly or in a way allowing for non-linear effects).

One indicator we expected to have a potentially major impact on our estimated spending needs formula was the employment density. This indicator, which we measure by the ratio of workers to residents based in an area, would capture the effect of the additional costs to councils that have a large net inflow of commuters and, more generally, that are major employment centres.

This indicator is very strongly positively correlated with the existing measure of EPCS spending needs: on its own, it statistically ‘explains’ 40% of the variation in needs per person according to the existing formula. This is not surprising, as a very similar indicator (daytime population) is included in the existing formula.

This indicator was also positively correlated with spending in 2009–10, so its inclusion in a new formula estimated using that year’s data benefits councils with a high worker-resident ratio. For example, Westminster’s estimated spending needs per person are 39% above the national average if the formula excludes employment density and 129% above the national average if it does include this indicator. By way of

comparison, its estimated spending needs using the existing formula are 153% above the national average, and its actual spending in the most recent year, 2016–17, was 12% *below* the national average.

But employment density is now slightly negatively correlated with spending on EPCS. For most councils, its inclusion or exclusion in a spending-needs formula therefore makes little difference if 2016–17 data are used to estimate the formula.

This may provide a rationale for the MHCLG's current intention not to include such an indicator, given that its preference is to use data from 2016–17 (or later) to estimate its formulas.

For the councils with the very highest or lowest employment densities though, whether employment density is included can matter. Take Westminster: estimated spending needs per person are 28% and 3% above the national average, respectively, if employment density is excluded or included from a formula based on 2016–17 data. Therefore, the inclusion of employment density in a new spending-needs formula could hit rather than help Westminster.

Impact of updated formula likely greatest – but also most uncertain – for those currently with the highest or lowest assessed needs

We also test the sensitivity of formulas – and hence spending-needs estimates – to the inclusion or exclusion of a series of indicators. These include: the fractions of the population aged under 16 or over 75, or the fraction who are non-white (to reflect potential differences in spending needs driven by demographics); benefit receipts per person (an additional proxy for deprivation); and population density (to reflect potential differences in spending need driven by congestion or other factors associated with densely built-up areas).

We find that estimates of spending need are most sensitive to the choice and number of indicators for those councils that have the highest levels of spending and highest levels of assessed spending need according to the existing formula.

- For example, for the tenth of councils that currently have the highest levels of assessed spending needs, depending on which indicators are included, the average of our new estimates of their spending needs per person ranges between 21% and 44% above the national average: a difference of 23 percentage points.
- However, for councils with average levels of need according to the existing formula, the choice of indicators makes less of a difference. The average of our new estimates of their spending needs per person ranges from 9% to 5% below the national average, depending on the choice of indicators: a difference of 4 percentage points.

In all the specifications that we test, the councils with the lowest assessed needs currently see, on average, an increase in their assessed needs, and those councils with the highest assessed needs currently see a decrease.

- For example, the tenth of councils with the lowest assessed spending needs currently have an average spending need per person of 14% below the national average. However, the average of our new assessment for them varies between 12% and 7% below the national average, depending on which indicators are used.

- However, for the tenth of the councils that currently have the highest assessed needs, their current average (47% above the national average) lies above our new estimates, which vary from 21% to 44% above the national average, depending on the indicators used in the formula.

This means that councils with high assessed spending needs for EPCS under the existing formula are likely to lose funding as a result of the updating of the EPCS spending-needs assessments – and those councils with low assessed spending needs for EPCS under the existing formula are likely to gain funding.

This does not mean that these groups of councils will lose or gain from the Fair Funding Review overall. This will depend on decisions taken in relation to the measurement of councils' revenue-raising capacity, and about how redistributive the overall funding system should be. It will also depend upon the updates made to spending-needs assessments for other services, including adult social care and children's services.

For social care, the government proposes to use subcouncil-level data

For social-care services, the government proposes to use subcouncil-level data to estimate spending-needs data. This will be at the level of lower super output areas (LSOAs) – which, on average, contain 1,500 people – for adult social care, and possibly at the individual level for children's services. This builds on the use of ward-level data – wards, on average, contain 7,000 people – for the construction of existing spending-needs formulas for these services.

The estimates of spending needs produced by these approaches will still depend upon subjective decisions about what needs indicators to include. Comprehensive sensitivity analysis – including for 'outlier' councils – will therefore be important for properly informed decisions. Such testing has taken place for the new adult social care formula.

The major benefit of this approach is that it allows us to include statistical controls for each council, and to estimate formulas using relationships between spending and needs indicators *within* councils. This allows one to 'strip out' the effect of any non-needs factors – such as preferences, efficiency or funding availability – that affect the overall level of spending on a service by different councils.

This makes such an approach more robust than using council-level data, but it does not mean that it is unaffected by the influence of non-needs factors.

- For example, suppose that some councils receive more funding relative to their 'true' needs than others. Including and stripping out a council 'indicator' in the regression formula can control for the impact of this on the average spending of these councils. But a higher level of spending may also be associated with a different distribution of spending across small areas or individuals with different characteristics: more or less concentrated on the most deprived, for instance.

In such circumstances, regression analysis using subcouncil-level data can still lead to biased regression formulas. Sensitivity analysis to the set of councils on whose data

the formula is based on would therefore also be wise. Such testing does not appear to have taken place.

Final thoughts

While our report focuses on the issues and sensitivities of the methods proposed by the MHCLG, we must not be too negative. Assessing councils' spending needs is both conceptually and practically difficult. The principles set out by the MHCLG for the needs assessment (simplicity, transparency, robustness and being evidence-based) are sensible and the methods reasonable given data availability. Indeed, the proposal to use individual-level data for children's services would be innovative.

But three things are important going forwards.

- **Being clear that no assessment of spending needs can be objective** – although it can and should be evidence-based. Judgement inevitably plays a part in deciding what year of data to use, what indicators to include, and what (if any) adjustments to make to formulas estimated by regression analysis if there is a concern that they are being biased by non-needs factors.
- **Being as transparent as possible about the impact that different choices (e.g. years of data, needs indicators) will have for different councils.** Our analysis shows that these things can matter a lot for specific councils – especially those that have quite different characteristics to the country as a whole. More generally, they will affect the relative levels of funding distributed to different types of council – deprived or affluent, urban or rural, county or borough. It is important that these effects are understood and debated.
- **Investing in improvements in subcouncil-level and individual-level spending (or service utilisation) and socio-economic data.** The aim, if possible, should be to wean ourselves off the use of council-level regression analysis in spending-needs assessment for all services. This approach could become increasingly untenable over time if the new funding system is designed so as to *not* fully equalise with respect to spending needs and revenue-raising capacity.

1. Introduction

As part of broader changes to the local government finance system, the government is currently conducting what it terms the 'Fair Funding Review'. The aim is to update and improve the methods used to redistribute funding between councils in order to account for the differences in both the costs they face to provide services to their residents – termed their 'spending needs' – and the revenues they can each raise themselves from local taxes and other sources, such as sales, fees and charges (SFCs). The government has held two formal consultations on approaches to estimating the relative spending needs of different councils.¹ That is the focus of this paper. In a companion paper, we consider the options for accounting for differences in councils' revenue-raising capacities, and the overall system of redistribution between councils.²

There are, of course, many reasons why spending needs could differ between councils. These include: differences in population size (councils that must provide services to more people will generally face higher overall costs); socio-economic disparities (councils facing high levels of deprivation and social disadvantage may have higher demand for costly social services); and differences in input costs (councils where labour and property costs are higher may need to spend more per unit of services). But spending needs are not something that can be directly observed and measured: they must instead be estimated.

There are a number of ways to do this. In Chapter 2 of this report, we review the pros and cons of different options, paying particular attention to the regression-based 'utilisation' approach. This approach infers spending needs from relationships between past spending and local characteristics, and it is this approach that the government proposes to use. We show that while there is no obvious better alternative, this approach may produce biased estimates of needs – although plans by the government to use subcouncil-level data may be helpful in ameliorating such problems for a number of services.

In Chapters 3 and 4, we present empirical analysis to illustrate these issues. We first show the changing relationships between spending by councils, how much councils were assessed to need at the last needs assessment, and the local characteristics that might be expected to drive spending needs. The patterns are stark and, taken at face value, they would suggest big changes in the distribution of spending needs. But we then show that cuts to available funding – which were due to central government policy and were larger in areas deemed to have higher spending needs and lower capacity to raise revenues themselves – are likely to be having a big impact on these patterns. This illustrates the key drawback of the utilisation approach: it can be biased due to factors other than needs (including central government funding decisions) affecting councils' spending. In Chapter 4, we build on this to show how sensitive the estimates of councils' needs for one particular group of services – environmental, protective and cultural services (EPCS) – can be to the details of the needs assessment: the year(s) of data used, the needs indicators included and the structure of the formulas used to calculate spending needs (e.g. whether they are linear or allow non-linear effects). The results show that these decisions matter, emphasising that needs assessment is inherently a subjective – indeed political – decision, even when based on careful empirical analysis.

¹ Department for Communities and Local Government (2016, 2017).

² Amin-Smith and Phillips (2018).

Then, in Chapter 5, we briefly discuss whether the use of subcouncil-level data is likely to be helpful in practice. We conclude in Chapter 6, highlighting the main implications of our analysis for the Fair Funding Review.

2. How can spending needs be assessed?

The spending needs of councils cannot be observed directly. Instead, they must be inferred or estimated from something that we do observe – such as local socio-economic and geographic characteristics, expenditures and the unit costs of providing different services.

There is more than one way to do this, and different methods have their pros and cons. In this chapter, we outline the approaches that the Ministry of Housing, Communities and Local Government (MHCLG) proposes to use for different service areas. We also evaluate them from a conceptual point of view, and highlight when they may not work properly. In subsequent chapters, we look at whether the issues highlighted are likely to be a problem in implementing the chosen methods in practice.

2.1 What are the main approaches?

In designing a new funding system, there is a range of different approaches to needs assessment that the MHCLG could utilise. These approaches include the following.

- **The use of actual past expenditures of the council in question.** Under this approach, a council's assessed need for spending on a particular service is a function of its own past spending. This has the benefit of being simple and transparent but, in all other respects, it is undesirable. While need for spending is likely to be an important factor in determining spending, other factors will also play a role, including local preferences (e.g. for higher quality more expensive services, or lower council tax rates and hence lower spending) and efficiency (e.g. less efficient councils would need to spend more to deliver the same quality services as more efficient councils). As expenditure is a choice, basing assessed spending need on past expenditures will give councils a strong incentive to increase spending on the services for which this method was used: they will be assessed to need more funding in future. This could lead to a misallocation of expenditures by councils and it might put upwards pressure on overall expenditure. For this reason, this approach is only really suitable for use in determining needs for spending that councils have little or no direct control over (e.g. where spending is determined according to rules set by national government).
- **Expenditure- or utilisation-based formulas estimated by regression analysis.** Under this approach, council spending needs are inferred from the statistical relationships between council characteristics selected as 'needs drivers' (e.g. population size, age structure, deprivation, etc.) and past spending on different services. These estimated relationships are then used in formulas to calculate the relative spending needs of different councils. The needs drivers are generally selected through consultation with local government and experts for the service area in question, and through statistical analysis of their importance in 'explaining' spending patterns. 'Regression' is the term given to the statistical technique that is applied to estimate the statistical relationships, and the regressions may utilise council-level data, or subcouncil-level data.

- **Unit-cost approaches.** This approach involves counting the number of 'units' of different types on which the council must spend money, and then assigning a cost per unit to each of these units. A council's spending need is then calculated according to the following simple formula,

$$\text{Needs} = \sum_{i=1}^K (\text{Number of Units of Type } i) * (\text{Cost Per Unit of Type } i),$$

where there are K different types of units relevant to the service in question. The unit types are generally identified through consultation with local government and experts for the service areas in question. There are two broad classes of unit: client groups (e.g. children aged 0–2, 3–4, 5–11; adults aged 80–84, 85–89, 90+) and activities (e.g. the number of schools, the number of residents in care homes). The unit costs assigned to these can be determined either empirically (e.g. the average spend per child aged 0–2 across all councils or a peer group of councils) or normatively (e.g. through judgement based on what 'reasonable' or 'best practice' unit costs would be, given prices of inputs).

- **Judgement-based formulas.** It is also possible to construct a formula where the weights applied to different local characteristics are based on the judgement of stakeholders and experts. They may utilise empirical analysis of how spending and service-use patterns relate to the various needs drivers in order to inform their discussion and decisions, but this analysis does not directly determine the formulas. This means that this approach is both more subjective and potentially less transparent than the aforementioned approaches. Because of this, and because the MHCLG does not propose to use such an approach going forwards, we do not consider formulas based purely on judgement in the remainder of the report. However, as we will see, judgement will still play a decisive role even using supposedly more objective methods to assess and determine councils' spending needs.

In addition to choosing which broad approach(es) to use, the MHCLG also has to take decisions on several practical issues, such as:

- **At what level of disaggregation should the spending-needs assessment take place?** At one extreme, a single formula or set of units and unit costs could be used to assess a council's overall spending needs. However, this might require a formula that includes a long list of needs drivers or the breaking down of activities and client groups into many different 'units', undermining the seeming simplicity of such an approach. Such an approach is also practically difficult where different councils have different sets of responsibilities, which is the case in England.³

If spending need is instead assessed separately for different services, a decision has to be taken on what weight to allocate to each service when calculating a council's overall spending need. One option would be to base this on the average share of spending councils allocate to the different services (an empirical approach). An alternative is to give policymakers the discretion to set weights, based on sectoral and expert advice and on policy priorities (a normative approach).

³ In some parts of England, most council services are provided by a single tier of local government – this includes unitary authorities, metropolitan districts and London boroughs. In other areas, two tiers of local government are responsible for different services: non-metropolitan (or shire) districts and (shire) counties.

- **What needs drivers or units should be utilised in the spending-needs formulas or cost calculations?** Here, there can be a trade-off between simplicity (and transparency) and accuracy. In general, one might expect that a formula with just a couple of needs drivers would be simpler and easier to understand, whereas a formula with additional drivers would be more accurate. However, this is not always the case: what probably matters more for simplicity and transparency is whether there is a clear rationale for the inclusion of different drivers and an intuitive explanation for their weight in the formula.⁴ While, statistically speaking, a formula with more variables estimated via regression analysis will result in a 'better fit' for the expenditure data used in the estimation process, this does not necessarily mean a more accurate formula for needs. As we discuss in more detail below, formulas (and empirical estimates of unit costs) can be biased by factors other than needs and the inclusion of an additional needs driver may improve the statistical fit but introduce more bias.

For formula-based approaches, as well as deciding what needs drivers to include, decisions must also be taken about the form in which these drivers enter an equation. Should the drivers be included in a linear or non-linear form, with the latter allowing, for instance, economies (or diseconomies) of scale in service provision with respect to the needs driver in question (e.g. the number of very elderly residents)?

2.2 What approaches does the MHCLG propose to use?

The MHCLG has not made decisions on the above questions yet. But it has set out a set of principles for the design of the new system, and it has indicated its preferred approaches for different service areas.

The overall principles for needs assessment

Looking first at the principles, the MHCLG has said that the new system should be:

- **Simple and transparent.** The assessment should involve the fewest formulas and needs indicators possible, and the impact of different indicators and formulas on overall spending needs (and ultimately funding allocations) should be straightforward to understand.
- **Contemporary and sustainable.** The assessment should be based on the most up-to-date data that are available. It should also be suitable for future years as well as at the point of introduction. This means utilising needs drivers for which data can practically be collected on an ongoing basis, and which will continue to be important drivers of spending needs in future.
- **Robust.** The assessments should be based on the best possible objective analysis of spending needs.

These are a reasonable set of aims. However, there could be trade-offs between them and it is not clear to which aims priority will be given in such circumstances. And while the aim of using the best methods and data possible is also welcome, it is probably not wise to

⁴ Transparency is also aided by ensuring that the impact of assessed needs on the funding provided to different councils can easily be understood. Amin-Smith and Phillips (2018) discuss this issue in more detail.

consider any of the methods truly 'objective'. As already mentioned, and as we will elaborate later in this report, 'subjective' decisions will necessarily play a vital role in any approach to needs assessment.

The approaches for different service areas

Based on the above principles, the MHCLG has developed a set of preferred and alternative approaches for different service areas and these are outlined in Table 2.1.

The first thing to note is that, in each instance, both the preferred and alternative approaches suggested are some form of expenditure- or utilisation-based regression. For both adult social care and children's services, the preferred approach is to use subcouncil-level regression analysis to estimate the correlation between expenditure or service use at the very local level with a set of needs drivers. When the regression includes service use as the dependent variable, the resulting predictions of service need will have to be multiplied by an estimated or assumed unit cost in order to provide a prediction of spending needs.

For other services, the front-runner currently seems to be council-level regressions of expenditure on sets of need drivers deemed important for these services in question. For the purposes of analysis, the MHCLG is using 2016–17 data on councils' expenditures to test the effects of different versions of the formulas (e.g. with different service groupings and/or the inclusion of different sets of needs drivers in different ways). This suggests that the MHCLG wishes to use the most recent expenditure data for these formulas – in line with the principles it has outlined for the Fair Funding Review.

However, the options set out by the MHCLG also illustrate the tension between its aims for both simplicity and robustness. The MHCLG initially sought views on a dramatic reduction of the number of formulas and the construction of a 'foundation formula', instead, which would include the key drivers for councils' overall spending. However, consultation responses indicated that councils preferred to retain a number of separate formulas for different service areas, and to include the needs drivers relevant to a specific service only in that specific formula (rather than to include it in or omit it from a general foundation formula).⁵ Indeed, consideration is being given to the inclusion of additional formulas for specific areas that have previously not had their own formula, such as housing and waste.

It is also unclear whether the number of needs indicators included in the various formulas will be reduced. In its December 2017 consultation, the MHCLG proposed using population, and measures of deprivation and population sparsity in the foundation formula. Respondents to the consultation broadly agreed with the inclusion of these indicators but also highlighted additional factors such as daytime populations (reflecting commuters and visitors), and populations of specific subgroups, such as migrants and students.

Taken together, this suggests that the new system will represent an evolutionary rather than revolutionary change with respect to past approaches to needs assessment.⁶ The use of updated and higher quality data may allow for a more accurate assessment of councils' current (and future) spending needs. But the use of similar approaches means that the new system will share many of the same pros and cons as past systems.

⁵ Ministry of Housing, Communities and Local Government (2018a).

⁶ In Appendix A, we discuss the approaches to needs assessment used under the standard spending assessments (in place between 1990–91 and 2002–03), the formula spending shares formulas (2003–04 and 2005–06) and the Four Block Model (2006–07 to 2013–14).

Table 2.1. Approaches to needs assessment being analysed by the MHCLG for different service areas

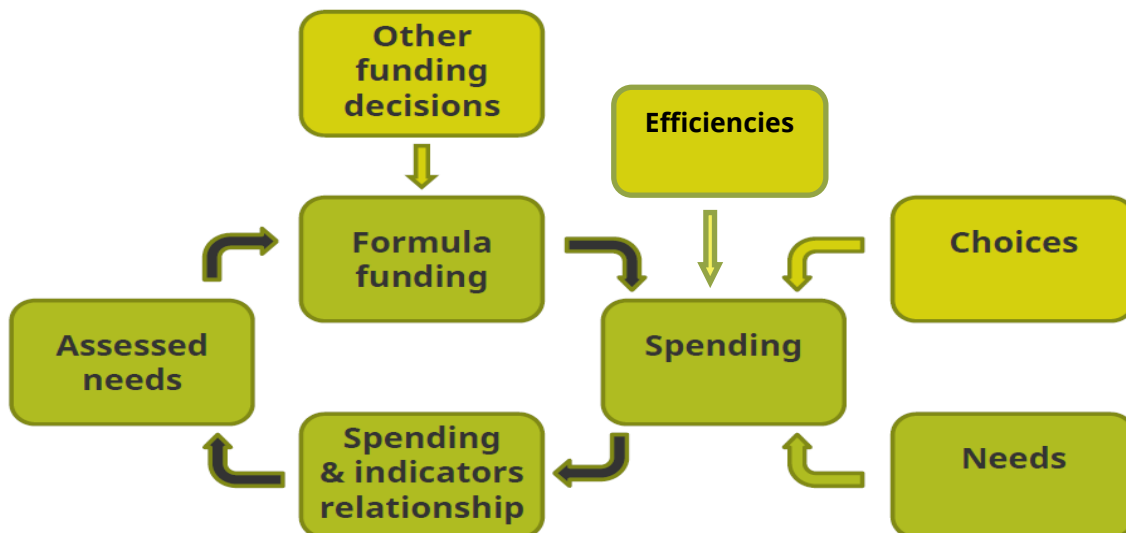
| Service area | Preferred choice | Further detail and possible alternative approaches |
|--|---|---|
| Adults' personal social services | Small area modelling using regressions of service usage at a subcouncil level, and service unit costs estimated from England-wide data. | Estimated by the Department of Health using 2012–13 data on usage and population characteristics at the level of lower super output areas (LSOAs), which contain approximately 1,500 people each. Spending needs are then calculated by multiplying predicted usage by average unit costs for England as a whole. <i>Possible alternative:</i> Council-level expenditure regression using 2016–17 or later data. |
| Children's services | Multi-level modelling using regressions of expenditure or usage at a subcouncil and, possibly, individual level. | The MHCLG have commissioned researchers to develop new spending-needs formulas using either LSOA-level expenditure data or individual-level utilisation data (the latter would again require estimation of service unit costs). It is unclear what year of data will be used for this approach. <i>Possible alternative:</i> Council-level expenditure regression using 2016–17 or later data. |
| Highways maintenance and public transport | Council-level expenditure regression using 2016–17 or later data. | Suboptions for this are: inclusion of concessionary travel and support for bus services as part of the new foundation formula; or inclusion of concessionary travel in the adult social care formula (given that the number of older people may be a key driver of needs for both services) and support for bus services within a 'rurality' cost adjustment. |
| Waste services | Council-level expenditure regression using 2016–17 or later data. | <i>Possible alternative:</i> These services to be included within the foundation formula rather than have a separate formula. |
| Fire and rescue service | Council-level expenditure regression using 2016–17 or later data. | <i>Possible alternative:</i> The National Fire Chiefs Council has also requested that statistical analysis be based on sub-council level (e.g. LSOA) expenditure and data, and for 'an element of judgement' to be used in assigning formula weights. |
| Foundation formula for other services, including environmental, protective, and cultural services (EPCS) | Council-level expenditure regression using 2016–17 or later data. | Regression at a local authority level using 2016–17 Revenue Outturn expenditure data as a proxy for local authority needs. <i>Possible alternatives:</i> As well as including additional services (e.g. concessionary travel, waste), consideration is being given to separate formulas for: housing services, public health services, and for services that generally account for a small share of expenditure but are important for particular councils, such as for flood and coastal protection, and unaccompanied migrant children. |

Source: Ministry of Housing, Communities and Local Government (2018b) and National Fire Chiefs Council (2018).

2.3 What are the pros and cons of the proposed approaches?

Figure 2.1 is a graphical representation of the expenditure-based regression approach, designed to illustrate the rationale and pros and cons of this approach.

Figure 2.1. The expenditure-based regression approach to assessing spending needs



Consider, first, the darker green boxes, which illustrate the idea behind this approach from right to left. The first assumption is that spending needs will influence actual spending. A regression can then be used to estimate the relationship between spending in different geographical areas (e.g. councils) and various local characteristics believed to be drivers of spending need. Finally, the formula estimated can be used to predict the spending needs of those different geographical areas.

This approach has several key advantages.

Compared to using councils' actual spending as an indicator of need, this approach is less affected by the impact of factors other than needs affecting the expenditure of each council. For instance, if a particular council happens to spend more on a service because there is a local preference for a higher quality service, if the council is less efficient at delivering the service or if funding is just generally more available, then there will be no effect on its assessed spending need. What matters is the average relationship between spending and needs drivers across all councils. In this way, the approach does not reward a council for being inefficient or deciding to spend more, and thereby avoids incentivising such behaviour.

Compared to formulas constructed purely on the basis of judgement, this approach relies less on subjective decisions, and is more transparent as to how the weights for different needs drivers have been determined.

Compared to a unit-cost approach, it generally allows for greater flexibility in the way needs drivers can influence spending needs. Regression-based approaches allow for the correlation between different needs drivers included, and allow one to account for non-linear effects (e.g. by including functions of the underlying needs drivers in the regression).

However, this approach can also suffer from significant problems, such as the following.

- **It can become a circular process.** Assessments of needs based on past spending patterns will be a major determinant of the funding provided to councils with particular characteristics, which will influence subsequent spending patterns and assessments of needs. This is illustrated by the black arrows in Figure 2.1.
- **Formulas derived via regression analysis can be biased if an important needs driver is omitted.** Many factors may affect the spending needs of councils and it is unlikely any formula could include them all: appropriate data may be unavailable, or the analysts building the regression formula may just not have thought to include them. If these omitted needs drivers have only a small effect on spending needs, then this is probably not a major concern. However, if they have a big effect, at the very least the estimates of spending needs produced by the regression formula will be subject to wide margins of error. Moreover, if the omitted needs drivers are correlated with needs drivers that are included in the regression formula, then the estimates of spending needs may be systematically biased. This means that it is important for regression formulas to contain all key drivers of spending needs.
- **Formulas can also be biased by factors other than needs that affect councils' spending if those factors are correlated with the needs drivers included in the regression.** The paler green boxes in Figure 2.1 show some examples of such factors: choices over the quality and scale of provision, perhaps related to local preferences over tax and spending; the efficiency with which services are delivered by different councils; and funding decisions by central government. While the impact of such factors on spending is likely to vary across councils, if that variation were to be uncorrelated with the needs drivers included in the regression formula, then estimates of spending needs would still be unbiased. However, if these non-needs factors are correlated with the needs drivers, the regression formula may be picking up variation in these factors as well as variation in spending needs. Again, this may result in systematically biased estimates of spending needs.

For example, suppose that councils with high levels of deprivation have both high levels of spending need and are more likely to be governed by political parties that favour higher spending to provide higher quality services. This could lead to a very strong positive correlation between spending and deprivation, only part of which is related to spending need – but this approach would assume it is all driven by spending need. This would lead us to overestimate the spending needs of deprived areas relative to less deprived areas. However, suppose that, historically, the funding system did not compensate deprived councils for their higher spending needs. This lack of funding could offset the impact of higher spending needs, leading to only a weak positive correlation (or even a negative correlation) between spending and deprivation. This would lead us to underestimate the spending needs of deprived areas relative to less deprived areas.

The upshot of this is that one should not include a characteristic in the regression formula just because it has a strong correlation with spending: that correlation could be driven by non-needs factors, which would then bias estimates of spending needs.

Does using subcouncil-level data allow one to avoid these issues?

The use of subcouncil-level data – such as at the LSOA level or individual level as proposed by the MHCLG for adult social care and children's services, respectively – to estimate the relationship between spending (or service utilisation) and needs drivers can help to ameliorate these issues. In particular, such an approach allows one to include statistical indicators for each council in the regression formula. These indicators can control for any non-needs factors – such as preferences, efficiency and funding availability – that affect the overall level of spending by councils on the service in question. Relationships between spending and needs drivers can then be estimated using *within* council variation in spending (or utilisation) and needs drivers, stripping out these council-level effects.

For instance, consider again our example of deprived councils with both high needs and a preference for higher spending. The council indicators would control for the higher average level of spending in these councils resulting from their needs and preferences. The relationship between spending and deprivation would instead be estimated from variation in the amount councils spend on small areas (e.g. LSOAs) or individuals that are deprived or affluent.

The use of such approaches clearly requires the following.

- **It must be possible to disaggregate spending or utilisation data to a subcouncil level.** This may not always be possible due to data availability (it may be costly to collect data at the subcouncil level) or because it is not conceptually possible to allocate particular spending to a subcouncil level (e.g. spending on core administration or major facilities designed to provide services to wide geographic areas).
- **There must be sufficient *within* council variation in needs drivers.** The council indicators will capture variation in needs drivers *between* councils, which is then disregarded for the purpose of constructing spending-needs formulas. If there is little or no variation in needs drivers within councils remaining once this between-council variation is discarded, one might not have enough statistical power to estimate a spending-needs formula with any precision.

It is also important to recognise that there is no guarantee that these approaches will fully deal with the issue of non-needs drivers affecting spending.

For instance, the council indicators will control for factors affecting the average level of spending by a council. But different councils may allocate their spending between small areas (e.g. LSOAs) or people with certain characteristics (e.g. those who are deprived or affluent) in different ways. This could reflect differences in local preferences, differences in the efficiency with which the councils can deliver services to different types of communities and people, and differences in funding levels.⁷

⁷ A particular example relates to the fact that the distribution of relative spending needs between small areas and individuals with different characteristics may change when the overall level of funding available changes. With high levels of funding, a council may be able to afford preventative or more universal services (e.g. after-school activities for children, or services for those with moderate care needs). However, with lower levels of funding, it may need to focus on the most acute problems (e.g. foster placements for children subject to neglect, or services for those with the most serious needs only). The distribution of needs for these two types of services may be quite different, leading to different patterns of spending in councils with high and low levels of funding. This could bias estimated spending-needs formulas. It could also mean that a formula estimated using data from a period when funding was high would not be suitable for allocating funding according to need when funding is low, and vice versa.

Trying to estimate a single set of relationships between spending and needs drivers in such circumstances could produce a biased spending-needs formula. This is particularly true if most of the small areas or people with particular characteristics (e.g. those that are deprived or affluent) come from councils that allocate spending in a particular way (e.g. more towards deprived or affluent areas).

If there was enough variation in needs drivers within councils, then the different relationships for different councils could instead be estimated separately. However, there would then be a question of how to choose from or weight these individual estimates to produce a single formula to calculate spending needs, which could be applied across councils. And perhaps more fundamentally, if councils were making different decisions on how to allocate their spending, it would be a clear illustration that 'spending needs' are a subjective rather than objective concept.

Thus, while use of subcouncil-level data is certainly better than using council-level data, it is not perfect.

What about using a unit-cost approach?

Depending on how they are implemented, unit-cost approaches can suffer from many of the same problems as regression-based approaches.

For example, unit costs estimated from actual spending on different client groups or activities can be biased by non-needs factors. Consider the calculation of the unit costs of providing social-care services to an adult aged 90 or over. One might want to account for the fact that these costs are higher in areas with high levels of deprivation than in areas with low levels of deprivation – both because poorer people tend to have poorer health, and because social-care services are meanstested. But if the funding system historically provided councils that serve poorer communities with lower levels of funding, the average amount spent per adult aged 90 or over in a poor area may be relatively low compared to actual spending needs. Conversely, if the funding system historically provided councils that serve richer communities with higher levels of funding, the average amount spent per adult aged 90 or over in a rich area may be relatively high compared to actual spending needs. The estimated unit costs would then, in part, reflect differences in the availability of funding rather than differences in the need for spending on these different client groups.

The use of judgement rather than empirical estimates to determine unit costs would avoid this problem but it would increase reliance on subjective decisions. Such an approach would therefore conflict with the MHCLG's aim to ensure that the new needs assessments are based on 'objective' data-driven analysis of council spending.

2.4 Summary

In this chapter, we have considered the tricky issue of how to assess the spending needs of councils, given that these cannot be observed directly. We have argued that the approaches proposed by the MHCLG – expenditure- or utilisation-based regressions – have a number of key benefits over other methods, including flexibility (compared to unit-cost approaches) and apparently objectivity (compared to formulas based purely on judgement). However, like all methods that infer spending needs from actual spending, these approaches suffer from one key problem: council spending is affected by factors other than needs. Such factors include local preferences, the efficiency in delivering local services and the funding made available to different councils via the funding system.

If these non-needs factors were uncorrelated with the needs indicators included in the regression formulas, then this would not be a problem. But if they were correlated, then the regression formulas may produce biased estimates of spending needs.

For example, if deprivation is included as a needs factor and councils serving deprived communities were historically under- or over-funded, the relationship between spending and deprivation would reflect this funding misallocation, as well as reflecting any underlying relationship between spending needs and deprivation.

The system can also become circular, with past spending patterns determining assessed needs and hence funding allocations, thereby determining future spending power. Alternatively, if the government cuts or increases the funding to councils with particular characteristics for reasons other than need, then this could affect subsequent spending patterns and hence spending-needs assessments. This is an issue we explore empirically in the next two chapters.

We have also discussed how using subcouncil-level data can help to reduce the extent of these problems: one can control for the impact of non-needs factors on the average level of spending by different councils on different services. It is therefore welcome that the government proposes to use subcouncil-level data for the assessment of adult social-care services (the largest area of spending) and children's services.

However, this method requires that there is sufficient *within* council variation in needs drivers. Also, the resulting spending-needs formulas can still be biased if councils' allocations of spending to small areas or people with different characteristics differ in systematic ways – especially if a lot of the small areas or people with particular characteristics (e.g. those that are deprived or affluent) come from a subset of councils (e.g. those governed by a particular political party). In Chapter 5, we explore how much of an issue this could be in practice.

3. Austerity and the pattern of spending across councils

The new spending-needs assessments being developed by the MHCLG will take place in the context of substantial reductions in English councils' spending on public services: down by 19% in aggregate and 24% per person between 2009–10 and 2017–18, after accounting for inflation.⁸ These cuts have largely been driven by reductions in the grant funding councils receive from central government (i.e. a factor other than spending needs). In this chapter, we examine the impact of these cuts on the patterns of spending across councils, both for overall service spending and for spending on EPCS and other services that the government proposes to estimate need for by using a simple 'foundation formula' based on council-level regression analysis. This analysis illustrates the difficulties in inferring spending needs from spending patterns, when government funding decisions (and other factors) play such a major role in determining those spending patterns.

3.1 How have spending patterns changed in recent years?

Figure 3.1 shows the relationship between spending per person, and assessed relative spending need per person in 2009–10 and 2016–17, where spending need is measured using existing relative needs formulas (RNFs). Both spending and spending needs per person are normalised so that the average across England in each year is equal to 100. Also, both are aggregated at the level of upper-tier county councils in areas with two-tier local government, allowing us to easily compare these areas with single-tier local government.

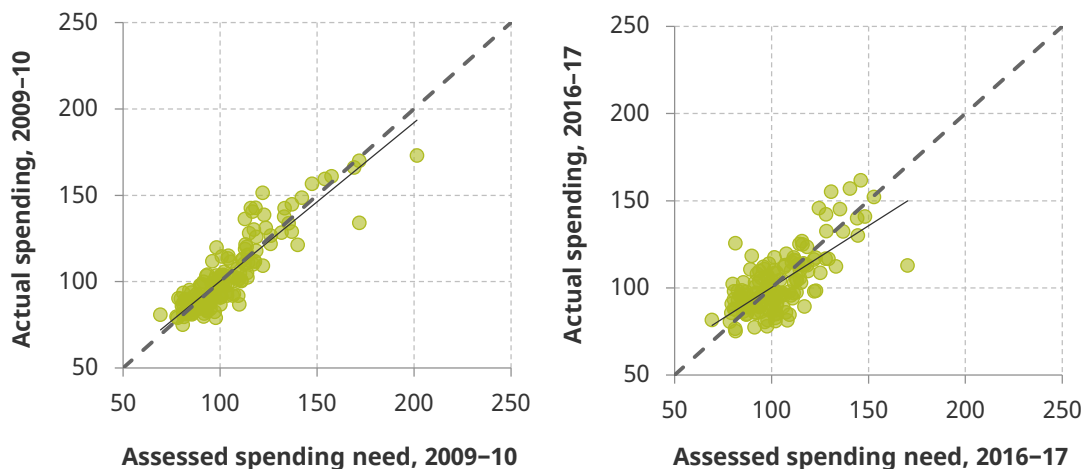
Examination of Figure 3.1 shows three key patterns.

- **Actual levels of relative spending per person differ significantly from assessed relative spending needs per person for many councils in both years.** This could reflect the influence of factors other than need – such as preferences, efficiency and funding availability – or inaccuracies in the existing spending-needs assessment.
- **Between 2009–10 and 2016–17, the range of both relative spending and assessed relative spending needs per person narrowed.** Previous IFS research has shown that at least part of the narrowing in assessed spending needs is due to changing patterns of deprivation and demographics: areas with high levels of assessed relative spending have become relatively less deprived and have seen less population ageing.⁹
- **On average, relative spending levels fell in areas with high assessed spending needs compared to those with low assessed spending needs during this period.** This is reflected in the reduction in the slope of the black trend lines between 2009–10 and 2016–17.

⁸ Phillips and Simpson (2018).

⁹ Amin-Smith et al. (2018).

Figure 3.1. Relationship between actual relative spending per person and assessed relative spending need per person, all services, 2009-10 and 2016-17

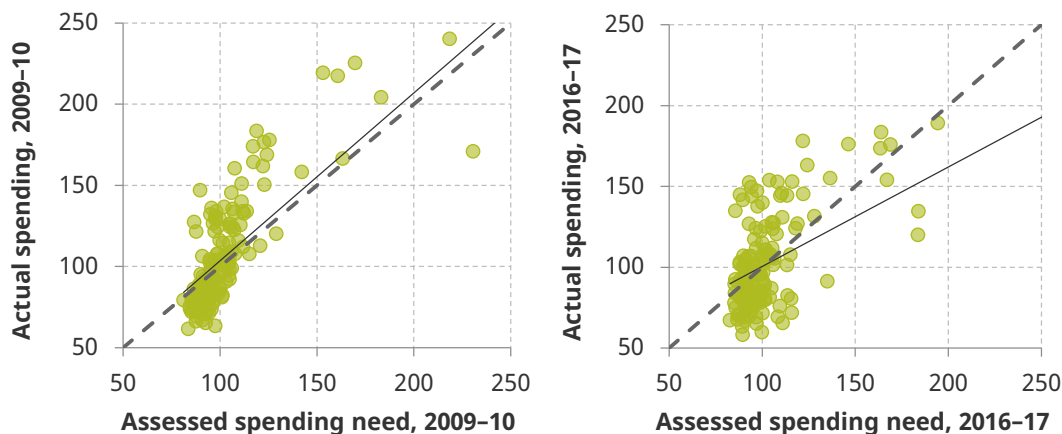


Note: Excludes the City of London and Isles of Scilly. Spend and spending needs measures are scaled such that the mean is equal to 100. 2013-14 RNFs are used as a proxy for assessed spending need in 2016-17 due to the fact that RNFs and the data used in them have not been updated since 2013-14.

Source: Authors' calculations using Department for Communities and Local Government (2013), Ministry of Housing, Communities and Local Government (2011a, 2017) and Office for National Statistics (2018).

Figure 3.2 shows that these patterns are even more stark for the EPCS that the MHCLG plans to use a simple council-level regression approach to estimate spending needs for. These changing spending patterns matter more for these services because they will directly influence the new needs assessments (whereas for adult social-care services and children's services, what will matter is the subcouncil patterns of spending).

Figure 3.2. Relationship between actual relative spending per person and assessed relative spending need per person, EPCS and other services, 2009-10 and 2016-17



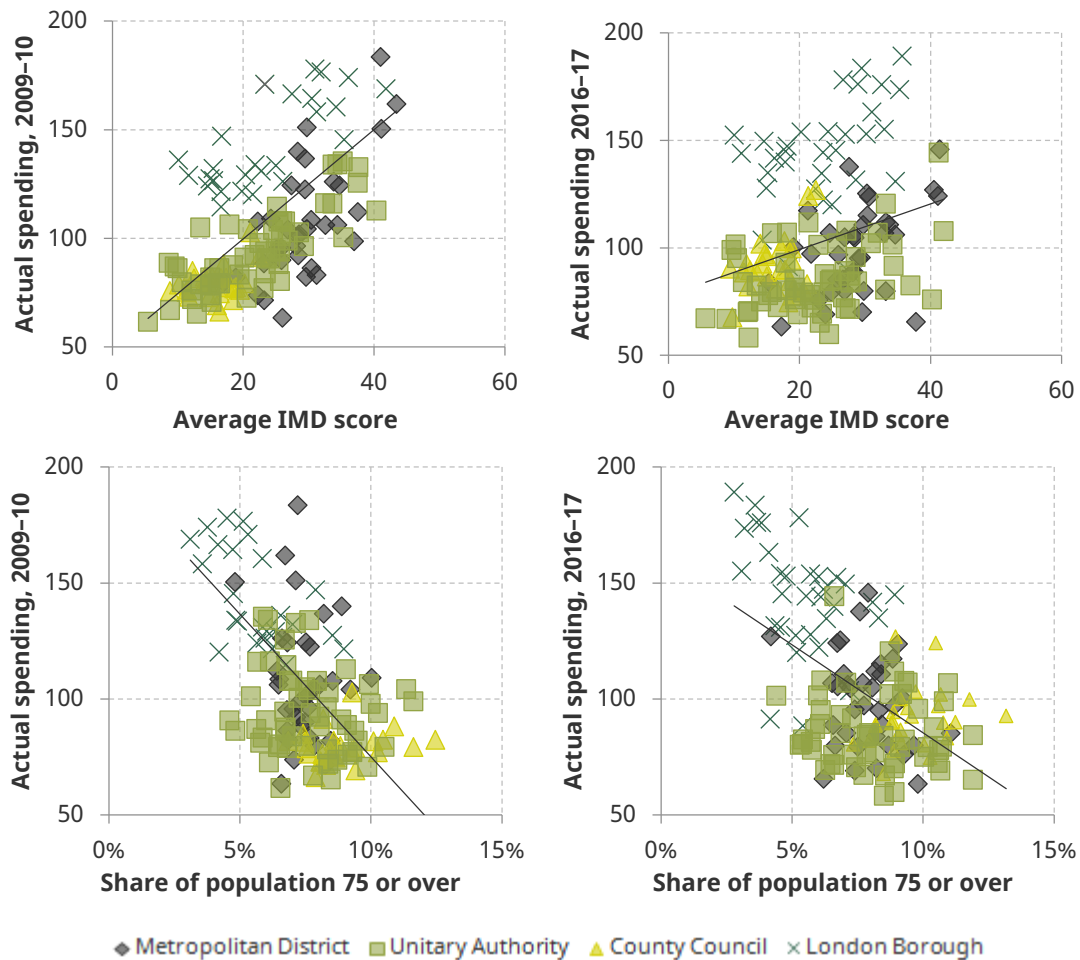
Note: As Figure 3.1. In addition, Westminster's assessed spending needs are so high (298% and 253% of the national average in 2009-10 and 2013-14, respectively) that it is not included in either panel of this figure.

Source: As Figure 3.1.

The changing spending patterns have also changed the relationships between spending per person on EPCS and other services and local characteristics that might be considered needs drivers. Figure 3.3 illustrates this for deprivation, as measured by councils' average

index of multiple deprivation (IMD) scores,¹⁰ and for the share of the population aged 75 or over. The strong positive correlation between deprivation and spending on EPCS and other services that was evident in 2009–10 was significantly weaker in 2016–17, particularly for councils outside London. Meanwhile, there was a weakening in the strong negative correlation between the share of the population aged 75 or over and spending on EPCS and other services during the same time period.¹¹ Changes in relationships with spending can also be observed for other local characteristics that might be considered drivers of spending needs, including population density and sparsity, and the ratio of workers to residents in a council area.

Figure 3.3. Relationship between actual relative spending on EPCS and other services and local characteristics, 2009–10 and 2016–17



Note: As Figure 3.1.

Source: As Figure 3.1, and Ministry of Housing, Communities and Local Government (2011b, 2015a).

¹⁰ The IMD is a multi-dimensional measure of inequality taking into account income, employment, education, health, access to services, and the local environment.

¹¹ Note that this negative correlation is likely to reflect, at least in part, the fact that having more elderly residents is correlated with factors (such as rurality and low levels of deprivation) associated with low spending on EPCS and other services. Phillips and Simpson (2017) show that this is the case for spending on adult social-care services, for instance, where once one controls for other factors, the 'raw' negative correlation between spending and older populations disappears.

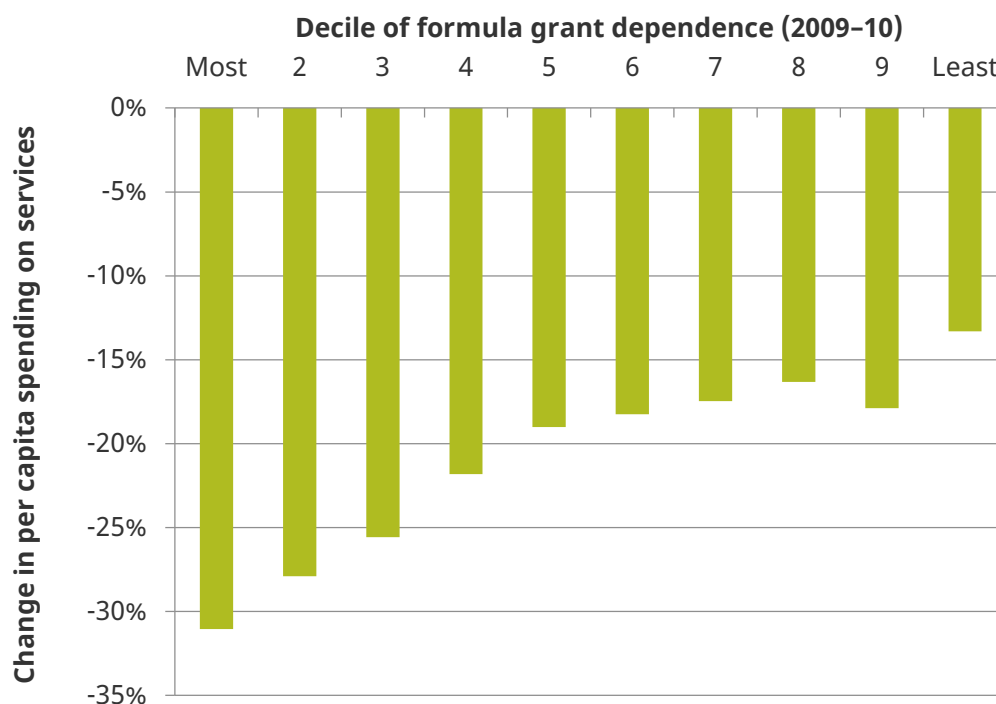
3.2 What explains these patterns?

Spending-needs assessments based on these council-level spending and socio-economic data would be affected by these spending patterns. For instance, a formula estimated using 2016–17 data would imply that spending needs were less positively correlated with deprivation than a formula estimated using 2009–10 data. These differences would result in different predictions of spending needs for different councils – as we show in Chapter 4, when we illustrate the sensitivity of spending-needs estimates to methodological changes.

In principle, such changes could represent genuine changes in the drivers of spending needs, as technology changes and the types of services delivered by councils evolve. However, if we suspect that factors other than spending needs have caused changes in the patterns of spending across councils since 2009–10, we might be sceptical about any spending-needs formulas estimated using 2016–17 data.

In fact, there are good reasons to believe that factors other than spending needs have had a significant impact on the pattern of funding – and hence spending – across councils. This is because the cuts to grant funding highlighted at the beginning of this chapter had a disproportionately large impact on the spending power of councils that were highly dependent on grant funding, necessitating bigger reductions to their spending. This is illustrated in Figure 3.4.

Figure 3.4. Change in per capita spending on council services, 2009–10 to 2016–17, by initial decile group of (formula) grant dependence (2009–10)



Note: As Figure 3.1. Grant dependence calculated as $([\text{formula grant funding}] / [\text{formula grant funding} + \text{special grant funding} + \text{council tax revenue}])$, excluding grants and other funding for education, police and fire services.

Source: As Figure 3.1.

In general, these ‘grant-dependent’ councils were those who had high assessed needs and/or low capacity to generate their own revenues via council tax. Moreover, such councils also tended to have higher levels of deprivation – which is strongly correlated

with existing assessments of spending needs and, with the exception of parts of inner London, is associated with lower capacity to raise revenues via council tax – and younger populations.¹²

The larger cuts to spending power for more grant-dependent (and higher needs and more deprived) councils were not driven by falls in their assessed relative spending needs. Instead, as we discuss in our companion paper,¹³ they reflect policy choices by the government: first, to use the flexibility provided by the funding system in place at the time (the Four Block Model) in order to make the council funding system less redistributive and, ultimately, to take no account of councils' spending needs or revenue-raising capacity when determining cuts to grants in 2014–15 and 2015–16.

Given the importance of government grant funding to many councils, and restrictions on councils' abilities to offset cuts to grants via increases in council tax – first, via caps to council tax increases, and later via referendum requirements for large increases in councils – it seems highly likely that it is these government decisions that have driven the changes in spending patterns; not changes in councils' own assessments of how much they need to spend relative to other councils.

3.3 What are the implications of this for spending-needs assessment?

This should clearly make us at least somewhat cautious about any spending-needs assessment based on council-level patterns of spending in 2016–17, as proposed by the government for EPCS and a number of other services. But it is also a reminder to be cautious about spending-needs assessments based on council-level patterns of spending in 2009–10 or any other year: spending patterns in those other years will also be significantly affected by the level of funding provided by central government. Moreover, if we are reliant on council-level data only, we have no objective way of determining in which year the relative level of government funding provided to different councils best reflected their relative spending needs – precisely because our estimates of what those spending needs are will depend on which year of data we use to estimate them.

This is another example of the fundamentally subjective nature of spending-needs assessment. How much of an issue it is in practice depends on just how sensitive the estimated spending-needs formulas are to the year of data used. It is to this issue we now turn.

¹² Amin-Smith, Phillips and Simpson (2018).

¹³ Amin-Smith and Phillips (2018).

4. How sensitive may an EPCS spending-needs formula be?

In addition to examining how the year of data used to estimate a spending-needs formula for EPCS affects resulting spending-needs estimates, in this chapter we also consider the sensitivity of needs assessments to other subjective choices:

- **the needs indicators included in the formula;**
- **the way those indicators enter the formulas (e.g. linearly or non-linearly).**

We highlight key patterns by examining impacts across the distributions of spending need according to the current formula for EPCS, actual spending as of 2016–17, deprivation, and other key characteristics. We also highlight specific councils that can exemplify the patterns of sensitivity found. None of the formulas we estimate, nor the spending-needs estimates that result, are meant as recommendation. Their purpose is only to illustrate what different methodological choices may mean for different councils. As in Chapter 3, we aggregate spending, estimate spending-needs formulas, and predict spending needs at the level of upper-tier authorities in areas with two-tier local government. This allows us to compare the impact of modelling choices across England in its entirety in a simple and straightforward way.

4.1 The existing formula for EPCS spending needs

Before looking at the possible effects of new formulas though, it is worth considering the existing relative needs formula (RNF) for EPCS, and the spending-needs estimates it assigns to different councils.

There are in fact several separate formulas for different elements of EPCS: services carried out by upper-tier (county) authorities in two-tier areas; services carried out by lower-tier (district) authorities in two-tier areas; flood defence; coastal protection; levies to the Environment Agency; and fixed costs.¹⁴ An assessed spending need for each subservice is calculated and then weighted according to a 'control total' weight determined by central government, to arrive at a measure of overall EPCS spending need. An area cost adjustment (ACA) was then applied to account for differences in labour and property costs.

The formulas for upper- and lower-tier services (which had a combined weight of almost 99% in the measure of overall EPCS spending need) included almost the same indicators:¹⁵

- **measures of population density and sparsity;**
- **the daytime (working) population and number of day visitors relative to the number of residents;**

¹⁴ There is also a formula for concessionary bus travel for the over 60s but we exclude this from our analysis as until 2011–12 these services were funded by a separate grant outside of the general grant funding calculated by RNFs. See Appendix A.

¹⁵ The only difference is that the lower-tier formula includes the proportion of the older population in receipt of income support, income-based jobseekers allowance or pension credit as an additional indicator.

- **the proportion of the population in receipt of a series of benefits** – this includes incapacity benefit and severe disablement allowance, income support, income-based jobseekers allowance, pension credit or other unemployment benefits;
- **the proportion of the population born outside the UK.**

Each indicator is given a positive weight in the formula – so that a higher value for an indicator leads to a higher assessed spending need. These weights were determined via expert judgement and consultation with the sector, rather than any formal statistical analysis of spending patterns.

The estimates of EPCS spending needs per person produced by these formulas in 2013–14 (the last time spending-needs estimates were updated) varied between 83% of the national average in the case of Wokingham and 253% of the national average in the case of Westminster. One-in-ten upper-tier council areas had an assessed spending need per person of below 88% of the national average, while another one-in-ten upper-tier council areas had an assessed spending need per person greater than 119% of the national average.

Table 4.1 shows how assessed EPCS spending needs per person according to these formulas relate to a number of local characteristics, the first two of which have been highlighted in the MHCLG's recent consultations as possible needs indicators in a future formula:

- **the level of deprivation;**
- **rurality**, which we measure by the percentage of a council's population living in a rural area as classified by the Office for National Statistics;¹⁶
- **employment density**, which we measure using the ratio of the number of workers employed in a council area to that area's resident population.

The table shows that a greater rural population share is associated with lower assessed spending needs as measured by the existing formula: each 1 percentage point increase in the share of a council's population that is rural *reduces* assessed spending needs per person by 0.16 percentage points. In contrast, deprivation and employment density are positively associated with assessed spending needs as measured by the existing formula: each 1 percentage point change in deprivation or employment density (where the national average of these indicators is normalised to 100%) is associated with a 0.23 and 0.31 percentage point *increase*, respectively, in assessed spending needs.

This means that the existing formulas estimate EPCS spending needs per person to be relatively high in deprived urban areas with lots of employment based in them. As we see later, together with the ACA, this means high assessed spending needs for inner London. In contrast, they estimate spending needs per person to be relatively low in affluent rural or suburban areas with relatively little employment based in them.

¹⁶ The Office for National Statistics counts small towns with populations of between 10,000 and 30,000 as rural if they are not part of a larger urban area.

Table 4.1. Relationship between assessed EPCS spending need per person according to existing RNFs and various local characteristics

| Local characteristics | Regression coefficient | Statistically significant |
|------------------------|------------------------|---------------------------|
| Rural population share | -0.16 | Yes |
| Deprivation | +0.23 | Yes |
| Employment density | +0.31 | Yes |

Source: Authors' calculations using Department for Communities and Local Government (2013), Ministry of Housing, Communities and Local Government (2011b, 2015a) and Office for National Statistics (2011, 2017b, 2018).

4.2 Using the most recent data to estimate spending-needs formulas benefits less-deprived councils

We start our analysis of issues arising in the development of a new formula by examining the differences between spending-needs assessments based on formulas estimated using data from 2009–10 (just prior to the large budget cuts discussed in the previous chapter) and 2016–17. Note that it is only the formulas themselves that are based on different years of data: once we have estimated the formulas, the per-person spending-needs assessments for each council – which we term their spending-needs assessment or SNA – are calculated by plugging the latest data (from 2016–17) into the formulas.

The formulas are estimated by regressing spending per person in the relevant year (2009–10 or 2015–16) in each upper-tier council area on two spending-needs indicators: deprivation and rurality. As already mentioned, these have been chosen to reflect the needs indicators highlighted in recent consultations.¹⁷

Figures 4.1 and 4.2 show how our SNAs, based on formulas estimated using 2009–10 data (left-hand panels) and 2016–17 data (right-hand panels), relate to current spending and to spending needs calculated by existing relative needs formulas (RNF values), respectively.

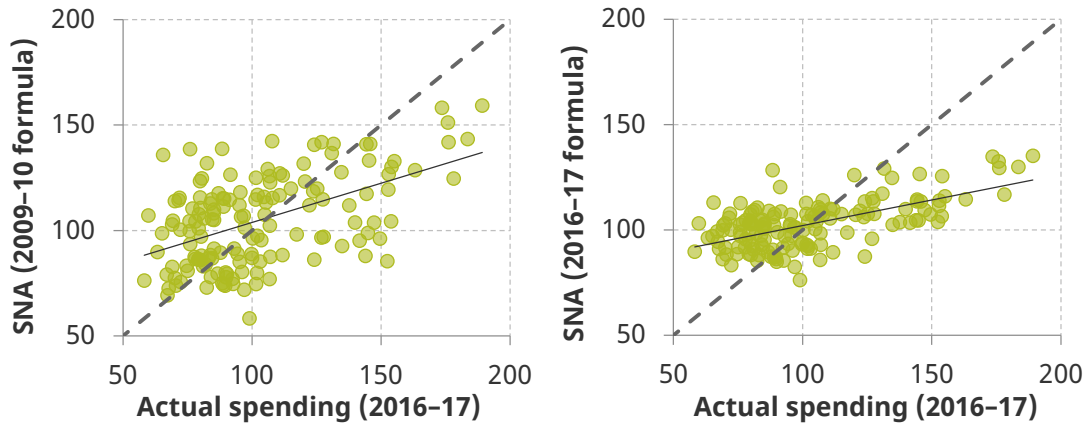
Several patterns are clear from these figures.

- **Irrespective of whether 2009–10 or 2016–17 data are used to estimate the spending-needs formula, the resulting spending-needs estimates are less dispersed than actual spending.** This is unsurprising though, as the needs indicators can statistically explain only part of the variation in actual spending.
- **But the range of SNA values produced by the 2016–17 formula is much narrower than the range produced by the 2009–10 formula.** For instance, using the 2016–17 formula, one-in-ten councils have an SNA value of less than 88% of the national average, while another one-in-ten councils have an SNA value of more than 115%. For the 2009–10 formula, the equivalent SNA figures are 77% and 134% of the national average.
- **This means that the relationship between SNA values and both actual spending and existing RNF values is flatter for the 2016–17 formula than the 2009–10 formula.** In other words, the 2016–17 formula tends to lead to lower spending-needs

¹⁷ Department for Communities and Local Government (2017).

assessments than the 2009–10 formula for councils with high spending and high needs as measured by existing RNFs. Conversely, it tends to lead to higher spending-needs assessments for councils with low spending and low needs as measured by existing RNFs.

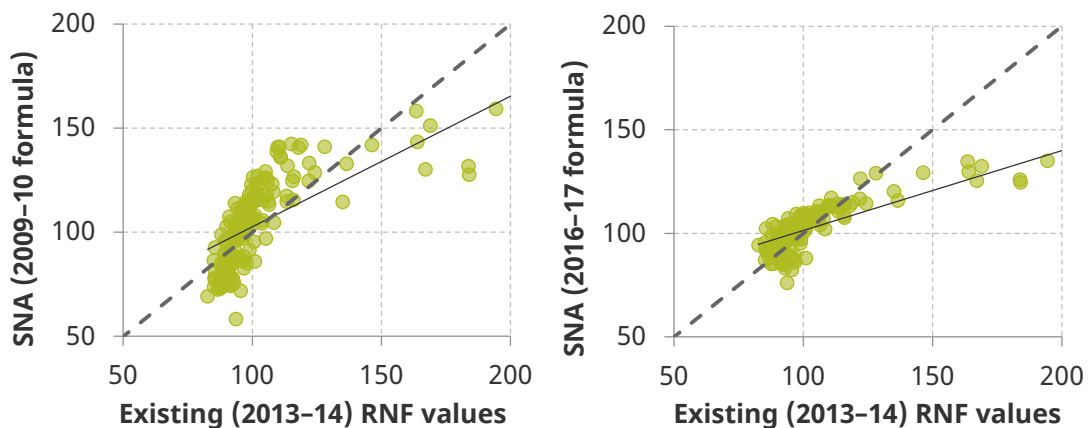
Figure 4.1. Relationship between EPCS SNA values and EPCS spending, by year of data used to estimate the spending-needs formula



Note: Excludes City of London and Isles of Scilly. Relative measures are scaled such that the mean is equal to 100.

Source: Authors' calculations using Ministry of Housing, Communities and Local Government (2011a, 2011b, 2015a, 2017) and Office for National Statistics (2011, 2018).

Figure 4.2. Relationship between EPCS SNA values and existing EPCS RNF values, by year of data used to estimate the spending-needs formula



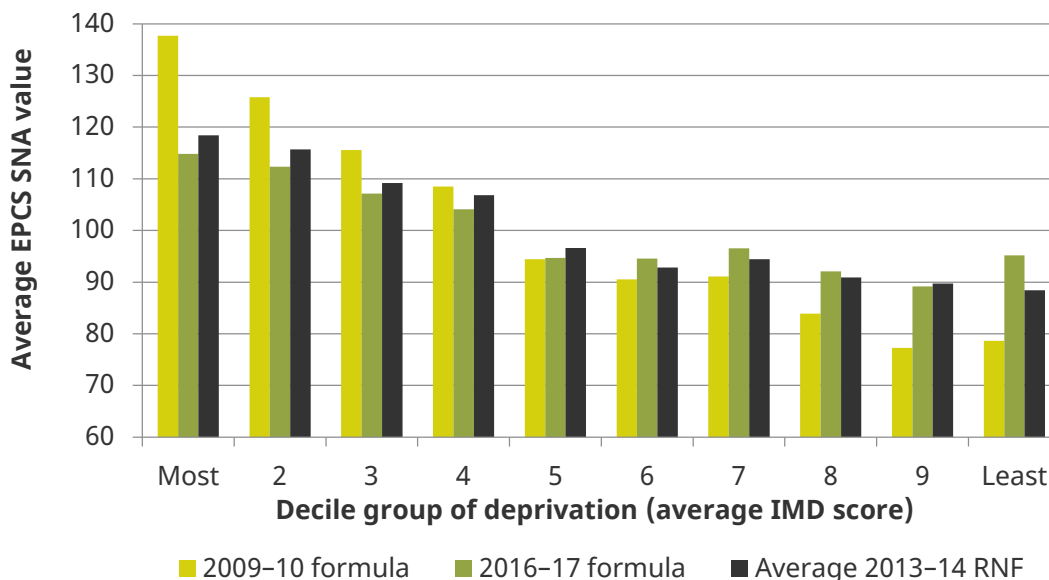
Note: As Figure 4.1.

Source: As Figure 4.1 and Department for Communities and Local Government (2013).

- **Related to this, except for those councils that have the very highest needs according to the existing RNF, the 2009–10 SNA would generally lead to an increase in assessed needs for those with high needs, and vice versa for those with low needs.** Conversely, the 2016–17 SNA would generally lead to a decrease in assessed needs for those with high needs according to the existing RNF, and an increase for those with low needs.

Figure 4.3 also shows clear differences between the two formulas when we rank councils according to their level of deprivation: the 2016–17 formula results in lower (higher) estimates of spending need, on average, for more (less) deprived councils.

Figure 4.3. Average EPCS SNA and RNF value by decile group of deprivation



Note: As Figure 4.1.

Source: As Figure 4.1 and Department for Communities and Local Government (2013).

For instance, the 2016–17 formula produces an average estimate of spending needs per person for the most deprived decile group of councils of 115% of the national average; this compares to 138% for the 2009–10 formula. Conversely, the average estimate of spending needs for the least deprived decile group of councils using the 2016–17 formula is 95% of the national average, compared to 79% using the 2009–10 formula. Furthermore, there is little difference in assessed spending needs between the fifth decile group (those with just-below-average deprivation levels) and the most deprived group when the 2016–17 formula is used. But there is a difference of 15 percentage points (94% versus 79%) when the 2009–10 formula is used.

Figure 4.3 also shows that average assessed spending needs by deprivation level according to the 2016-17 formula are most similar to the average assessed spending needs under the existing RNF for EPCS. For example, for the most deprived decile group of councils, the average estimate of spending needs per person for the most deprived decile group of councils is 118% of the national average – just 3 percentage points difference from the 2016–17 formula, but 20 percentage points difference from the 2009-10 formula. Thus, the 2016–17 formula would lead to smaller changes in assessed spending needs relative to assessed needs under the existing RNFs than the 2009–10 formula – at least on average.

Table 4.2 shows the effect of the two formulas by council type. Metropolitan districts – covering urban areas in the north of England and West Midlands – see substantially lower assessed spending needs per person under the 2016–17 formula (106% of the national average) compared to the 2009–10 data (117% of the national average). This reflects the fact that metropolitan districts have the highest levels of deprivation, on average (which is weighted less heavily in the 2016–17 formula). Estimates under both formulas are higher

than existing RNF values (101% of the national average) and actual spending (96% of the national average).

London boroughs also see lower estimated spending needs under the 2016–17 formula (117% of the national average) compared to the the 2009–10 formula (121% of the national average). Both are lower than the existing RNF values (127% of the average) and actual spending (145% of the national average).

In contrast, use of the 2016–17 formula would benefit county areas (the least deprived type of council), with the averaged assessed spending need (91% of the national average) broadly in line with existing RNF values (91% of the national average) and actual spending (92% of the national average).

Table 4.2. Average EPCS SNA values, RNF values and actual spending per person and deprivation levels, by council type

| | Average SNA value (2009–10 formula) | Average SNA value (2016–17 formula) | Difference (percentage points) | Average IMD score | Average RNF value (2013–14) | Actual spending (2016–17) |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------------|-------------------|-----------------------------|---------------------------|
| London boroughs | 121 | 117 | –4 | 24 | 127 | 145 |
| Metropolitan districts | 117 | 106 | –11 | 30 | 101 | 96 |
| Counties (and underlying districts) | 83 | 91 | +8 | 16 | 91 | 92 |
| Unitary authorities | 99 | 98 | –1 | 23 | 97 | 86 |

Note: As Figure 4.1.

Source: As Figure 4.1 and Department for Communities and Local Government (2013).

Table C.1 in Appendix C shows impacts for some specific councils chosen to exemplify the patterns. On the one hand, for example, for Knowsley, one of the most deprived councils in the country, the 2009–10 formula implies a spending need per person of 141% of the national average. However, the 2016–17 formula implies a figure of just 113% of the national average. By way of contrast, the existing spending-needs formula estimates Knowsley’s spending needs per person to be 111% of the national average, while its actual spending per person in 2016–17 was 146% of the national average.

On the other hand, for Wokingham, one of the least deprived councils in the country, the 2016–17 formula would be more generous (a spending need per person equal to 94% of the national average) than the 2009–10 formula (69%). The current formula estimates Wokingham’s spending need per person to be 83% of the national average, and its spending per person was 67% of the national average in 2016–17.

These differences beg the question – which formula best reflects spending needs? Unfortunately, as we remarked in the previous chapter, there is no objective way to determine this – at least not with council-level data alone.

Judgement and subjective decisions will therefore have to play a key role in the spending-needs assessment. In which year was the funding system fairest? How, if at all, should estimated formulas be ‘tweaked’ following consultation with local government or technical experts? Different people will have different views on these issues – illustrating the inherently subjective nature of ‘spending needs’ as a concept.

Clearly, one option is simply to use the formula from the most recent year of data available – which is the MHCLG's preference. This would generally mean the closest match between assessed spending needs and actual spending at the time of implementation – minimising any subsequent funding reallocations. And as we have seen, it would lead to smaller changes relative to the existing spending-needs formula than using spending data from before the budget cuts to estimate a spending-needs formula. But we should not be under any illusions that this approach represents the most 'objective' approach.

4.3 Estimation of non-linear spending-needs formulas risks 'over-fitting' the data

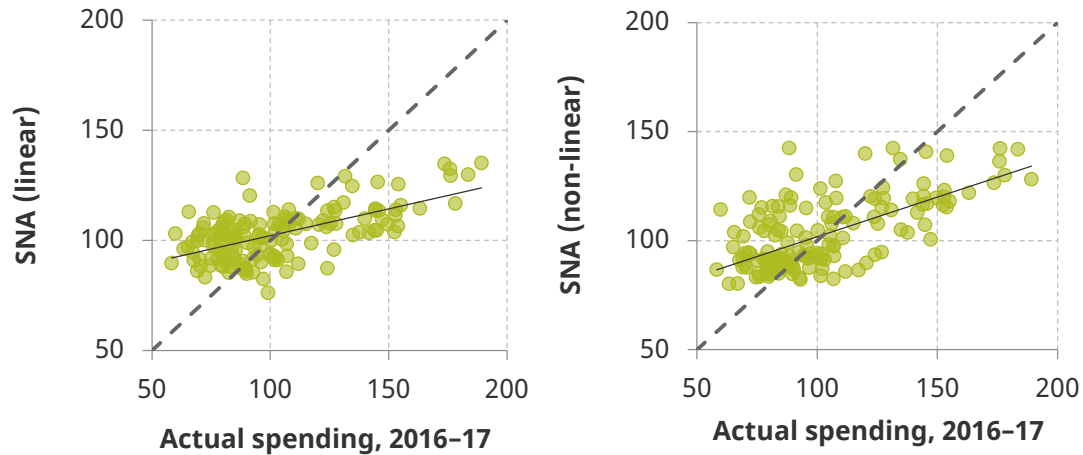
The formulas we have examined so far have been linear. This means, for example, that each percentage point change in the share of a council's population living in a rural area has the same impact on its assessed spending need no matter what the starting *level* of rurality or its other characteristics (e.g. its level of deprivation). This would be appropriate if we thought the relationship between spending needs and local characteristics was indeed linear. For example, if the extra (or lower) costs associated with each additional person living in a rural area was the same in all circumstances.

However, in some circumstances, costs may vary in non-linear ways. Perhaps there are economies of scale in serving rural areas – a travelling library may be able to visit multiple rural villages. Or there could be diseconomies of scale in serving deprived areas – it may be less possible to cross-subsidise leisure facilities with fees and charges from more affluent communities. Or there could be interaction effects – perhaps rurality is more costly in deprived councils, because residents are less able to travel or they rely more on subsidised bus services to do so.

Chapter 2 highlighted that one of the benefits of estimating spending-needs formulas using regression analysis is that non-linear effects can easily be accounted for. We take advantage of this and estimate a spending-needs formula using 2016–17 data that include quadratic, cubic, quartic and quintic terms for each needs indicator (deprivation and rurality).¹⁸ The right-hand panel of Figure 4.4 shows the relationship between the resulting SNAs and actual spending for each council in 2016–17. The left-hand panel shows, for ease of comparison, the SNAs obtained from the linear spending-needs formula.

¹⁸ We have also examined the sensitivity of estimated SNAs to inclusion of interaction terms either instead or in addition to quadratic and cubic terms. Results are available from the authors on request.

Figure 4.4. Relationship between EPCS SNA values and EPCS spending, by functional form of formula (linear or non-linear)



Note: As Figure 4.1. Both formulas estimated using 2016–17 data.

Source: Authors' calculations using Ministry of Housing, Communities and Local Government (2015a, 2017) and Office for National Statistics (2011, 2018).

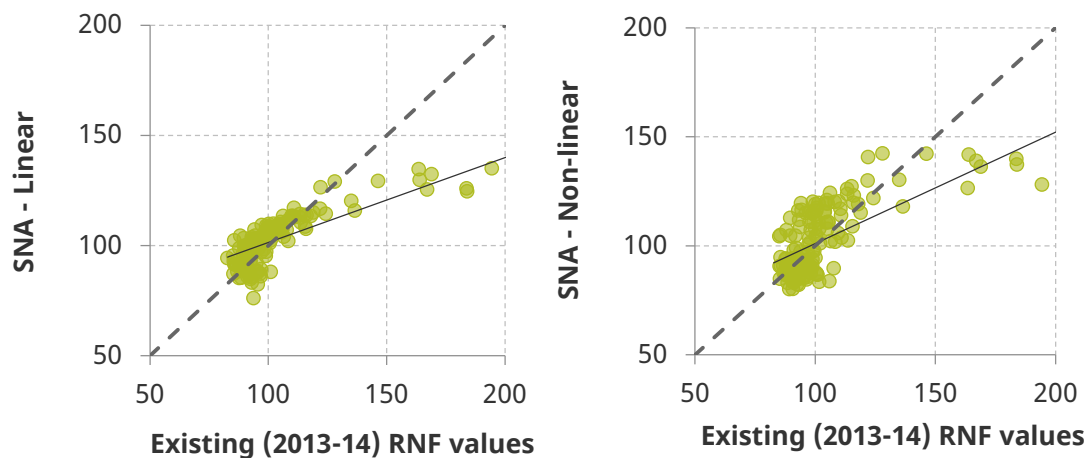
Figure 4.4 shows the following.

- **The range of SNA values produced by the non-linear formula is much wider than produced by the linear formula.** According to the non-linear formula, one-in-ten councils have a spending need per person of 85% of the national average or less, while another one-in-ten have a spending need of 125% of the national average or more. The equivalent figures for the linear formula are 88% and 115%, respectively.
- **The non-linear formula 'fits' the spending data better than the linear formula.** Statistically speaking, this has to be true. But it means that compared to the linear formula, the non-linear formula provides lower estimates of spending needs for councils with low levels of spending, and higher estimates of spending needs for councils with high levels of spending. This is demonstrated by the steeper trend line in the panel for the non-linear formula.

Figure 4.5 shows that the linear formula leads to spending-needs estimates that are closest to those produced by the existing spending-needs formula though – perhaps reflecting the fact that the existing formula is also linear.

Table 4.3 shows the impact of using a non-linear formula by council type. The average SNA value for counties and unitary authorities is little affected. However, on average, London boroughs see substantially higher SNAs and metropolitan districts see lower SNAs, under the non-linear formula relative to the linear formula. This reflects the fact that the non-linear formula is a better fit to actual spending patterns, with London boroughs having spending per person substantially above the national average (145%), and metropolitan districts having spending per person a bit below the national average (96%).

Figure 4.5. Relationship between EPCS SNA values and 2013–14 RNF values, by functional form of formula (linear or non-linear)



Note: As Figure 4.1. Both formulas estimated using 2016–17 data.

Source: As Figure 4.4, and Department for Communities and Local Government (2013).

Table 4.3. Average EPCS SNA values, RNF values and actual spending per person and deprivation levels, by council type

| | Linear formula | Non-linear formula | Average IMD score (2015) | Average RNF value (2013–14) | Actual spending (2016–17) |
|-------------------------------------|----------------|--------------------|--------------------------|-----------------------------|---------------------------|
| London boroughs | 117 | 125 | 24 | 127 | 145 |
| Metropolitan districts | 106 | 102 | 30 | 101 | 96 |
| Counties (and underlying districts) | 91 | 91 | 16 | 91 | 92 |
| Unitary authorities | 98 | 97 | 23 | 97 | 86 |

Note: As Figure 4.1. Both formulas estimated using 2016–17 data.

Source: As Figure 4.4, and Department for Communities and Local Government (2013).

Table C.2 in Appendix C shows that SNA values for some councils change very substantially according to whether a linear or non-linear formula is used to calculate spending needs. For instance, Bradford’s spending need per person for EPCS is 107% of the national average according to the linear formula, but just 84% according to the non-linear formula. Conversely, Knowsley’s assessed spending need per person increases from 113% to 117% under the non-linear formula.

This reflects the fact that the non-linear formula is better able to ‘match’ Bradford’s low levels of EPCS spending per person (80% of the national average) and Knowsley’s high levels (146%). But do these big differences in spending reflect big differences in spending needs or in some other factor – local preferences, efficiency or funding availability? Bradford and Knowsley are both urban councils with high levels of deprivation as measured by the IMD (17th and 2nd highest, respectively, out of 150 councils). It would therefore seem odd if the spending needs per person of Knowsley were nearly 40% higher than those of Bradford, which is what the non-linear formula implies.

The examples of Bradford and Knowsley therefore illustrate the risk of over-fitting the data by including additional non-linear terms to pick up economies (or diseconomies) of scale with respect to needs indicators. A non-linear formula will, by definition, provide a better statistical fit to spending data. But it may result in worse estimates of spending needs if, by doing so, it is providing a better statistical fit to the non-needs drivers of spending patterns.

4.4 Employment density no longer a strong predictor of councils' spending on EPCS, so its inclusion in a formula has little impact

There is similarly a risk of 'over-fitting' the data by including additional characteristics as needs indicators if those characteristics are correlated with non-needs drivers of spending. But, as discussed in Chapter 2, omission of important needs drivers can also lead to inaccurate or biased formulas for spending needs. Careful judgement is therefore required in determining what needs indicators to include in spending-needs formulas.

In this and the next section, we test the sensitivity of spending-needs estimates to the inclusion of additional needs indicators. The first indicator that we test is employment density – measured by the ratio of workers to residents based in an area. An employment density of greater than 1 indicates that there are more people working in a council area than living in it; while a value of less than 1 indicates there are fewer people working in a council area than living in it. The lowest employment densities are in suburban parts of East London (from where many people commute) and the highest are in central London (into which many people commute) and a number of other major employment centres, such as Manchester and Nottingham. The employment density of Westminster, the council with the highest employment density, is over ten times that of Lewisham, Redbridge, and Barking and Dagenham, the councils with the lowest employment densities.

Such an indicator in a formula could capture the effect of the additional costs to councils of having a large net inflow of commuters and, more generally, of having lots of employment located in them. Such costs could include those associated with licensing and regulating businesses, street cleaning, handling complex planning applications for commercial developments, and the provision of the cultural facilities and activities expected in major urban centres (and which typically serve people outside the council area as well).

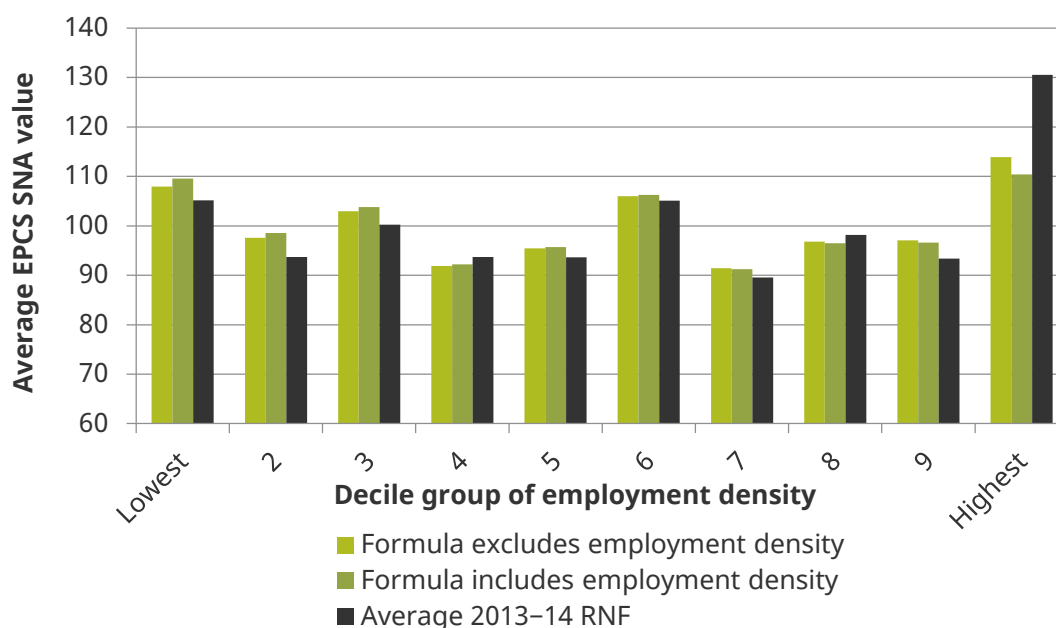
As explained earlier, the current RNF for EPCS includes a very similar needs indicator – the daytime population – and weights it highly. Indeed, this one indicator explains approximately 40% of the variation in councils' spending needs per person according to the existing RNF for EPCS. In particular, it is a key factor driving the high spending needs assigned to central London boroughs, including Westminster (253% of the national average), Tower Hamlets (194%) and Camden (184%).

However, in 2016–17, spending per person on EPCS was slightly *negatively* correlated with employment density, once one controls for deprivation and rurality. For most councils, inclusion or exclusion of employment density in the spending-needs formula therefore makes little difference. This is illustrated in Figure 4.6, which ranks councils according to their employment densities, and in Table C.3 in Appendix C, which shows the effect for a number of specific councils.

Figure 4.6 shows that even for the tenth of councils with the lowest employment densities, the inclusion or exclusion of this indicator makes only a very modest difference: the average SNA per person for this group is 108% of the national average for the formula excluding employment density, and 110% including it. Similarly, the tenth of councils with the highest employment densities, the average SNA per person is 114% of the national average for the formula excluding employment density, and 110% including it.

Figure 4.6 also shows that for those councils with the highest employment densities, a new formula would tend to lead to lower assessed spending needs than the existing EPCS RNFs. This reflects the fact that the high employment density of such councils – including Westminster, Camden and Tower Hamlets – does not increase their assessed spending needs under either of the new formulas, unlike the existing EPCS RNFs.

Figure 4.6. Average EPCS SNA and RNF values by decile group of employment density



Note: As Figure 4.1. Both formulas estimated using 2016-17 data.

Source: As Figure 4.4, and Department for Communities and Local Government (2013) and Office for National Statistics (2017b).

However, the inclusion or exclusion of employment density as a needs indicator in a new formula would make a significant difference to these councils. But rather than increase their estimated spending needs – as under the existing EPCS RNFs – the inclusion of employment density in a formula estimated using 2016-17 spending data significantly decreases their assessed spending need per person: in Westminster’s case (shown in Table C.3) from 128% to 103% of the national average.

The fact that this does not matter for most councils though may provide a rationale for the MHCLG’s current intention not to include a measure of employment density (or daytime population) in a spending-needs formula for EPCS. Excluding employment density also, in general, leads to a slightly closer match to the spending-needs estimates produced by the existing RNF.

It may be worth noting, however, that if we estimate the spending-needs formulas using data from 2009-10, then the inclusion or exclusion of employment density makes much more of a difference. For Westminster, for instance, a spending-needs formula including

employment density estimates spending needs per person to be 229% of the national average, compared to 139% from a formula excluding employment density. This is because in 2009–10, prior to recent budget cuts, there was a positive correlation between employment density and spending per person on EPCS.

Again, this begs the question as to whether the 2009–10 spending patterns or 2016–17 spending patterns better reflected variation in need (as opposed to, for instance, variation in funding from government). And once again, there is no objective way to tell.

4.5 Sensitivity to other needs factors

We also test the sensitivity of estimates of spending needs per person to the inclusion of a range of other characteristics as needs indicators:

- **population** (to account for economies and diseconomies of scale in service provision);
- **the fractions of the population aged under 16 or over 75, or the fraction that are non-white** (to reflect potential differences in spending need driven by demographics);
- **benefits receipts per person** (an additional proxy for deprivation);
- **population density** (to reflect potential differences in spending need driven by congestion or other factors associated with densely built-up areas).

As with the inclusion of non-linear terms, the inclusion of additional needs indicators must, by definition, improve the statistical fit of the formula with respect to actual spending (you cannot ‘explain’ less of the variation in spending after including another indicator in the formula). But it need not lead to better estimates of *spending need* if the indicator is correlated with non-needs factors that affect spending as well.

We do not attempt to summarise the effect of including or excluding each of the indicators. Instead we highlight two key findings from our analysis, using Figure 4.7. This figure shows how variable our average estimate of spending need is for each decile group of councils ranked according to their spending need under the existing EPCS RNF. It is a fan chart: each coloured band (from lightest green to darkest green and back to lightest green) represents 10% of our estimates of spending needs (from different formulas with different combinations of needs indicators).

Estimates of spending need are most sensitive to the choice and number of indicators for the councils that have the highest levels of spending need according to the existing formula.

For example, for the tenth of councils that have the highest level of assessed spending needs currently, depending on which indicators are included, the average of our new estimates of their spending needs per person ranges between 121% and 144% of the national average:¹⁹ a difference of 23 percentage points.

However, for those councils with just below average spending needs according to the current formula (the fifth decile group), the average of our new estimates ranges between 91% and 95% of the national average: a difference of 4 percentage points.

¹⁹ Half of the estimates lie between 139% and 144% though.

This makes intuitive sense. The councils with the highest assessed needs currently have such high spending-needs assessments because they are quite different to England as a whole. All are London boroughs – mostly from inner London. As such, they are substantially younger, have higher density and are less rural and generally more deprived than the average council in England, and they have either significantly above- or below-average employment densities. Because their characteristics are 'extreme', estimates of their spending needs are more sensitive to the indicators included (or excluded) in the spending-needs formula. In contrast, councils with average levels of spending needs under the existing formula are more average, by definition. So the choice of indicators (or the way they are included in the formula – linearly or non-linearly) is less likely to make such a big difference for them.

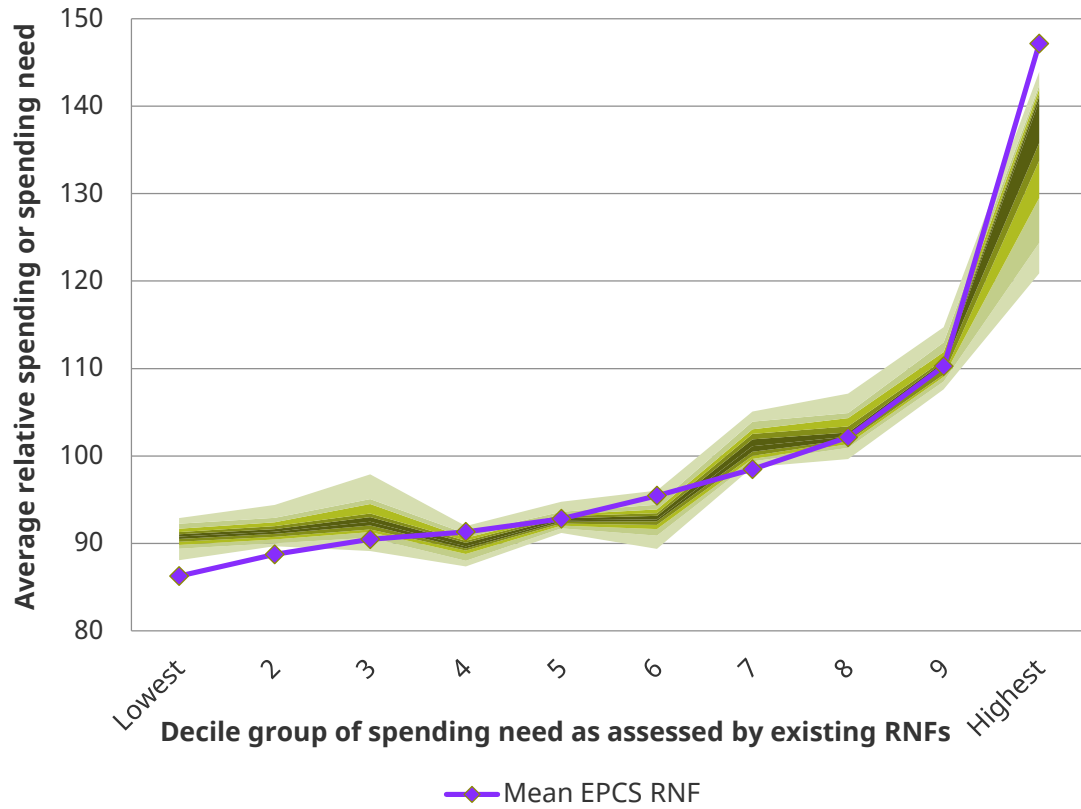
In all the specifications that we test, the councils with the lowest assessed needs according to the existing formula see, on average, an increase in their assessed spending needs in our new formulas. And those councils with the highest assessed spending needs according to the existing formula see, on average, a decrease.

For example, the tenth of councils with the lowest assessed spending needs according to the existing RNF have an average RNF per person of 86% of the national average. However, the average of our new SNA for them varies between 88% and 93% of the national average, depending on which indicators are included in our SNA formula.

However, for the tenth of the councils with the highest assessed needs currently, their current average spending need (147%) lies above our new estimates, which vary from 121% to 144% of the national average, depending on the indicators used.

This means that councils with high assessed spending needs for EPCS currently are likely to lose funding as a result of the updating of the EPCS spending-needs assessments. And those councils with low assessed spending needs for EPCS currently are likely to gain funding. This does not mean that these groups of councils will lose or gain from the Fair Funding Review overall though. That will depend on decisions taken in relation to the measurement of councils' revenue-raising capacity, and about how redistributive the overall funding system should be. It will also depend upon the updates made to spending needs for other services including adult social care and children's services. It is to the MHCLG's plans for these services that we now turn.

Figure 4.7. Distribution of average EPCS estimated need under different specifications, by decile of recently assessed need (2013–14 RNFs)



Note: As Figure 4.1. All formula specifications estimated using 2016–17 data.

Source: As Figure 4.4, Department for Communities and Local Government (2013), Department for Transport (2010, 2017), Department for Work and Pensions (2017), and Office for National Statistics (2017a, 2017b).

5. Will a subcouncil-level approach for social care be useful?

As discussed in Chapter 2, the MHCLG's preferred approach to assessing the spending needs for adult and children's social-care services is to use subcouncil-level data: measured at the LSOA-level for adult social care, and possibly even the individual level for children's services.

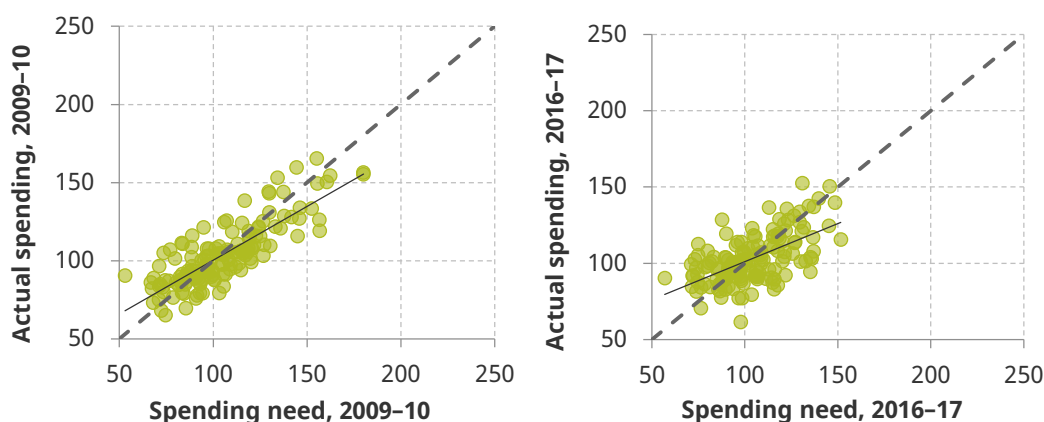
The spending-needs estimates produced by such an approach will still likely be sensitive to the choice of indicators used, and the way they enter the regression formula (e.g. linearly or non-linearly). But, because one can include statistical controls for each council, and estimate spending-needs formulas based on variation in spending and needs indicators *within* councils, one can avoid bias due to the impact on spending of non-needs factors (e.g. central government funding decisions, or local preferences and efficiency) on a council's overall spending.

5.1 A council-level approach would likely face problems

The above approach seems sensible. Figures 5.1 and 5.2 show that, as with overall spending and spending on EPCS and other services, the pattern of social-care spending has changed considerably since austerity began in 2009–10.

- **The relationship between actual and assessed spending needs has weakened.** In 2009–10, it was the case that councils with low assessed spending needs tended to spend more than their assessed needs, and councils with high assessed needs tended to spend less. This pattern was more pronounced in 2016–17.
- **The positive link between spending and deprivation has also weakened.** The relationships between spending and other council-level characteristics have also changed in systematic ways.

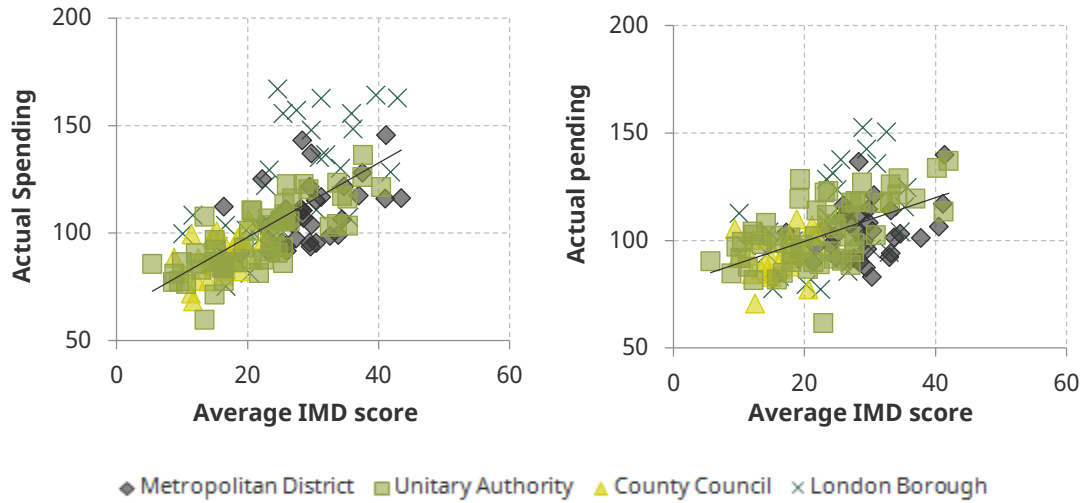
Figure 5.1. Social care: relative spending need and relative spending per person, 2009–10 and 2016–17



Note: As Figure 3.1.

Source: As Figure 3.1.

Figure 5.2. Correlation between local authority characteristics and relative social care spending, 2009–10 and 2016–17



Note: Excludes City of London and Isles of Scilly. Relative measures are scaled such that the mean is equal to 100.

Source: As Figure 3.3.

As with overall and EPCS spending, these trends are likely to be driven by the fact that cuts in central government grants to councils had a substantially bigger impact on the overall spending power of those councils most reliant on grant funding. That is, generally, those with the highest levels of assessed spending needs, and levels of deprivation. Indeed, recent IFS research shows that there is a strong correlation between cuts to councils' overall funding, overall spending and spending on adult social care.²⁰

As with EPCS and other services, these changing spending patterns would mean spending-needs formulas estimated would vary quite significantly depending on which year of data was used – with no objective way of telling which formula best reflected councils' spending needs.

5.2 Subcouncil-level approaches will be better but are not infallible

A spending-needs formula estimated using subcouncil-level (LSOA) data from 2012–13 has already been estimated for adult social-care services,²¹ and subcouncil data (although not at the individual level) were used in the last needs assessment for these services.²² Regression analysis using subcouncil-level data is therefore clearly a practical possibility for these areas. As discussed in Chapter 2 though, despite major advantages relative to using council-level data, the use of subcouncil-level data does not lead to fully objective measures of spending need.

The estimates of spending needs produced by these approaches will still depend upon subjective decisions about what needs indicators to include. Comprehensive sensitivity analysis – including for 'outlier' councils – will therefore be important for properly informed decisions. Such testing has taken place for the new adult social care formula, which shows that spending-needs estimates for different councils are generally robust to the *exclusion* of indicators included in the final specification (as well as a number of other

²⁰ Phillips and Simpson (2018).

²¹ Vadean and Forder (2018).

²² See Appendix A.

specification changes), although it is not clear how robust estimates would be to the *inclusion* of additional indicators. Box 5.1 discusses in more detail the indicators used in the adult social care formulas.

Box 5.1 Indicators included in the proposed new adult social-care services RNFs

The final set of indicators in the proposed adult social care formulas are:

- For younger adults' social services: the proportion of adults aged 16–64 with a limiting health condition; the proportion of households consisting of one family; and the proportion of adults aged 16–59 in receipt of income-contingent benefits.
- For older adults' social services: the proportion of people aged 65 or over claiming attendance allowance; the proportion of people aged 65 or over who are also aged 85 or over and have a limiting health condition; the proportion of households containing someone aged 65 or over that are headed by a couple; the proportion of people aged 65 or over who are also aged 80 or over and claim pension credit; the proportion of households containing someone aged 65 or over that are owned outright and in council tax bands A–E; and the proportion of households containing someone aged 65 or over that are owned outright and in council tax bands F–H.

The precise indicators differ from those in the existing RNFs for adult social-care services, but are similar in nature. The indicators for younger adults reflect the fact that ill-health, availability of family support and low income are predictors of need for social-care services. The first three indicators for older adults reflect care needs, while the latter three reflect financial means, given that social-care services are means-tested.

When these formulas were estimated, the proportion of the population that was white was controlled for. For younger adults and community-based care for older adults, having a higher proportion of white people was statistically associated with lower service usage or expenditure. But for residential-based care for older adults, having a higher proportion of white people was statistically associated with higher service usage. These effects were 'stripped out' of the final versions of the new RNFs though – an explanation for which is not provided in the final report from the researchers developing the formulas.²³ Perhaps it was felt inappropriate to base allocations on the ethnic make-up of the population, especially if variations in service use reflect variations in preferences among different ethnic groups (e.g. non-white groups may prefer to care for elderly residents at home rather than using a care home).

Chapter 2 also highlighted that differences in funding, preferences and efficiency may affect not only the overall level of spending by councils on social-care services (which can be dealt with by the inclusion of statistical controls for each council), but also how councils allocate that spending between small areas or people with different characteristics.

²³ Vadean and Forder (2018).

For instance, in some councils, the relative levels of spending allocated to deprived areas (or individuals) may be much greater compared to affluent areas (or individuals) than in other councils. This could reflect differences in local preferences – with some councils favouring a more progressive allocation of spending than others. Alternatively it could reflect differences in efficiency – with some councils able to provide services relatively cheaply to the most deprived areas and individuals, while being less efficient at providing services to the most affluent. Or, it could reflect differences in funding provided by central government – councils with less funding may have to focus on small areas and individuals with the most acute problems, who may be more or less deprived than those with more modest problems.

These issues become a problem when these non-needs factors are correlated with the needs indicators, such as the level of deprivation. This is more likely to be the case if the small areas or individuals with particular characteristics (e.g. being highly deprived) are particularly concentrated in a small number of councils.

With this in mind, Table 5.1 examines how concentrated the two most deprived and two least deprived decile groups of LSOAs are in councils with high and low levels of assessed spending needs, respectively. Deprivation as measured by the IMD (or a sub-component of that index) has been suggested as a needs indicator for children’s services.

The table shows clearly that the most deprived LSOAs are not all found in the most needy councils – just 21% of the most deprived LSOAs are in the most needy decile group of councils. Similarly, just 33% of the least deprived LSOAs are in the least needy decile group of councils. But it is also clear there is a strong concentration of deprived LSOAs in needier councils, and affluent LSOAs in less needy councils. For example, of the more than 3,000 most deprived LSOAs, only 0.5% (or 15) were in the least needy decile group of councils, and another 1.7% (or 55) in the second least needy decile group of councils. A very similar pattern holds for the least deprived LSOAs – very few are in the most needy group of councils.

Table 5.1. Distribution of the most and least deprived LSOAs across councils, by decile group of councils’ assessed spending needs as of 2013–14

| LSOA deprivation level | Decile of relative assessed needs for authorities (according to 2013–14 RNFs) | | | | | | | | | |
|---|---|-------|-------|-------|------|-------|-------|-------|-------|-------|
| | Most | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Least |
| Most deprived decile group of LSOAs | 20.8% | 25.1% | 17.7% | 11.2% | 7.8% | 6.7% | 4.5% | 4.1% | 1.7% | 0.5% |
| Least deprived decile group of LSOAs | 0.5% | 1.8% | 4.3% | 4.6% | 4.6% | 7.8% | 11.6% | 12.9% | 18.7% | 33.3% |
| Next most deprived decile group of LSOAs | 23.0% | 17.4% | 14.3% | 12.0% | 7.9% | 6.9% | 6.9% | 6.6% | 3.3% | 1.7% |
| Second least deprived decile group of LSOAs | 1.5% | 4.1% | 6.7% | 7.9% | 8.1% | 11.2% | 12.1% | 12.8% | 15.0% | 20.5% |

Note: Excludes City of London and Isles of Scilly.

Source: Department for Communities and Local Government (2013), Ministry of Housing, Communities and Local Government (2015a, 2015b) and Office for National Statistics (2016, 2018).

Thus, very little information on funding for the most deprived LSOAs will come from the least needy councils, and very little of the information on funding for the least deprived LSOAs will come from the neediest councils. If the distribution of funding to (or service use by) families living in the most and least deprived LSOAs differs between needy and

non-needy, then this could lead to formulas that produce biased estimates of spending needs.

There are ways to help mitigate these issues.

First, the sensitivity of spending-needs estimates to the set of councils used in constructing the spending-needs formulas could be tested. If similar results are obtained from different formulas constructed using subcouncil-level data from different sets of councils, then one could be reassured. If very different results were obtained, further investigation would be warranted. It does not appear that such sensitivity testing was conducted for the adult social-care services formulas.

Second, efforts can be made to make the estimation of spending-needs formulas more robust to these issues. For instance, the researchers estimating the adult social-care needs formulas included controls for the number of care home beds in the wider local area as a measure of the supply of care services to each LSOA. The aim of this was to allow the effect of choices over service provision (by the public or private sector) on subsequent service utilisation to be stripped out, so that spending-needs formulas would then reflect underlying demand/needs. In addition, rather than use councils' actual spending on people living in different LSOAs, the researchers used service utilisation multiplied by average unit costs for England as a whole. This was designed to strip out the effect of variations in efficiency or quality of care provided in different LSOAs, so that again the spending-needs formula would reflect underlying demand/need. These methodological choices may not fully control for non-needs drivers of service utilisation but should help to reduce their impact.

Third, as discussed in Chapter 2, one could estimate separate formulas for each council that would capture the relationship between spending and deprivation (and other needs characteristics) in that council only. These formulas could then be averaged to arrive at one final spending-needs formula. This could provide an equal weight (or perhaps a population-based weight) in the final formula to the way each council allocates resources between LSOAs or individuals with different degrees of deprivation, say – not a weight affected by the concentration of deprived and non-deprived LSOAs or individuals in particular councils (as takes place if a single formula is estimated using LSOAs from the entire set of councils for which information is available).

This may seem more objective. But ultimately, the way the relationships in different councils are weighted is subjective, as highlighted in Smith, Rice and Carr-Hill (2001). Moreover, if relationships in different councils do differ in systematic ways, that in itself is a reminder of how subjective spending needs are. Hence, while the use of subcouncil-level data for social-care services should be welcomed as a big improvement on council-level data, we cannot expect such methods to provide an 'objective' measure of spending needs for these services.

6. Conclusion

Updated assessments of councils' spending needs will be one of the key outputs from the government's 'Fair Funding Review'. Producing these is no easy task. Many factors apart from spending needs – such as local preferences and efficiency, and central government funding decisions – can affect the pattern of spending *across* councils and *within* councils. Estimating formulas to calculate spending needs using the relationship between spending and local characteristics can therefore run into a problem: the formulas could be picking up the relationship between these non-needs factors and local characteristics instead.

These problems are most severe for formulas estimated using council-level data. This is what the government proposes to use for environmental, protective and cultural services (EPCS), in large part due to the lack of subcouncil-level data on expenditure or service use for these services. Spending patterns for these services have changed significantly in recent years, with spending falling significantly more in those councils most dependent on central government grants. This is the result of the government's decision to reduce the degree of redistribution between councils with low assessed spending needs (or high revenue-raising capacity) and those with high assessed spending needs (or low revenue-raising capacity). As a result, spending has fallen more in deprived councils than less deprived councils, and more in those in which the most employment is based, such as central London and major cities (which tend to have high deprivation levels).

Our analysis shows that EPCS spending-needs formulas based on most spending data would therefore assign lower spending needs to deprived councils and higher spending needs to less deprived councils than formulas based on data from before the budget cuts and reductions in redistribution between councils.

This begs the question – which formula best reflects spending needs? Unfortunately with council-level data only, there is no objective way to tell. This is because any attempt to assess needs will be affected by the MHCLG's funding policy regarding the year of data used to estimate the spending-needs formulas.

Judgement and subjective decisions will therefore have to play a key role in the spending-needs assessment. In which year was the funding system fairest? How, if at all, should estimated formulas be 'tweaked' following consultation with local government or technical experts? Different people will have different views on these issues – illustrating the inherently subjective nature of 'spending needs' as a concept.

Clearly, one option is simply to use the formula from the most recent year of data available – which is the MHCLG's preference. This would generally mean the closest match between assessed spending needs and actual spending at the time of implementation – minimising any subsequent funding reallocations. But we should not be under any illusions that this approach represents the most 'objective' approach.

Our analysis also shows that estimates of spending needs for those councils currently assessed to have the highest needs are most sensitive to the choice and number of indicators included in the formula. The details of the spending-needs formula will therefore matter most for councils such as Westminster, Camden and Tower Hamlets in central London.

If they are based on the most recent data, then updated spending-needs assessments for such councils are also likely to be lower than under the existing relative needs formulas. Conversely, updated assessments are likely to be higher than existing assessments for those councils that currently have the lowest assessed spending needs. This means

updating the approach to assessing EPCS spending needs will likely redistribute funding from central London towards more rural and suburban areas, including outer London.

For adult social services and children's services, the government proposes to use subcouncil-level data to estimate spending-needs formulas. This is much more robust than using council-level data, as the effects of local preferences or efficiency and central government funding decisions on the overall level of spending on these services by different councils can be controlled for. However, it cannot fully control for these issues if they affect not only the overall level of spending but also how it is allocated between small areas or individuals with different characteristics in different councils. For example, if some councils have more funding than others, they may be able to offer a wider range of higher of services to people with less severe care needs – who might have different characteristics, on average, than those with the most severe care needs. Thus, the subcouncil approach, while it is a real improvement on council-level approaches to estimating spending-needs formulas, is not infallible.

While there are potentially issues with all the methods proposed by the government, we must not be too negative. The principles set out for the needs assessment (simplicity, transparency, robustness and being evidence-based) are sensible and the methods reasonable given data availability. Indeed, the proposal to use individual-level data for children's services would be innovative.

Three things are important going forwards though.

- **Being clear that no assessment of spending needs can be objective – although it can and should be evidence-based.** Judgement inevitably plays a part in deciding what year of data to use, what indicators to include, and what (if any) adjustments to make to formulas estimated by regression analysis if there is a concern that they are being biased by non-needs factors.
- **Being as transparent as possible about the impact that different choices (e.g. years of data, needs indicators) will have for different councils.** Our analysis shows that these things can matter a lot for specific councils – especially those that have quite different characteristics to the country as a whole. More generally, they will affect the relative levels of funding distributed to different types of council – deprived or affluent, urban or rural, county or borough. It is important that these effects are understood and debated.
- **Investing in improvements in subcouncil-level and individual-level spending (or service utilisation) and socio-economic data.** The aim, if possible, should be to wean ourselves off the use of council-level regression analysis in spending-needs assessment. This approach could become increasingly untenable over time if the new funding system is designed so as to *not* fully equalise with respect to spending needs and revenue-raising capacity.

Appendix A: Previous assessments of councils' spending needs

The methods for assessing the spending needs of English councils have been subjected to multiple reforms and changes since the first systematic efforts were made in the 1950s. The current spending-needs formulas – termed relative needs formulas or RNFs – have been in use (with some relatively minor modifications) since 2006–07, when the Four Block funding model was introduced. This appendix describes some of the main features of these RNFs, as well as the earlier formula spending shares (FSS) formulas. A discussion of the broader funding systems that operated alongside these RNFs, FSS and the standard spending assessments (SSAs, which were used in the 1990s and early 2000s) can be found in Amin-Smith and Phillips (2018).

The Four Block Model RNFs

Under the Four Block Model, separate RNFs were estimated or developed for different service areas – termed service blocks, and sub-blocks. These are set out in Table A.1.

Table A.1. Service blocks and sub-blocks: Four Block Model

| Blocks | Sub-blocks |
|--|--|
| Children's services | Youth and community Local Education Authority central functions Children's social care |
| Adult personal social services | Social services for older people Social services for younger adults |
| Environmental, protective and cultural services (EPCS) | County-level EPCS District-level EPCS Fixed costs Flood defence Continuing Environmental Agency (EA) levies Coast protection Concessionary fares |
| Highways maintenance | – |
| Capital financing | – |
| Fire | – |
| Police | – |

Note: The concessionary fares sub-block was added in 2011–12 when a specific grant to fund concessionary bus fares for the over 60s was rolled into general grant funding. The police block was removed in 2013–14 when full responsibility for police funding was transferred to the Home Office.

Each RNF has the same basic structure, accounting for the following three primary drivers of costs.

- **The size of the relevant population for each service.** For example, for older people's social services, this would be the population aged 65 or over. For children's social services, this would be the population aged 0 to 17. For highways maintenance, it is the length of roads in a council's area weighted by the type of road.
- **Variations in the characteristics of the populations or councils that affect the demand or need for spending for a given population size.** For example, for older people's social services, such characteristics include the fraction aged 90 or over, the fraction in receipt of income-based benefits or disability-related benefits, and the fraction living in rented accommodation. For highways maintenance, the characteristics include measures of traffic flow, the daytime population, and the number of snowy days or days where roads require gritting.
- **Variation in the input costs facing councils.** This was taken into account by an area cost adjustment (ACA), which multiplied each council's RNF value by a factor reflecting estimated variation in labour costs (for all workers) and business rates bills (which could also reflect wider property costs such as rent).

The characteristics taken into account in different formulas were chosen based on consultation with experts and local government, and statistical analysis of the extent to which they explained variation in spending on the services in question.

The weights assigned to the chosen needs indicators were determined by different approaches for different blocks and sub-blocks.²⁴ For example, weights for adult social services were estimated using ward-level regressions that examined the relationship between spending-needs indicators and the proportion of the population of different electoral wards who were users of social-care services. Similarly, weights for children's services were estimated using subcouncil-level regression analysis.

In contrast, weights in the RNFs for highways maintenance and fire and rescue services were estimated through council-level regressions of spending on needs indicators. Weights in the various sub-blocks for EPCS were based on judgement rather than any formal statistical analysis.

Formula spending shares

Prior to the introduction of the Four Block Model RNFs, council-level regression of spending on needs indicators had been used to assign weights to different indicators in the spending-needs formulas for adult social-care services as well (although subcouncil-level modelling has been used for children's social services since the late 1990s).²⁵ In this respect, the Four Block Model's RNF for adult social services represented an improvement on earlier approaches.

The same types of spending-needs indicators were included in the FSS formulas as were included in the later RNFs – client-group populations, factors affecting service demand/need from that client group such as measures of deprivation, and an input cost

²⁴ Ministry of Housing, Communities and Local Government (2018b).

²⁵ Smith et al. (2001).

adjustment. There were differences in the precise indicators used though. For example, the younger adults's social services formula under the FSS included: the proportion of people aged 18–64 in receipt of income support; the proportion living in purpose-built flats rented from a social housing provider; and the proportion of households with no family. The Four Block Model's RNF for younger adult's social services instead includes: the proportion of people aged 18–64 in receipt of disability living allowance; the proportion who had never worked or were long-term unemployed; the proportion in routine occupations; and the proportion of households with no family.

Needs indicators were changed following both consultation with stakeholders and technical experts, and statistical analysis of the drivers of council-level or subcouncil-level spending. Some indicators could also have been dropped if the data were not readily available at a subcouncil-level (e.g. the proportion of people living in purpose-built flats rented from a social housing provider).

Appendix B: Methodological detail

This appendix sets out details of how we calculate actual spending, spending needs as measured by existing RNFs and our new spending-needs assessments (SNAs).

Calculating spending and spending need as measured by existing RNFs

We take actual expenditures in 2009–10 and 2016–17 from local authority revenue expenditure outturn returns. In addition to aggregating expenditure at upper-tier (county) level in two-tier areas (for ease of comparison across England) we make the following adjustments.

- **We exclude expenditure on fire, police, educational and public health services.** This allows for consistent comparisons between (upper-tier) councils with and without responsibility for fire services (in some parts of the country there are separate fire and rescue authorities), and over time (e.g. public health services were only devolved to councils in 2013–14, and increasing numbers of schools have become academies and free schools directly funded by central government). It also allows for more consistent comparisons between actual spending and spending need as reported by existing RNFs.
- **We add levies paid to waste authorities and a proportion of levies paid to combined and transit authorities.** This is so that we capture spending by these authorities on waste disposal and support for bus services on behalf of councils. Again, this allows for more consistent comparisons between actual spending and spending need as reported by existing RNFs.

Our measure of EPCS spending is calculated to align with the set of services included in the EPCS RNF according to the MHCLG.²⁶ However, we exclude both spending and the RNF for concessionary bus travel as this was added to the EPCS service block in 2011–12: prior to that, these services had been funded by a specific grant. Our overall measure of spending needs for EPCS is therefore calculated as the sums of the EPCS upper and lower tiers, food defence, coast protection, and fixed cost service sub-blocks.

Estimating spending-needs assessments

To estimate our SNAs, we follow these steps.

- **EPCS expenditure in 2016–17 (or 2009–10) is first divided by population and then divided by the 2013–14 (or 2009–10) ACA for EPCS services.** Note that 2013–14 is the most recent ACA available.
- **This cost-adjusted EPCS expenditure per person is regressed on a set of local spending need indicators (e.g. average IMD score, rurality).** These regressions will pick up the correlation between EPCS spending and each need indicator (conditional upon the correlations with other indicators).

²⁶ Ministry of Housing, Communities and Local Government (2018c).

- **These correlations are then used to predict an initial spending need per person for each council using data on needs indicators for that council in 2016–17.** We use 2016–17 irrespective of whether the regression formula was initially estimated using 2016–17 or 2009–10. We do this so that our formula makes use of the most up-to-date data when predicting spending needs.
- **The initial spending need per person for each council is multiplied by that council’s ACA for EPCS in 2013–14.** This provides our final SNA for each council and undoes the adjustment made in the first step of this process.

The SNAs are then normalised so that the average for England as a whole is equal to 100. This means that a SNA value of greater than 100 indicates a council is assessed to have EPCS spending needs per person that are above the English average, while a value of less than 100 indicates a council is assessed to have EPCS spending needs per person that are below the English average.

Appendix C: Additional tables of results

Table C.1. Examples of EPCS SNA values when changing period of input data, by council for selected councils

| | Authority type | SNA per person (2009–10 data) | SNA per person (2016–17 data) | Change in assessed need between SNA measures (% points) | 2015 average IMD score | 2013–14 RNFs per person | 2016–17 relative spending per person | 2016–17 employment density (%) |
|----------------------|----------------|-------------------------------|-------------------------------|---|------------------------|-------------------------|--------------------------------------|--------------------------------|
| Kingston upon Thames | L | 88 | 105 | 17 | 11 | 94 | 144 | 54 |
| Lewisham | L | 141 | 129 | -12 | 29 | 128 | 132 | 27 |
| Westminster | L | 139 | 128 | -10 | 28 | 253 | 88 | 316 |
| Bradford | MD | 123 | 107 | -16 | 33 | 102 | 80 | 43 |
| Calderdale | MD | 102 | 98 | -4 | 25 | 94 | 107 | 53 |
| Knowsley | MD | 141 | 113 | -28 | 41 | 111 | 146 | 49 |
| Northumberland | UA | 86 | 89 | 2 | 21 | 95 | 79 | 39 |
| Slough | UA | 115 | 113 | -2 | 23 | 113 | 101 | 62 |
| Wokingham | UA | 69 | 94 | 25 | 6 | 83 | 67 | 58 |
| Cumbria | SC | 87 | 87 | 1 | 21 | 97 | 124 | 55 |
| Leicestershire | SC | 74 | 87 | 13 | 12 | 85 | 90 | 49 |
| Worcestershire | SC | 85 | 91 | 6 | 18 | 88 | 103 | 49 |

Note: As Figure 4.1. The 'authority type' abbreviations are defined as follows: L= London boroughs; MD = Metropolitan districts; UA = Unitary authorities; and SC = Counties (and underlying districts).

Source: Authors' calculations using Ministry of Housing, Communities and Local Government (2011a, 2011b, 2015a, 2017) and Office for National Statistics (2011, 2018).

Table C.2. Examples of EPCS SNA values for linear and non-linear specifications, by council for selected council

| | Authority type | Linear formula | Non-linear formula | Change in assessed need between SNA measures (% points) | 2015 average IMD score | 2013-14 RNFs per person | 2016-17 relative spending per person | 2016-17 employment density (%) |
|----------------------|----------------|----------------|--------------------|---|------------------------|-------------------------|--------------------------------------|--------------------------------|
| Kingston upon Thames | L | 105 | 116 | 11 | 11 | 94 | 144 | 54 |
| Lewisham | L | 129 | 142 | 13 | 29 | 128 | 132 | 27 |
| Westminster | L | 128 | 142 | 14 | 28 | 253 | 88 | 316 |
| Bradford | MD | 107 | 84 | -23 | 33 | 102 | 80 | 43 |
| Calderdale | MD | 98 | 97 | -1 | 25 | 94 | 107 | 53 |
| Knowsley | MD | 113 | 117 | 4 | 41 | 111 | 146 | 49 |
| Northumberland | UA | 89 | 85 | -4 | 21 | 95 | 79 | 39 |
| Slough | UA | 113 | 124 | 11 | 23 | 113 | 101 | 62 |
| Wokingham | UA | 94 | 49 | -45 | 6 | 83 | 67 | 58 |
| Cumbria | SC | 87 | 94 | 7 | 21 | 97 | 124 | 55 |
| Leicestershire | SC | 87 | 91 | 4 | 12 | 85 | 90 | 49 |
| Worcestershire | SC | 91 | 91 | 0 | 18 | 88 | 103 | 49 |

Note: As Figure 4.4. The 'authority type' abbreviations are defined as follows: L= London boroughs; MD = Metropolitan districts; UA = Unitary authorities; and SC = Counties (and underlying districts).

Source: Authors' calculations using Ministry of Housing, Communities and Local Government (2015a, 2017) and Office for National Statistics (2011, 2018).

Table C.3. Examples of EPCS SNA values when changing regression specifications (adding ‘employment density’ as a cost driver), by council for selected councils

| | Authority type | Formula <i>excludes</i> employment density | Formula <i>includes</i> employment density | Change in assessed need between SNA measures (% points) | 2015 average IMD score | 2013–14 EPCS RNFs per person | 2013–14 EPCS relative spending per person | 2016–17 employment density (%) |
|----------------------|----------------|--|--|---|------------------------|------------------------------|---|--------------------------------|
| Kingston upon Thames | L | 105 | 105 | 0 | 11 | 94 | 144 | 54 |
| Lewisham | L | 129 | 132 | 3 | 29 | 128 | 132 | 27 |
| Westminster | L | 128 | 103 | -25 | 28 | 253 | 88 | 316 |
| Bradford | MD | 107 | 108 | 1 | 33 | 102 | 80 | 43 |
| Calderdale | MD | 98 | 98 | 0 | 25 | 94 | 107 | 53 |
| Knowsley | MD | 113 | 114 | 1 | 41 | 111 | 146 | 49 |
| Northumberland | UA | 89 | 89 | 0 | 21 | 95 | 79 | 39 |
| Slough | UA | 113 | 112 | -1 | 23 | 113 | 101 | 62 |
| Wokingham | UA | 94 | 94 | 0 | 6 | 83 | 67 | 58 |
| Cumbria | SC | 87 | 87 | -1 | 21 | 97 | 124 | 55 |
| Leicestershire | SC | 87 | 87 | 0 | 12 | 85 | 90 | 49 |
| Worcestershire | SC | 91 | 91 | 0 | 18 | 88 | 103 | 49 |

Note: As Figure 4.5. The ‘authority type’ abbreviations are defined as follows: L= London boroughs; MD = Metropolitan districts; UA = Unitary authorities; and SC = Counties (and underlying districts).

Source: Authors’ calculations using Ministry of Housing, Communities and Local Government (2015a, 2017), Office for National Statistics (2011, 2017a, 2017b, 2018), Department for Communities and Local Government (2013), Department for Transport (2010, 2017), and Department for Work and Pensions (2017).

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