

## MORI Frontiers of Performance: Setting Realistic Targets for Public Services

Mark Abrams prize submission by Jayne Taylor & Bobby Duffy

30/9/2005

### Abstract

Assessments of public service performance, on things like exam results, generally take account of local circumstances and how this may influence outcomes. However, perception data from surveys (for example, satisfaction and other rating measures) are often taken at face value. This seems a simplistic use of data, as attitudes are as likely to be influenced by local circumstances beyond the control of services as other outcomes. In order to explore this, we have applied statistical techniques to existing survey datasets on council residents' and health service users' perceptions. This paper focuses on our latest study published in June 2005, which looks at resident ratings of local councils.

Building on a number of theoretical studies, and our own previous experience, the results of our analyses show the central importance of place, in particular local levels of deprivation and ethnic diversity, when comparing how well local agencies (e.g. local councils, hospitals and Primary Care Trusts) are seen to be performing by their 'customers'. The studies do this by applying a range of statistical techniques, including regression, Monte Carlo simulations and Data Envelopment Analysis (DEA).

Our results show that a number of local councils and health authorities that were considered to be under-performing in terms of customer perceptions are in fact excelling, given their very difficult local circumstances - and that many that were considered above average should not in fact be praised, as this is largely a result of serving easier populations. In short, our analysis shows that it is essential to recognise that 'excellence' in perceptions (as in any aspect of measurement) looks different in different types of areas.

This analysis has received a great deal of coverage, and, through working with colleagues at the Audit Commission, ODPM and Healthcare Commission, it has helped ensure that deprivation in particular is considered more directly in

service assessment exercises, such as the Comprehensive Performance Assessment (CPA) in local government.

## 1. Background

It is commonplace for assessments of performance, whether these are regular exercises such as the Comprehensive Performance Assessment (CPA) in local government, or one-off evaluations of government programmes to take account of local circumstances and how this may influence outcomes. Indeed, this is a central feature of most evaluation frameworks; for example, approaches to "realistic" evaluation emphasise the importance of contextual social conditions (Pawson and Tilley, 1997). The *local* context is a key element of this, and is seen in more sophisticated measures of, say, educational performance, where straightforward measures of exam achievements are adapted to take account of the educational starting points of pupils coming through the school, through a value-added approach (see, for example, DfEE, 2001).

In this context, it is surprising that perception-based data (satisfaction and other rating measures) are often taken at face value and not interpreted in light of local circumstances. It is taken for granted that we should factor in local circumstances when comparing school performance or the amount of recycling in a council - but it is rarely raised as an issue when considering user ratings of services. This seems wrong, as attitudes are as likely to be influenced by circumstances beyond the control of local services as other outcomes.

In order to explore this, we have borrowed a technique from the production economics field called Data Envelopment Analysis (DEA), which allows like-for-like comparisons of the relative 'efficiency' of local services. DEA offers an alternative and more meaningful approach for measuring relative performance than using simple league tables, and enables realistic targets to be set against which performance can be more fairly assessed.

But our analysis does not simply drop a statistical technique onto the data. DEA is the end point of a process that started from our experience of working in local areas, then used regression and simulation techniques to develop a robust model of the influences on perceptions of services that made sense to researchers and practitioners.

Essentially, the key questions that MORI's frontiers analysis can help answer are:

1. which local agencies (councils, hospitals etc.) are performing best on the basis of customer satisfaction/ratings, given the relative constraints under which they are operating and the inputs available to them?
2. how far can an individual council/hospital/etc. be expected to improve, based on satisfaction/customer ratings achieved in other 'similar' areas?

## 2. Methodology and data sources

Our approach involves four stages:

**STAGE 1: Data mapping exercise.** Local level data, taken from the census and other sources (see below), is combined with empirical customer survey data, using postcode information.

**STAGE 2: Identification of key exogenous 'drivers' of performance.** Correlation patterns in the data are explored and regression analysis applied to identify exogenous factors linked to perceptions of local service performance. Ordinary least squares regression was initially applied to the data and the results of this simple linear regression analysis were then corroborated through application of a more sophisticated approach called compositional analysis, which enables both satisfaction and dissatisfaction data to be model simultaneously (see annex 2). The method we use for the analysis combines two lines of research both dealing with 'compositional data' (a term that describes data sets with multiple outcomes, where the outcomes add to one for each unit of analysis), namely geology/geochemistry (see for example Aitchinson, J. (1986)) and voting models for multiparty systems. The model we use is based on the *additive logistic Student t* (LT) distribution, which was developed by Katz and King (Katz, J and King, G (1999)).

**STAGE 3: Simulations:** This stage involves simulating satisfaction levels for different combinations of local circumstances. This is mainly used as a tool to demonstrate the relationships, as it is time-consuming to run (unlike DEA), but does make the points very clearly (as outlined in the following section).

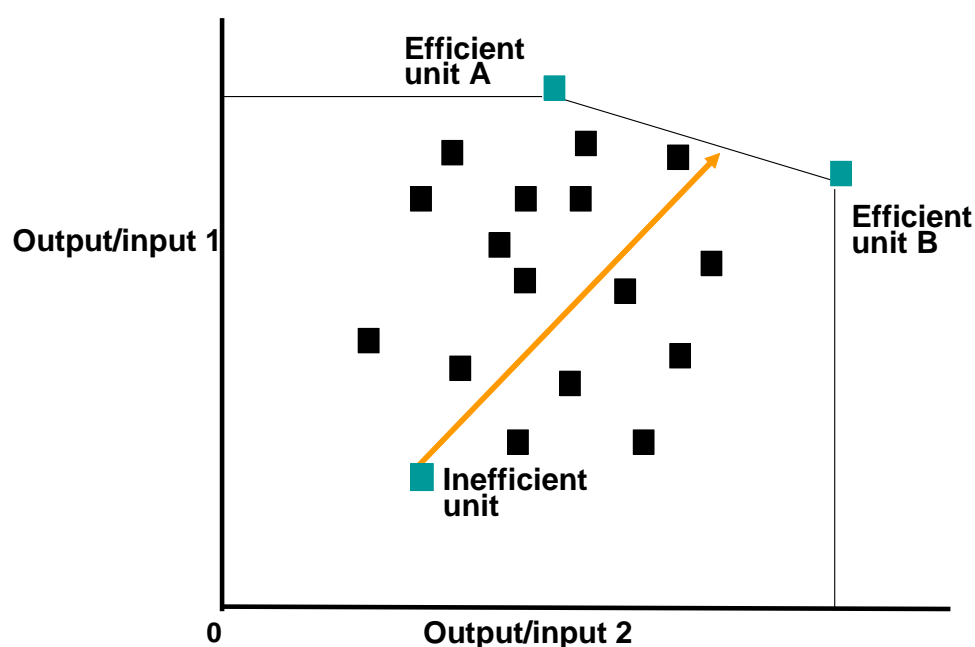
**STAGE 4: Benchmarking and target-setting.** The central focus of MORI's frontiers analysis uses DEA, a benchmarking technique developed by management scientists (Charnes, Cooper and Rhodes, 1978) building on the work of Farrell (1957), which captures the relative 'efficiency' of homogenous units in producing 'outputs' from a set of 'inputs'. One of the strengths of DEA is that it is a non-parametric approach, requiring no assumptions to be made about functional form linking the inputs and outputs. The only requirement, in fact, is that the units being compared in each case use similar inputs or resources to generate similar outputs or products/services.

The analysis converts multiple inputs and outputs into a single measure of 'efficiency' - those making the best

use of resources are rated as '100% efficient', while 'inefficient' units receive lower scores. The analysis therefore not only shows which local units are under-performing, but also by how much they could be expected to improve. The key feature of DEA in the context of the current analysis, is that the technique compares individual units with their peers - i.e. those operating under similar local conditions.

The key concept behind DEA is the 'efficiency frontier', as illustrated in figure 1. In this example, efficient unit 'A' and efficient unit 'B' form the efficiency frontier, as they have the highest ratio of output (here, measured by customer satisfaction) to each of the two local 'input' variables. The efficiency frontier 'envelopes' all other units and clearly shows the relative efficiency of each - the further away from the frontier a local unit is, the less efficient it is said to be.

**Figure 1: The efficiency frontier**



Over the past 20 years, since the initial DEA formulation, a number of different models for DEA have been developed, presenting researchers with a number of choices in the analysis (e.g. variable or constant return to scale, input or output orientation of the model). For these studies we used Banxia' *Frontiers* software, specifying constant returns to scale within an output maximisation model.

## Data sources

This paper focuses on our latest local council study, which was published this year, but we also draw on our 2004 study on health services to illustrate the range of possible applications.

The results of our frontiers analysis on council services, described in the following section, takes it's measure of local council 'performance' (the 'output') from the latest available individual satisfaction scores for all English councils, collected in the 2002-3 Best Value Performance Indicator (BVPI) General User Survey.

For our NHS frontiers analysis, the two main empirical data sources were the 2002/3 PCT patient surveys and the 2001/2 acute and specialist trust inpatient surveys (this was the latest available data at the time of the analysis).

Customer ratings data is then linked to a range of local level variables, taken from ONS' Neighbourhood Statistics (including a number of census variables), Audit Commission Performance Indicators (including levels of spend) and the Office of the Deputy Prime Minister's (ODPM's) Index of Multiple Deprivation (IMD).

The IMD measure is constructed at Super Output Area (SOA) level<sup>1</sup> from a number of indicators covering six domains: income, employment, health and disability, education/skills/training, housing, and geographic access to services. It includes a range of specific indicators, such as unemployment levels, school results, crime rates, overcrowding in housing, distance to a GP etc. IMD has been shown to be a powerful measure of local circumstances, capturing a range of information about areas, and is used widely to allocate resources in the public sector (e.g. in regeneration, health and local government). For MORI's frontiers analysis, all postcodes within the boundary of each relevant local unit (e.g. local authority, acute trust or PCT) are matched to wards/SOAs and the corresponding IMD score then applied to each unit.

Another key measure in the analysis is an index of ethnic diversity, which is based on census data, and derived using a simple formula called the Herfindahl index (used in econometrics and politics to measure industry or political party concentration/competition). This takes account of both the range and proportion of local

---

<sup>1</sup> This was at ward level prior to 2004.

# MORI

residents from different ethnic groups, so that areas with a high proportion of minority ethnic residents that are all from the same ethnic group will have a lower a lower 'diversity' score than an area that has a similar proportion of ethnic minority residents drawn from a wide range of different backgrounds.

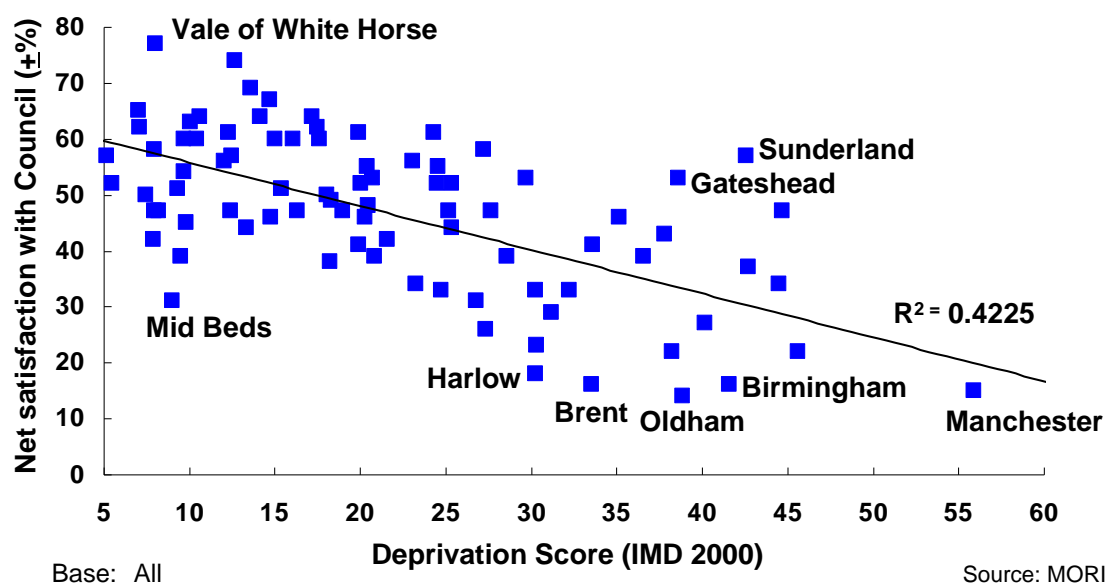


## 3. Results

### Stages 1 and 2: the exogenous 'drivers' of satisfaction

The strong links between ratings of services and both deprivation and ethnic diversity can be seen very simply and directly in scattercharts. The more deprived a local area, the less satisfied with services the population tends to be, as figure 2 demonstrates for English local authorities. Similarly, as figure 3 shows for PCTs<sup>2</sup>, providers that serve residents drawn from a relatively ethnically diverse local population are less likely to be perceived positively than those operating in relatively homogenous areas.

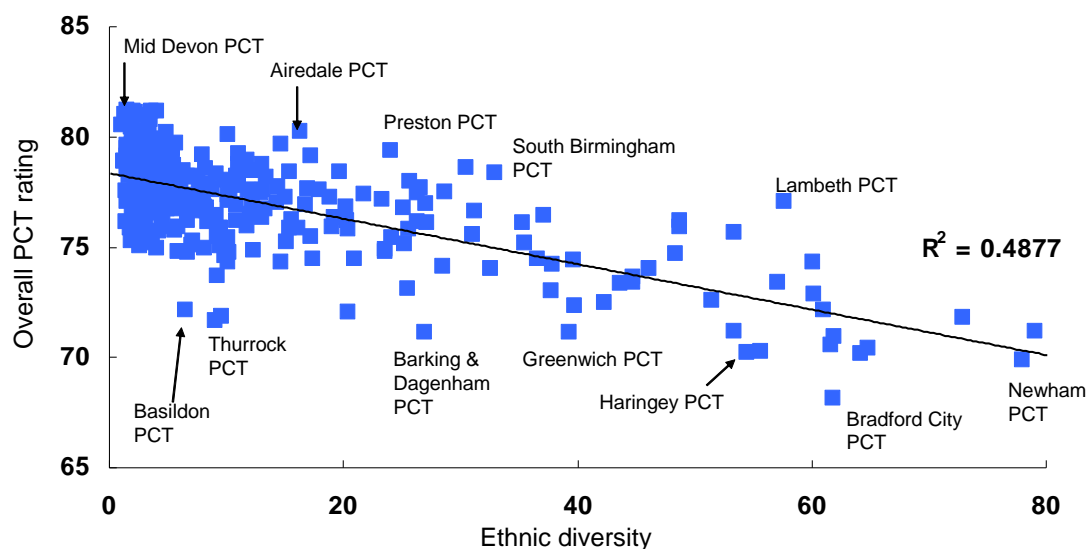
Figure 2: Satisfaction with council and local area deprivation<sup>3</sup>



<sup>2</sup> No overall patient satisfaction question was included in the 2003 PCT survey, on which these results are based. Instead, an overall rating score has been derived from the five 'domain' scores (themselves derived from individual survey questions) used in the previous Commission for Health Improvement's star rating system. The five domains are: 'access and waiting', 'safe, high quality, co-ordinated care', 'better information, more choice', 'building relationships', 'clean, comfortable, friendly place to be'. (Commission for Health Improvement, 2003).

<sup>3</sup> Net satisfaction is simply calculated by subtracting the percentage dissatisfied from the percentage satisfied for each local authority.

Figure 3: PCT ratings and ethnic diversity



Source: PCT patient surveys 2003/MORI

The explanation for these relationships can be seen in a range of social theories, and chimes with work we have conducted in local authorities, deprived and diverse areas. In general, it can be seen that those local authorities serving relatively deprived areas will face greater and more complex demands than those serving less deprived areas (see, for example, CASEpaper 45). As well as the direct needs of individuals being greater, there are a series of related issues in deprived areas:

- those in deprived areas lack access to some of the tools which make service delivery more straightforward - they are less likely to have internet access, and they are even three times as likely to have no telephone.<sup>4</sup> For example, 37% of those in the highest social classes have used a PC to get information, advice or purchase products compared with 9% of those in lower social classes;<sup>5</sup>
- it could also be argued that deprived areas are themselves more difficult to manage; poor design makes many of them harder to police, and this, along with cumulative neglect, makes maintaining their appearance more difficult;<sup>6</sup>
- there are also practical problems from operating in deprived areas with higher crime and disorder rates,

<sup>4</sup> Social Exclusion Unit - *Bringing Britain Together*

<sup>5</sup> MORI/Cabinet Office 2000

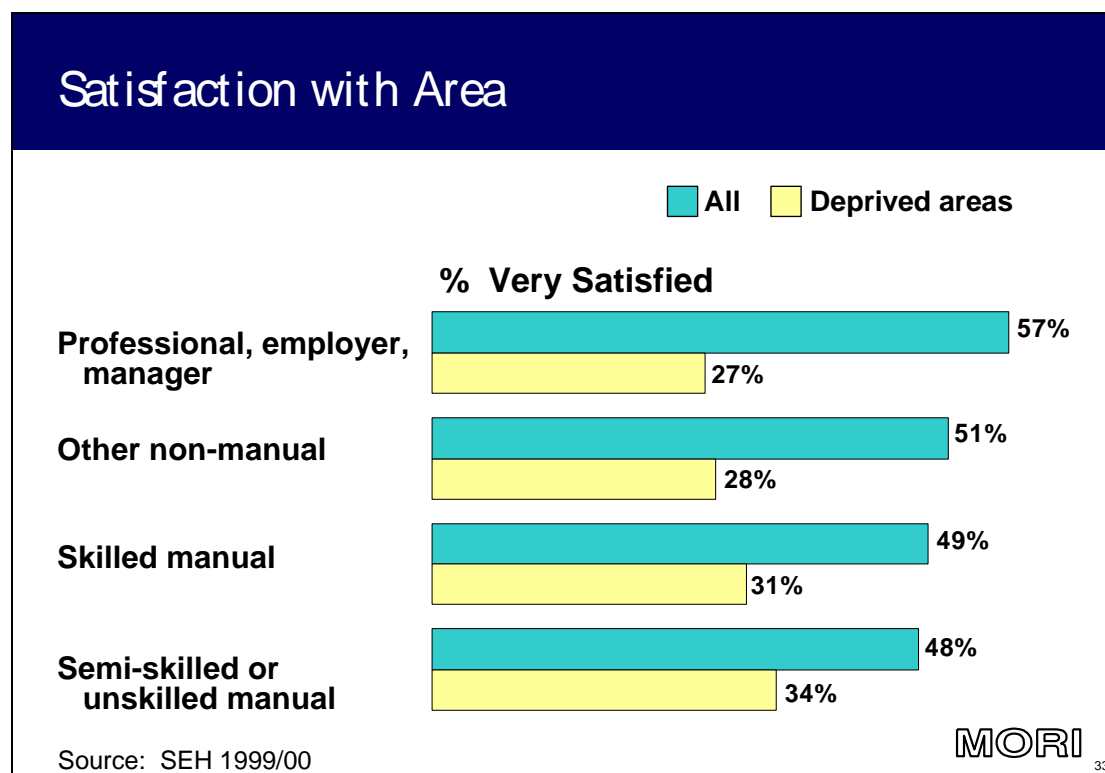
<sup>6</sup> Power, *A Poor areas and social exclusion* LSE CASEpaper 35

such as damage to property and theft of equipment, along with the associated higher security costs;

- and there is also evidence that the extent of local fundraising and certain types of volunteering is lower in deprived areas.

The fact that satisfaction with services is lower in deprived areas could be seen to contradict the common view that those in deprived areas have lower expectations;<sup>7</sup> this should make residents less demanding of service performance and even if objective quality is lower we may not expect to see such a clear-cut relationship between ratings and deprivation. However, other survey evidence does suggest that expectations are still important - in particular, when we look at area satisfaction (as seen in figure 4) it is the higher social classes living in deprived areas that are the least happy, a relationship that also applies to views of local services.

Figure 4: Expectations - the interaction between class and area deprivation



Ethnic diversity may also be seen to put more complex demands on local services, where they have to meet a wider range of cultural and practical (for example,

<sup>7</sup> See *Satisfaction and expectations: public services in deprived areas* CASEpaper 45

language) needs. Of course, deprivation and ethnic diversity are often closely linked, and both could simply be picking up other local area characteristics - such as age profile, population turnover/churn, levels of rurality/urbanity or inequality. However, the regression analysis stages show both deprivation and ethnic diversity to be strongly and independently related to customer perceptions even after controlling for a wide range of other local factors (see annex 1).

You can in fact get a sense of this from the simple chart of council satisfaction shown above (see figure 2): it tends to be the relatively ethnically homogenous areas such as Sunderland and Gateshead that achieve higher satisfaction levels than you would expect from the level of deprivation alone, and the relatively diverse areas of Birmingham, Brent and Oldham that achieve lower satisfaction levels than their deprivation would suggest.

### Stage 3: Monte Carlo simulations

In fact, our analysis shows that by knowing *only* the level of deprivation and ethnic diversity in a local area, it is possible to predict levels of customer satisfaction with council services within relatively small ranges. This is demonstrated in figure 5, which presents the results of a Monte Carlo simulation producing expected satisfaction levels for various simulated mixes of deprivation and ethnic diversity. The model can also predict upper and lower bands for these expected levels, within which we would expect 19 out of 20 authorities to fall.

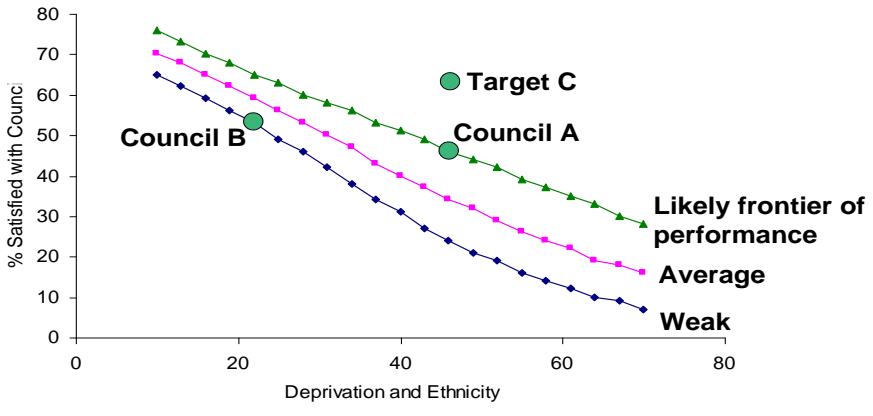
We did not run these simulations for individual clients, as the analysis is time-consuming, and the DEA performs a similar function more simply. However, this stage of the analysis has proved to be vital in helping to explain the concepts in simple terms - something that has been crucial to the success of our frontiers work. In particular, figure 5 makes two points very clearly:

- first, if you are Council A you should be congratulated for achieving that level of satisfaction among your local population. And you should be viewed as performing better than Council B, despite your lower absolute level of satisfaction, as your local circumstances are much more difficult;
- second, if you are Council A there is no point in setting yourself Target C, as you are very unlikely to achieve this, and you may just be setting yourself up to fail. You should set your organisation a testing target, but this needs to have some reference to the realities of local circumstances.<sup>8</sup>

Figure 5: Simulated satisfaction levels

---

<sup>8</sup> Of course, levels of deprivation and diversity may change over time, and indeed it will be the aim of council services to reduce deprivation. However, this will generally take a significant time, and trends in deprivation show that relative positions do not change greatly in the short-term.



Source: MORI

## Stage 4: benchmarking and target setting using DEA

The final stage of the analysis is the DEA. This technique depends on identifying robust and understandable reasons why the inputs should be taken into account when comparing the output, which is why the regression stages are so important to the analysis as a whole. To recap, the regression models found that the key input (or 'constraining') variables for local council services are ethnic diversity and local area deprivation. In our health frontiers work, we also included the age profile of the local population as an input to our model, as this was shown to be a strong 'driver' of patient perceptions in our regression models.<sup>9</sup>

In addition, we also include the level of available resources as an input variable, as this arguably determines the *minimum* level of service that can be delivered. For council services we simply used net council spend per head. For health services we used measures of manpower resources (GPs per 100,000 population and doctors per hospital bed).

Before describing the results of our latest frontiers analysis, it is important to note that being rated as '100% efficient' does **not** mean that there is no room for improvement in customer perceptions - it only indicates that there are no other similar units *currently* performing any better. As such, and as we have made clear whenever discussing the analysis, it is important that policy-makers and service managers do not focus solely on the results of this type of analysis but view it as an important supplementary indicator, to be counted alongside absolute levels of satisfaction and wider measures of performance.

As noted previously, frontiers analysis makes most sense when we are comparing performance of relatively similar units. For this reason, we have conducted the analysis separately for different types of local authority - district and county councils, unitary authorities, plus metropolitan and London boroughs.

Figures 6a, 6b, 7a and 7b present *actual* satisfaction levels (obtained from 2004/5 BVPI survey data) and the satisfaction levels *predicted* by the DEA model for the top and bottom 15 county council and unitary authorities. In addition, the charts also show the 'efficiency' score

---

<sup>9</sup>Specifically the percentage aged 0-15 and percentage aged 60+ - the former was found to be negatively correlated and the latter positively correlated with patient perceptions.

- this is simply the ratio of actual to predicted satisfaction. Local councils that are '100% efficient' are performing at least as well as can be expected, given prevailing local conditions. Those with less than 100% efficiency are functioning at a level below that which might be expected, given performance achieved elsewhere in similar areas by councils operating under similar constraints.

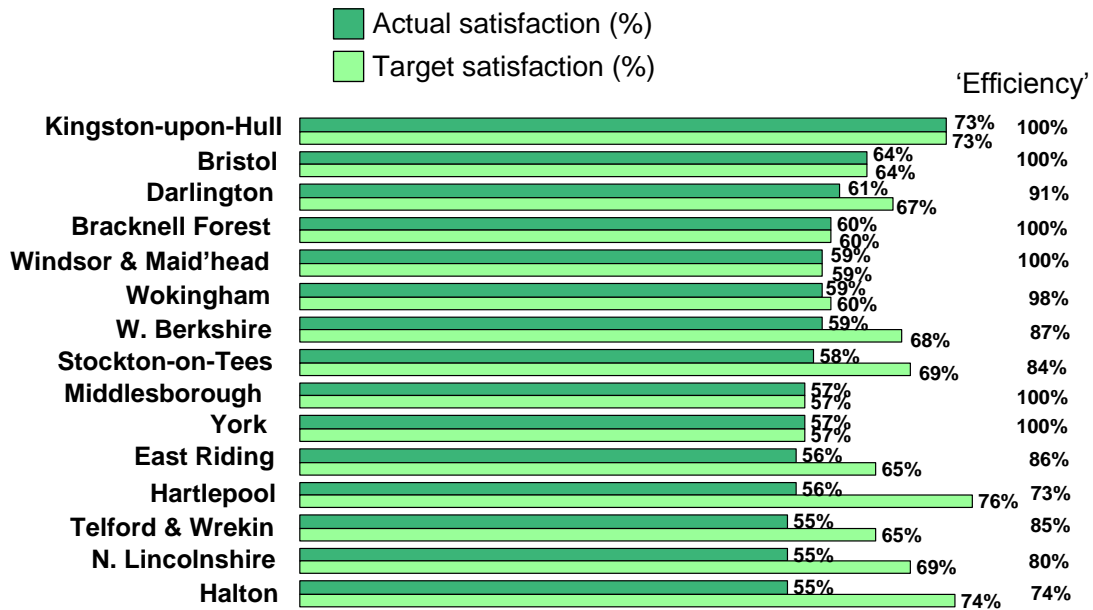
First, figures 6a and figure 6b for Unitary authorities show that, for example:

- while Slough is near the bottom of the league table in terms of absolute customer satisfaction, they should actually be viewed positively, as their relatively diverse and deprived population means they have particularly difficult local circumstances. However, as mentioned previously, this does not mean that they should not or cannot strive for improvements;
- on the other hand, a number of unitary authorities, including West Berkshire and Stockton-on-Tees, whilst achieving relatively high ratings from local residents should be performing even better, because their local populations are comparatively easy to serve and/or they have more resources available to them - both of these councils are operating at less than 90% 'efficiency'.

Figure 6a: DEA results for best rated Unitary authorities



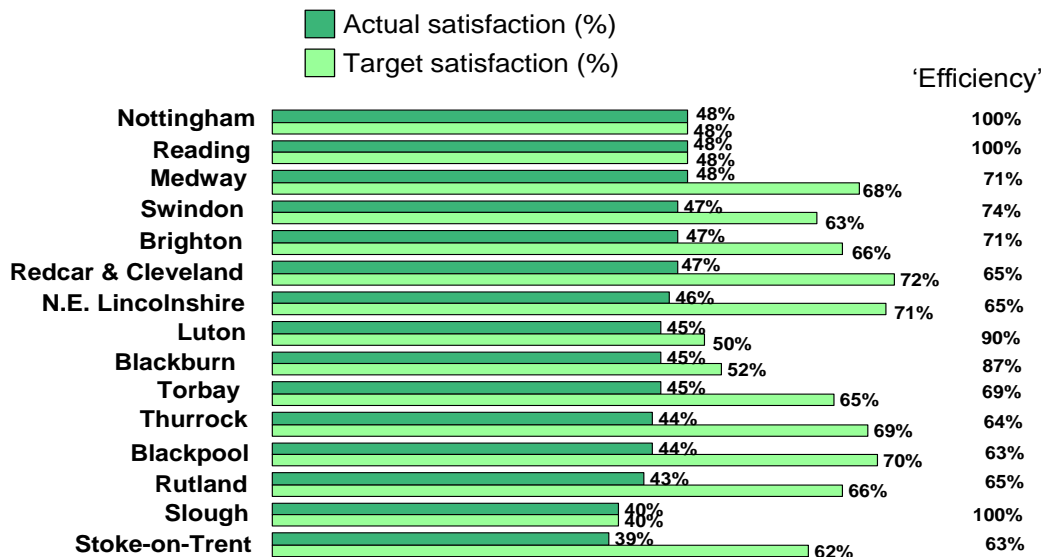
**Top 15 rated Unitary authorities**



Source: MORI

Figure 6b: DEA results for worst rated Unitary authorities

**Bottom 15 rated Unitary authorities**



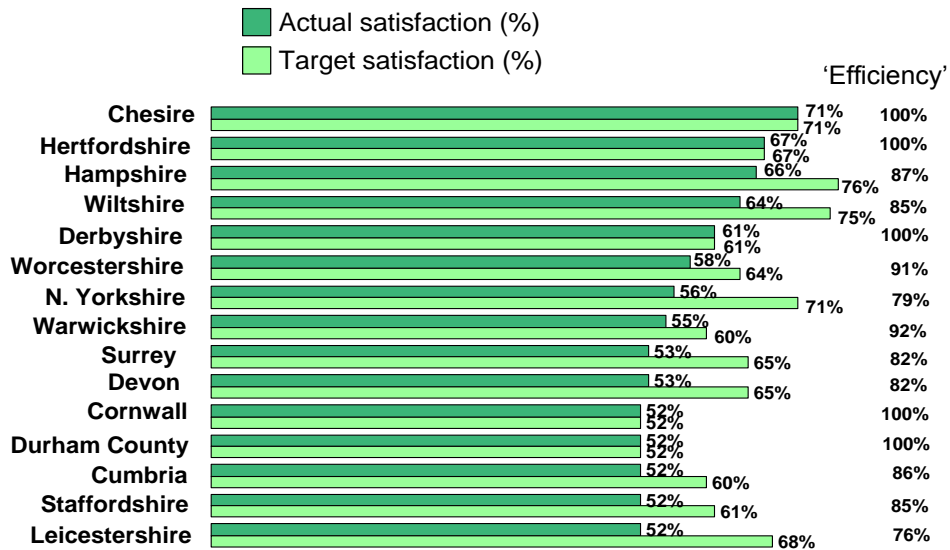
Source: MORI

Similar results are shown for **county councils** in figure 7a and 7b. For example, councils like Hampshire and Wiltshire, while achieving high absolute levels of satisfaction should actually be doing better, given what is being achieved by other councils operating under similar constraints. On the other hand, while Lancashire

and Buckinghamshire achieve relatively low absolute satisfaction scores, they are actually among the most "efficient", given the characteristics of the local population and/or the resources available to them.

Figure 7a: DEA results for best rated county councils

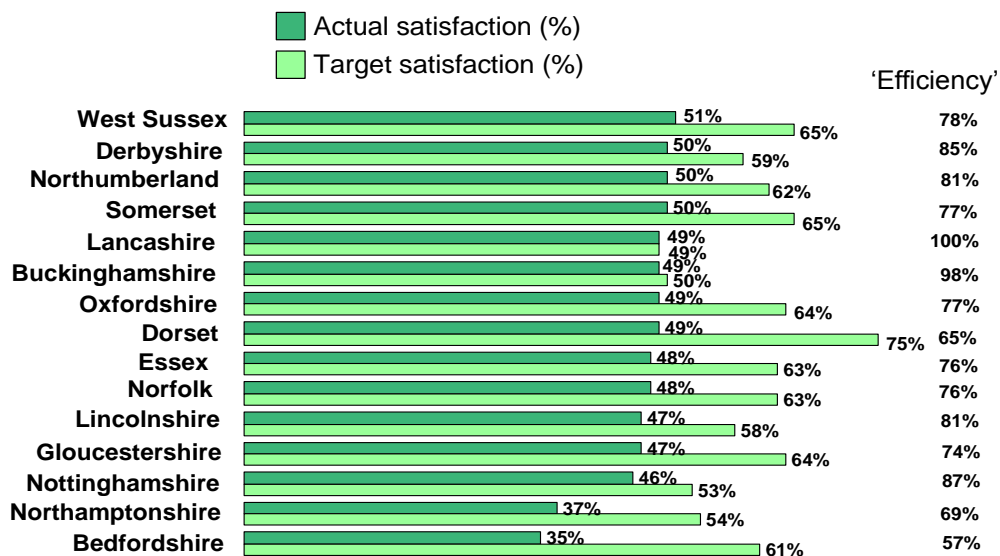
### Top 15 rated county councils



Source: MORI

Figure 7b: DEA results for worst rated county councils

### Bottom 15 rated county councils



Source: MORI

While we think the results of the analysis are very robust and an important addition to the debate on how to

interpret survey data in service assessments, there are a number of limitations to the DEA approach that should be kept in mind. Most notably:

- the results are wholly dependent on the inputs or 'explanatory' factors included in the model - other unobserved factors (which in this case could include for example the amount and slant of media coverage of different local services) not included in the model might also have an influence on achievable levels of customer satisfaction;
- DEA is very sensitive to outliers, which can greatly affect the shape of the efficiency frontier (Donthu and Yoo, 1998) - the selection of observations/organisational units is, therefore, critical, and is one of the reasons we conducted separate analyses for different local authority types;
- the number of inputs and outputs must be kept small relative to the number of observations to avoid abnormally large efficiency scores being generated. This was not in fact a problem in our studies, as the regression stages identified a fairly clear-cut and small number of important variables;
- finally, the analysis is based on survey data which are, of course, subject to sampling tolerances. However, all results are based on quite large sample sizes and are, therefore, subject to relatively narrow confidence intervals (perhaps an average of  $\pm 4$  percentage points).<sup>10</sup>

---

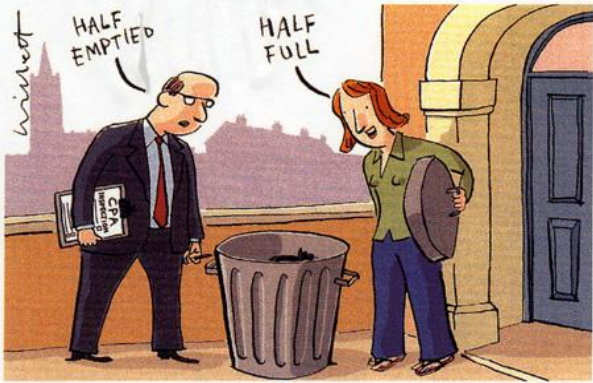
<sup>10</sup> Based on individual sample sizes of between 500 and 1,000, with fairly large design effects, given the significant profile weighting that is often required with these type of postal surveys.

## 5. Making an impact

The studies have had a real impact. For example the leader article from the Local Government Chronicle at the time of our first report said:

*"The analysis is dynamite, and backs the argument by the Local Government Association, and other respondents to the framework consultation, that deprivation should be taken into account when working out the ratings." (Local Government Chronicle)*

The most recent report was covered in the following article in the same magazine in June 2005:



**LEADER**

**Your reputation depends on it**

Councils must use MORI analysis to their advantage

**A** lot of fun will be had with the new MORI analysis of relative satisfaction of local people with their council's services (see pages 9 and 26). After all, one of the most notable findings is that Kingston upon Hull City Council has almost the highest level

learn lessons from them about effective reputation management. This is not about spin. It is a wholly respectable activity for any council — indeed, under the new comprehensive performance assessment rules, perception will be a key measure for the

**OPINION**

Our work has also added to the Audit Commission's case for the use of context information in assessing performance. For example, their Chief Executive Steve Bundred has said *"MORI's reports on the Frontiers of Performance in Local Government have been an important influence on the way in which the sector considers public satisfaction data, and have helped our thinking on these issues."*

The local council study has also been cited widely in central and local government research and policy reports. This includes, for example, a report on New Localism by ODPM (click [here](#)), which uses the analysis as evidence of the need for local variation in service provision.

MORI has also been working closely with the independent Quality Measures Group for health services, in debating the options for a replacement for the NHS star ratings system, taking account of the findings from the frontiers studies. Alongside this, MORI has been consulted by the Healthcare Commission to advise on these issues, and the study has been cited in the recent "State of Healthcare 2005" report (click [here](#)).

There is also evidence that individual Strategic Health Authorities are taking on board MORI's results in striving for improved standards - for example, Trent SHA's have used the report to help identify priorities and set targets (click [here](#)).

## 6. Conclusions and future research

The main reasons for the success of the frontiers of performance studies are that the story is intuitive - it is based on a clear theory of the link between local area characteristics and survey ratings - and that we have attempted to explain the analysis in as straightforward a way as possible. The studies were self-funded by MORI and we have tried to promote them as widely as possible, through launch events, newsletters and at a range of conferences.

Our analysis has highlighted the vital role of the nature of where people live in influencing perceptions of local services. This has important implications not only for assessments of the performance of individual service providers, but it also raises questions about the extent to which local and central government need to more actively manage the characteristics of local areas. This is particularly important when decisions are being made about the nature of significant new local communities, as part of the Communities Plan. It also backs up the case for greater local control of services seen in a number of recent theories, generally grouped together as "New Localism"; the very strong relationship between local characteristics and ratings of services suggests that greater local tailoring of provision could have a real impact.

The very strong relationship between perceptions and ethnic diversity also raises important questions. Whether or not diversity is actually causally related to poorer ratings of services, the relationship is strong enough to suggest that, if the aim is to improve perceptions overall, funding for local services should take account of the levels of ethnic diversity in the same way that deprivation is factored in to many public budget allocations.

We feel that the frontiers approach can be usefully applied in a large number of sectors, and we have started to explore the potential for similar analyses in housing, police and education services, where similar results are starting to emerge. For example, the early results of our housing analysis (using local authority tenants' satisfaction data) suggests that here, as well as in health and local government, deprivation and diversity are key drivers of perceptions. However, there are additional factors specific to housing that affect perceptions - for example, those tenants living in areas with more social housing tend to be less satisfied with

the housing services they receive than those living in areas with a smaller social housing stock. We will be publishing this work early in 2006.

*For further details, please contact Bobby Duffy ([bobby.duffy@mori.com](mailto:bobby.duffy@mori.com) or 020 7347 3000).*

## **Acknowledgements**

Particular thanks are due to Ben Page for comments on the design and Carlos Elordi, Andrew Zelin and Jamie Burnett for their input into the statistical analysis of the data.

## Annex 1

The table overleaf presents the results of a regression analysis relating local economic and social indicators to aggregate measures of satisfaction and dissatisfaction with local councils (the former using 2001 Census local area statistics and IMD; the latter taken from Best Value Performance Indicators survey data).

The model treats the dependent variable as a composite measure - proportion satisfied overall with their local council, proportion dissatisfied and proportion uncertain (where levels of uncertainty are measured by the proportion of 'don't know' responses). Two features of this kind of data are that each proportion falls within the range 0,1 and that the sum of all proportions sums to 1.

Since standard regression models cannot deal with this type of data, the compositional measure is modelled with the additive logistic Student t distribution, developed by Katz and King (1999). This involves transforming the dependent variable before the estimation of the main parameters. To recover the expected proportions of people satisfied with, dissatisfied with and uncertain about the performance of their local council, the following formula is applied:

$$S_{ij} = \frac{\exp(Y_{ij})}{1 + \sum_{j=1}^{j-1} \exp(Y_{ij})}$$

where: S is the proportion of people satisfied/dissatisfied/neutral

i denotes the local council

j denotes one of three 'choices' (satisfied, dissatisfied, neutral)

The table presents the results of the compositional analysis, where 'don't know' was used as a base category. The final set of independent, or 'explanatory' variables include a number of local area economic and social indicators:

- level of area deprivation (IMD)
- level of ethnic diversity (ETHDIV)
- unemployment level (UNEMP)



- level of council spend per capita (Q1)
- proportion of people renting council houses (COUNRT)
- proportion of people aged 60 and over (OVER60)
- proportion of people living in large houses (BIGHH)
- proportion of single parents (SINGPR)
- type of council (expressed as a number of dummy variables - CC for county council, LB for London Borough, M for Metropolitan District and U for Unitary)

The table below shows that both deprivation and ethnic diversity are significantly and negatively related to residents' satisfaction with their local council. However, while deprivation also appears as a significant *positive* correlate with *dissatisfaction*, ethnic diversity is linked to satisfaction only.

## Compositional analysis results

	Coeff	Std. Error	Z	P> z	[95% Conf. Interval]	
satlog						
OVER60	1.21865	1.714791	0.711	0.477	-2.142279	4.57958
ETHDIV	-2.313163	0.5407811	-	0.000	-3.373075	-1.253252
			4.277			
UNEMP	0.5466005	2.763015	0.198	0.843	-4.868809	5.96201
COUNRT	0.4417502	0.5558176	0.795	0.427	-	1.531133
					0.6476323	
BIGHH	16.93784	6.216181	2.725	0.006	4.754352	29.12133
SINGPR	3.670388	4.950736	0.741	0.458	-6.032876	13.37365
IMD	-0.154945	0.0073406	-	0.035	-	-
			2.111		0.0298818	0.0011073
Q1	0.0004761	0.0002949	1.615	0.106	-	0.0010541
					0.0001018	
CC	0.0684345	0.3218493	0.213	0.832	-	0.6992474
					0.5623785	
LB	0.0940062	0.2575545	0.365	0.715	-	0.5988037
					0.4107914	
M	-	0.2175847	-	0.530	-	0.2897167
	0.1367415		0.628		0.5631997	
U	-	0.2149292	-	0.005	-1.020328	-
	0.5990748		2.787			0.1778213
_cons	0.4860571	0.6063038	0.802	0.423	-	1.674391
					0.7022765	
disatlog						
OVER60	1.822116	1.801537	1.011	0.312	-1.708831	5.353063
ETHDIV	0.104765	0.5681373	0.184	0.854	-1.008764	1.218294
UNEMP	-5.047273	2.902786	-	0.082	-10.73663	0.6120837
			1.739			
COUNRT	1169727	0.5839345	2.003	0.045	0.0252368	2.314218

# MORI

BIGHH	5.694079	6.530636	0.872	0.383	-7.105733	18.49389
SINGPR	8.62885	5.201177	1.659	0.097	-1.567233	18.821
IMD	0.0199063	0.0077119	2.581	0.010	0.0047913	0.0350214
Q1	5.72e-06	0.0003098	0.018	0.985	-	0.0006129
					0.0006015	
CC	-	0.3381305	-	0.880	-	0.611622
	0.0511016		0.151		0.7138252	
LB	0.0920508	0.2705833	0.340	0.734	-	0.6223843
					0.4382827	
M	-0.105376	0.2285916	-	0.645	-	0.3426553
			0.461		0.5534072	
U	-	0.2258017	-	0.559	-0.574724	0.3105542
	0.1320091		0.585			
_cons	-1.843309	0.6369746	-	0.004	-3.091756	-
			2.894			0.5948613
	"R-sq"					
satlog	0.2952					
disatlog	0.5384					

## Bibliography

- Aitchinson, J. (1986). *The Statistical Analysis of Compositional Data* London: Chapman and Hall
- Charnes, A, W Cooper and E Rhodes (1978). "Measuring the Efficiency of Decision Making Units". *European Journal of Operational Research* 3(6): 429-44.
- Commission for Health Improvement (2003). "Survey Indicator Methodology, PCT Survey 2003, Local Health Services Questionnaire"
- Duffy, B (2001) *Satisfaction and expectations: attitudes to public services in deprived areas* CASEpaper 45
- DfEE (2001). *Statistics of Education: Pupil Progress in Schools in England. Statistical Bulletin. Department for Education and Employment.*
- Department of Health (2005). *Resource Allocation: Weighted Capitation Formula, fifth edition.*
- Farrell, M J (1957). "The Measurement of Productive Efficiency." *Journal of the Royal Statistical Society Series A* 120 (3): 143-55
- Katz, J and G King (1999). "A statistical model for multiparty electoral data", *American Political Science Review*, 93(1): 15-32
- King, G, Tomz, M and Wittenberg, J (2000). "Making the Most of Statistical Analyses: Improving Interpretation and Presentation." *American Journal of Political Science* 44, no. 2 (April 2000): 347-61.
- Luo, S and N Donthu (2001). "Benchmarking Advertising Efficiency", *Journal of Advertising Research*, 41(6)
- MORI (2004). "Frontiers of Performance in the NHS".
- MORI (2003). "Frontiers of Performance in Local Government".
- ODPM (2005). *A guide to the Local Government Finance Settlement. Office of the Deputy Prime Minister.*
- Pawson, R and N Tilly (1997). *Realistic Evaluation. Sage Publications.*
- Tomz, M, Wittenberg, J and King, G. (2003). *CLARIFY: Software for Interpreting and Presenting Statistical*

*Results. Version 2.1. Stanford University, University of Wisconsin, and Harvard University. January 5.*