“WE ARE THE DoH — THIS IS WHAT WE DO!”

Confronting a cliche

“Lies, Damned Lies ... and Statistics” is the commonplace that routinely helps all of us escape the pain of thinking seriously about numbers. It is the cliche that makes statisticians bristle, but the message it conveys is all too true when the statistics happen to be numbers with little or no rational basis — that are then used to mislead and serve some hidden agenda.

Change the cliche to “Lies, Statistics ... and Good-Thinking” — on the grounds that a lie is bad enough without explicit condemnation — and its anaesthetic force is lost. But for those willing to bear the pain, good statistical thinking overpowers statistical lies — just as paper beats stone in the paper-scissors-stone party game.

DoH as loss leader

If there were a prize for meaningless servile statistics, it is a sad relection on our times that government departments would be in the running. The Home Office could offer either the absurd measure of police force performance published in 2000 and discarded in 2002 or its ludicrous predictions in 2004 of numbers of immigrants from Eastern Europe. The Department for Transport could put forward its continuing claim that our speed camera partnerships are saving over 100 lives a year and over 40 percent of serious road casualties. And so on — through most of the departments of state. However there can be little doubt that the numbers that should get the prize are those that the Department of Health (DoH) still uses to dictate what any primary care trust (PCT) gets out the nearly £70B that England’s PCTs get for the health care of their captive populations. Determined in large measure by a funding formula that has been used without significant change since 2003 and that cannot be modified before the financial year 2008/2009, even partial implementation of the formula has resulted in *per capita* funding that has varied by a factor of nearly two across the PCTs of England. For 2005-06 Daventry & South Northamptonshire got £900 per head whereas Islington got £1700. (The £860 and £1166 for 2004/5 quoted in Box A of the committee’s report were for the bottom 20% and top 20% of PCTs.)

A serious charge

Any claim that the funding formula has no rational basis as a tool for the allocation of huge sums of public money is a serious charge. Can the formula really "lie" when so many good people have been engaged by the Department of Health in its construction — when so many good people have met in committee after committee to assert the soundness of that construction, and then to approve its use to carve up such a large portion of GNP? I suggest that it is an understandable unwillingness to envisage such a possibility that has inhibited questions about whether the construction has a logical mathematical/statistical basis. The wellsprings of natural curiosity seem to fail when it comes to challenging a formula that is even regarded as "very complex" by those with the task of administering it.

Breaking the spell

One of the achievements of the Health Committee's inquiry into NHS deficits has been to encourage witnesses to break the spell. Its terms of reference listed three concerns. The one that is relevant here is

"the relationship between the funding formula, the allocation of funds to trusts and the size of their deficits or surpluses"

At the end of its inquiry, the committee concluded in its First Report of Session 2006-07 that

"There is concern about the fairness of the funding formula. We do not consider ourselves qualified to judge whether these concerns are justified. We recommend that the formula be reviewed."

The evidence on which the committee came to that recommendation was very mixed. Published as Volume II of the Sixth Report of Session 2005-06 was the written evidence from 56 individuals and organizations. A further 18 pieces have now appeared as Volume II of the First Report of Session 2006-07. There were five oral evidence sessions, culminating in the questioning of Secretary of State Patricia Hewitt who, when asked to justify the very large differences in *per capita* resource allocation for different PCTs, appealed to both morality and authority with:

"It seems to be *absolutely* right and fair that places with *worse* health and *greater* health needs get *greater* funding and places with *better* health and *less* health needs get *less* funding. That is *fair*, in my view, and, rather more importantly, in the view of the independent Advisory Committee. ... I am satisfied

that the funding allocations are fair."

The morality here is both unquestionable and irrelevant. A quantitative formula has to do more than fix the qualitative "greater" or "less". As for the appeal to authority, we all know that the Pope was the authority when Galileo wanted to put the Sun at the centre of things: it is also unnecessary. What DoH has concocted (softer words will not do justice to what was done) is "fair", in any sense of that question-begging word, in the same way that numbers drawn from a hat are fair to all parties in a lottery.

Written evidence: Volume I (June 2006)

The view is widely held that the House of Commons and its works do not now deserve the respect they once commanded. Turn from the antics in the chamber and you find a bulwark of democracy in the diligent efforts of select committees to inquire and hold ministers and their departments to account. Any citizen is free to submit written evidence to an inquiry. If "accepted", it may well be ignored but it will appear in the committee's official publications. The Health Committee has been eclectic in what it has accepted, and it is therefore not surprising that not all of the 56 pieces in Volume I have been helpful to the committee's analytical objective, which was the documentation and understanding of the causes and consequences of the current NHS deficits and the prescription of necessary remedies.

The pieces move from the excusable ignorance or trusting indifference about the formula (in the majority) via some that express either satisfaction or distrust on the basis of what are seen as the consequences of the associated resource allocations, to a few pieces that are impressive in questioning the strong influence of broadly describable components of the formula and just one that dared to take it apart to see how it was constructed.

A few pieces were blatantly unhelpful! PricewaterhouseCoopers was content to trumpet its own "unique resource" and tell the Committee that it was confident that it was making a key contribution. KPMG played trumpet too, adding findings from its earlier work on 98 NHS "entities" that, as the committee noted, cost over £2.5M and two-thirds of which was "a brief initial examination". Such pieces are little more than assertions that claimants to "the wisdom of the private sector" (such as the self-declared "Big Five") have the DoH by the short and curlies — secure in the convention that mandarins are rarely blamed for failure provided the contract has been placed with a sufficiently expensive agency. Politesse underpins that understanding — so no questioning of the formula, please!

Silence about the formula was understandably maintained in the evidence from three manufacting companies doing business with the NHS but also, with less excuse, in a mixed bag of pieces from nine NHS managers whose motto might well have have been "Our's not to reason why/ Our's but to do and die." Far less resigned to their fate are the authors of the nice analytical piece from South East Hertfordshire PCT and Royston *et al* PCT. Their exposition of the dominant influence of the formula's "need index" on PCTs like their own is the platform from which they demanded that the formula be reviewed. That they asked for "a much more detailed paper . . . not delegated to one academic institution" showed awareness that special pleading alone is unlikely to get far. The piece submitted by the chief executive (CE) of the now abolished North East London Strategic Health Authority (SHA) may have surprised the committee with its claim to have had the "lowest *per capita* funding in the country" (over the period 2003-06). Since "highest" would be nearer the mark, I take it that this CE wants to redefine the concept of equality (of funding) to mean *no deviation from the target formula*. If that is done then "low" and "high" with their superlatives are locally determined by "Distance from target" (the gap between actual allocation and the target allocation corresponding to the formula). For 2005-06, NE London happened to be the English SHA furthest below target, at minus 4% — a measure of how much they will be favoured when the target formula is reached. Such redefinition of "equality" would help to make a case for funding to reduce the "unacceptable social injustice" in an area that covers Barking, Hackney, Newham and Tower Hamlets. This evidence of the usefully obfuscatory role of the formula may be related to an event I witnessed in early 2006. A public meeting of North West London's Community Voice was treated to a PowerPoint display by the CE of the not yet disbanded NW London SHA. One slide, headed "NWL SPENDS MORE ON HEALTHCARE THAN OTHER SHAs", showed an 18% difference between NW London with the highest and NE London with the lowest value (among England's then 28 SHAs) of the 2003-04 ratio of "spend" to formula — the latter disguised as the easily misinterpreted "100k unified weighted population". The actual *per capita* allocations were only marginally different at £1031 and £1027 respectively. No-one in the audience questioned the deception and everyone must have gone home feeling guilty in the way that may well have been intended.

Local government presented the Health Committee with another mixed bag. Leading with impeccable blandness and pious hopes was the Local Government Association, closely followed by the County Councils Network. In such organizations, hidebound by committee structures and relying on "cut and paste" professionals mesmerised by Whitehall directives, critical analytical thinking tends to be stifled at

birth. In remarkable contrast is the piece from the chairmen of the NHS Overview & Scrutiny Committees of nine South of England local authorities. The personal chemistry must have been good, since their evidence and analysis of what they saw as the effects of the formula makes a *prima facie* case for serious review.

Two trade unions together achieve a 50% hit rate for mention of the formula: Amicus is silent but Unison has a greater interest in it, conceding that "more affluent areas in southern England" may be under-funded while buttering both sides by expressing satisfaction that "the Department of Health is committed to ensuring that no area is more than 3.5% below its fair funding target."

There is a striking contrast between how two quangos offered assistance to the Committee. The Audit Commission presented "evidence" from a DoH-commissioned study that explicitly excluded any "consideration", and therefore any questioning, of the PCT allocation formula. This did not inhibit the Commission from giving its opinion about possible causes of the deficits without, of course, mentioning the formula. What value can be attached to such opinion? Unless the Audit Commission has privately given the formula a clean bill of health, its evidence could suggest only that any particular surplus was smaller or that any particular deficit was larger than it would have been if such and such financial mismanagement had not taken place. But as far as the actual deficit sizes are concerned that would be a misleadingly partial account.

The Health Commission was less constrained. While not mentioning the formula explicitly, it came close to doing so with its undocumented observation that "close to one in three of those PCTs with the lowest levels of growth are projecting a deficit", since the permitted growth is positively correlated with the target allocation of the formula. To author Alexa Knight, this finding indicates that it is "external pressures on resources, rather than an internal source such as weak financial management, that is driving the deficits".

From Sue Marks of the British Medical Association, the Committee got a useful graph — a plot of the percentage PCT surplus (negative if deficit) against the percentage "distance from target" for 2005-06. The claim that it shows "no correlation between size of deficit and distance from target" was a reasonable description of the birdshot figure.

Far less helpful was the evidence from an "independent charitable foundation". The King's Fund has considerable research capability and was, I know, aware of the widespread academic contention about the formula. It chose to do no more than reproduce DoH's claim that there is "no relationship between the

size of deficits and spending per head, or the distance from target (for PCTs) or growth in allocations". It is the formula itself that is contentious, independent of whether or not skilful management has concealed any nationwide appearance of adverse consequences. If the King's Fund thinking is that the formula is in itself "about right", as some assert, then its piece should have made the arguments that might have resolved the Committee's discernible uncertainty in the matter.

Of the remaining 30 pieces, all but ten make no allusion to the formula. Of the ten, the Royal College of Midwives is the most allusive with its nonetheless worthy intuition:

"A lesson of the current deficits must surely be that in the NHS financial resources must more accurately reflect activity levels."

The Socialist Health Association piece suggests that the formula is not yet "about right", with the kind of pure value judgement that brings us all back to where complex formula mongering started nearly two decades ago:

"The current weighted capitation funding formula has rightly led to increased funding for PCTs serving more deprived populations and given the current level of health inequalities this should continue."

Oral evidence: June to November, 2006

A1 & **A2** are the answers of two different witnesses, and so on.

From chief executives and finance directors of trusts.

Q5. *Is the funding formula used to allocate resources to PCTs fair?*

A1. . . . From the funding formulas which I have seen over my years in the NHS, it is as fair as anything else around.

A2. . . . small changes in the formula can quite significantly affect the way that resources are allocated: whether it is fair or not, I do not know.

Q52. [pointed to large *per capita* differences in allocations]

A1. . . . there is a resource allocation formula that takes into account multiple things like deprivation, like the elderly, levels of morbidity and so on, which presumably leads to those sorts of adjustments.

Q150. *Do you have any view from the outside about the funding formula and whether that does tie in*

. . . with deficits?

A3. . . . I cannot say that I know enough about the funding formula generally.

Q160-168. *. . . if you had a fairer formula?* [and similar elicitation]

A4. Whether the formula is entirely fair or not is a whole debate in itself and I am not sufficiently familiar with all the details of the formula.

A5. The funding formula is a very complex piece of work and whichever formula we have had to date there has always been controversy about whether it adequately reflects diversity or rurality.

A6. . . . I shall follow the machinations of the funding formula and if people and academics can do work on it, then that would be interesting. Ultimately, I think I know where our problems have come from and we are sorting them out.

Q168. *. . . Is the funding formula fair in your eyes?*

A6. I do not know how to make that answer to you in an honest way.

From the NHS chief executive and DoH director of finance

Q273-285. *Is it the case that the Government blames local deficits on local management?*

A7. . . . There is not necessarily a relationship between deficits, their size and the resources allocated. . . . there is no relationship between deficit size and resources allocated because I can take you to some areas where they have more percentage growth and more deficits than in others where they have less percentage growth and they go about their job differently.

Q322. *How fair is the funding formula? Does it need an independent assessor or should it be left in the parameters* [sic] *of the Government?*

A7. There are two things: the formula and the tariff. . . .

Q323. *What about an independent assessor? . . .*

A7. The independent assessor really relates to the point of the tariff . . . [Director of Finance takes over from his CE]

A8. . . . On the resource allocation formula, we have got an external advisory group that advises the Secretary of State on the allocation formula; so we do open the formula up to independent testing, support and challenge through that process. I would find it difficult to envisage a process where the Government would actually put the distribution of resources across the whole NHS into an entirely independent body.

Q333 *. . . There is considerable evidence . . . that PCTs in both affluent and rural areas are significantly*

underfunded. I suppose the question . . . is whether the department's mind is closed to the possibility of any review of the resource allocation formula given the evidence . . . you have not mentioned.

A8. . . . I do not believe the Government's mind is closed about the formula. . . . We are in the process currently, through the advisory committee on the formula, of commissioning three major pieces of work about elements of the formula before we go into the next allocation round that will look again at how we deal with needs.

Q334-335. [about regional differences]

A7. . . . of course all the South argues the formula is wrong in favour of elderly people. They do. . . . the formula does not suit anybody when you get down to it, no formula ever does. The truth is you have got to get the best fix. . . . The point is the formula is the formula . . . there is a lot of debate about the formula because there will always be.

Q336-337. . . . *one of the political parties is considering adopting . . . a straight abolition of the formula, where you take your money per head of population. What effect would you think that might have, in broad terms? . . . and the same amount of money involved presumably.*

A8. [Director of Finance] That would make a significant difference to those areas with a population that, for example, was older than the average. . . . a formula based on unweighted heads of population . . . would have a major impact on those areas that have a high elderly population or a highly deprived poulation.

From three academics A9, A10, A11

Q389-390. . . . *in very broad terms what is wrong with the existing funding formula?*

A9. . . . there are three broad areas in which the funding formula . . . is flawed . . . the principles on which it is based . . . the technical design . . . its outcomes . . . .

A10. . . . a vacuum of information and a vacuum of understanding.

Q392. . . . *nothing on the shelf at the moment that . . . would replace the current formula with something . . . fairer?*

A9. I think there is something on the shelf actually. . . . it is simply that the Department of Health has not shown much interest until recently in an alternative.

Q393. . . . *what do you feel about the issue of this mistrust in some circles about the allocation or people being trusted to allocate resources between different PCTs?*

A11. . . . I think the Department takes a very responsible position in that it has an independent body that

has sitting on it clinicians, economists, statisticians, a broad variety of people with knowledge of the health world. It commissions externally published work and makes recommendations to the Government based upon that externally published work . . . the context in which we are working here is one in which alternative models are explored, are examined and, at the present state of play, we believe that we are using the best model that was available. It was developed under academic research at the University of Glasgow . . .

Q410-412. . . . *it actually costs more to deliver these services in rural areas. How is that taken account of in the formula?*

A11. Well, the formula should be capturing that on the provision side of the model.

Q413-414. . . . *Are you convinced that it is?*

A11. I have come here today to talk about the relationship between the deficits and the formula. . . . I am not the expert in the Department on the working of the model. . . . it would be wrong of me to offer comments on other colleagues' areas.

Q418-420. [about the "rurality" question]

A11. . . . this is an issue that has been referred many times to that body of independent observers and they have recommended what we have at the present time. This is not something that has been politically imposed, except as a consequence of taking the advice of the independent body.

Q423-425. *The Department has issued an invitation for work to review the funding formula and the question is why now and why this particular time and what is the real concern of the Department?*

A11. The reason is very straightforward. I think the Department is continually concerned to make sure that it is bearing in mind, or that the independent committee's advice is bearing in mind, the best possible research that is available. . . . I think the Department is mindful that there is more than one way of constructing models of this sort and it is merely interested in constructing the models which are most appropriate on the basis of fairness and efficiency.

A10. . . . within the framework of the fitting that was carried out by the AREA study group, there are many models and there is a lack of imagination. . . . Such models are highly specific. How can you believe that reality does simply oblige you in that matter? . . .

Q427. *There is no easier way it can be done?*

A10. I think it is a long term task. . . . We have got to go back to basic principles and involve a much wider discourse than we have at the moment. I do not accept these claims that we have sufficient

independence ....

A9. ...the big issue for me is getting away from the constant refrain that we have a fair funding formula based on an independent set of advisers. It is a murky, unfair formula. It can be criticised on so many different levels and I think that if we could just have a little bit of honesty about that, that would be a great start.

From Patricia Hewitt, Secretary of State for Health

Q717-721. ...*There is a relationship between the size of deficits and [the funding formula]. Do you agree?* ...

A12. No, I do not. ...I think there is a very small – very small – correlation between the funding allocations and the deficits. ...My recollection of [the chief economist's] evidence was that he said there was a small correlation. ...the important thing is to look at the larger causes and, even more important than the causes, to look at the cures and concentrate on the action that needs to be taken. ...Almost everywhere I go around the country and in almost every group of parliamentary colleagues I meet, people complain to me about the funding formula. ...I have already asked the Advisory Committee to review the formula. We will look at their report. We have asked for that in good time so that it can inform the funding allocations for the next round, from April 2008, but I have to say, Chairman, and I really want to stress this point, all this argument about funding formula is in my view a complete distraction from the need to make decisions to sort out the problem now, because, whatever is right or wrong with the funding formula, we are not going to reopen the allocations for the current year and next year.

Written evidence: Volume II (January 2007)

Of the 18 pieces of written evidence submitted when the inquiry was under way only the first two from DoH and the last one from oral witness A2 say anything about the formula. In the first, DoH's Director of Finance assures the committee that:

"The aim of the formula is to ensure there is sufficient funding to provide equal access for equal need in all parts of the country, and to reduce health inequalities" and that

"In calculating the health needs of rural areas the weighted-capitation formula takes into account the effects of access, transport and poverty."

In the second piece the Chief Economic Adviser backs up the Director of Fiance's reassurance about

rurality by merely exhibiting the longer formula underlying the needs index used for acute and maternity services (A&MS), showing where measures of access to GPs and hospitals came in and how the full model had then been adjusted to give an index that would offer some compensation PCTs whose populations have poor average access.

The last of the 18 pieces is a factual correction of the claim by the Director of Finance in Q336-337 that PCTs with aged populations would lose out if the formula were dropped in favour of a constant *per capita* funding throughout the country. The piece establishes that PCTs with an above average age-profile index would have an average gain of over 3%.

Rejigging or rethinking?

The Department of Health must have known or guessed that the committee's recommendation that the formula be reviewed was coming. In October, it circulated here and there two pages of its tentative ideas about a possible review. Expressions of interest and tenders were invited for a contract that will have to be completed in time to rejig the formula for 2008/9 and beyond. The selection of the research group that then got the contract was in the hands of a committee whose membership has been fixed by a department that admits its own incompetence to handle the necessary technicality. That is the way government departments work — "We are the DoH. This is what we do."

All of which would not matter if there were not a large body of academic opinion holding that the formula has little or no rational basis as a financial tool. That body was poorly represented in the Scottish ISD Consultancy that engaged the academics that made the bits that DoH's finance division pieced together as the working formula. The Health Committee has now acknowledged that the formula is vigorously contested by independent academics when it recommended that

"Consideration be given to basing the formula on actual need rather than proxies for need."

It is obvious that such consideration was not envisaged in DoH's two pages of tentative ideas, which were accompanied by the instruction to potential contractees that the review be completed by July 2007 — an impossible time-table for any evidence-based changes.

Understanding the ISD/DoH construction

Recently, my own PCT has been top of the NHS deficits league table — with a reported deficit of £60M

on a £300M budget. Back in 2003, its Director of Public Health's annual report was making a case for moving health-care resources from the most affluent of its 22 electoral wards to the less affluent ones. Graphs showed correlations between several measures of morbidity of the ward populations and their score on a single index of deprivation constructed as the average of the ranks in six rankings of the wards on five socio-economic variables and just one direct measure of health need. The first and last of the five rankings were to do with "access to a car or van" and "non-white ethnicity". The impression was given that this approach to the allocation of Hillingdon PCT's budget was done in anticipation of DoH guidance, and that the DoH would approve the use of socio-economic proxies.

Could it be that DoH was doing something similar at the national level to divide up the national cake? Could it be that billions of public money were now being allocated using indices based on socio-economic variables as proxies for any direct measurement of health-care needs? The answer, as I discovered, was an incredible yes.

For three decades after the foundation of the NHS, the formula was, in DoH's own words, "What you got last year, plus a bit for growth, plus a bit for scandals." Richard Crossman put that right with a formula that was an equal share for everyone plus an engagingly simple adjustment for *per capita* "bed-years" and "cases". Crossman's mathematically unsophisticated formula opened the door for a succession of academic experts to add refinement after refinement to get where we are now. The bulk of the current formula was constructed from the many bits that ISD Consultancy pulled out of statistical analyses of ward-level utilisation estimates. John Hutton referred to the ISD report in written answers to parliament in January 2003.

DoH clearly thought that the latest refinement would help to narrow the "widening mortality gap between the social classes" by "integrating health inequalities into the mainstream of service delivery, with a focus on disadvantaged areas and groups." At the working heart of the current formula are the two so-called "need indices" that DoH picked out of the ISD report — one for "acute and maternity" services (A&MS) and and the other for mental health services (MHS). There were seven steps in ISD's construction of the A&MS inequality index from data for 8410 electoral wards in the then 95 health authorities of England's NHS:

(1). *Estimation* of the national *per capita* annual cost of A&MS in each of 19 age bands.

(2). *Estimation* from hospital records of the actual annual cost of the A&MS incurred for NHS patients

in each of the 8410 wards.

(3). *Estimation* for each ward of what the cost would have been if any individual registered with a GP in the ward had generated the national *per capita* cost for the individual's age band.

(4). *Calculation* for each ward of the ratio of the estimate in Step (2) to the estimate in Step (3) — a ratio that shows how far actual cost is above or below the ward's share of the total national cost according to its age-profile.

(5). *Compilation* of a huge and comprehensive data-base of the values in each ward of
(i) the socio-economic variables that might correlate with true health need [whatever that means] and
(ii) the "supply" factors whose variation from ward to ward might introduce historical, regional, geographical or social class biases into the estimation in Step (2) and hence into the calculation of the ratio in Step (4).

(6). *Search* for a simple formula (a mathematically simple combination of the socio-economic and supply variables in Step(5)) that tracks the up-and-down variations from ward to ward of the ratio calculated in Step (4) (but only the variations within the same health authority) — in a way that is both subjectively acceptable (on grounds of either prior knowledge or the consensus about perceived or hidden inequalities) and objectively acceptable (according to standard statistical criteria). In that search, the simplicity of the formula comes from *ad hoc* restriction of its shape to the "linear" form that Karl Friedich Gauss justifiably employed 200 years ago for astronomical and geodetic observations.

(7). *Adjustment* of the algebraic combination by replacing the symbols for the supply factors (and two socially important variables that turn out to have a "wrong sign", taken as suggesting "unmet need") by their arithmetic national average value — in order to create a conceptually level playing field for the supply factors (and to compensate for the wrong signs). The adjusted combination is the A&MS inequality index selected by DoH, with numerical coefficients that, still unchanged after five years, still have a strong influence on resource allocations.

After the adjustments in Step (7), the A&MS index might have been taken to have none of the biases referred to in Step (5), and used, as a multiplier of the ward's age-profile share of the national A&MS cake in Step (3), to give a supposedly unbiased estimate of a ward's *due share* (i.e. one that takes account

of socio-economic inequalities as well as age-profile). Any particular PCT might then have been given a resource allocation (for A&MS) proportional to the total of the fractions of the 8410 due shares generated by the GP-registered patients it is responsible for. (Patients often live in wards outside the PCT area.) That was not the logic followed by DoH in the necessary scaling-up from wards to PCTs. The DoH approach was first to estimate the PCT's age-profile share for the GP-registered population of the whole PCT. It then devised a new index — a linear combination of the A&MS and MHS indices calculated for the whole PCT, with weights corresponding to the national costs of A&MS and MHS. It is the product of these separately aggregated statistics (the age-profile share and the new index) that goes into the formula.

Questions of judgement and faith

In 1999 DoH published two documents of interest here. One was the from a newly created steering group, the Advisory Committee on Resource Allocation (ACRA), that reviewed the formula then in use and recommended some changes — but none that changed its reliance on socio-economic proxies fitting existing utilisation in a need/supply econometric model. The other, "A Brief History of Resource Allocation in the NHS 1948 –...", expressed the hope that history would "inform/stimulate discussion concerning how ACRA takes forward the wide ranging review of the formula". Appendix 1 of the ACRA report may be its most valuable legacy — thirteen "evaluation criteria for resource allocation formulas". Among the six criteria considered essential were

1. *Technical robustness*: The analytical techniques used to develop the formula should have an established academic pedigree, and should be evidence based and used in accordance with proper practices in relation to those techniques.
2. *Transparency*: In general the formula should be simple to understand although the detail may be complex. Analytical techniques should normally be capable of objective quality assessment, such as is provided by tests of statistical significance. Ideally, although this is difficult to quantify, the outcome of the process should command a wide degree of acceptance, i.e. "felt to be fair" on the ground.
4. *Plausibilty*: The plausibility of the relationships defined by the formula should be capable of reasoned and unambiguous explanation.

One of the seven criteria considered merely"desirable" was:

7. *Comprehensibilty to non-specialists*: The formula, and the means by which it has been arrived at,

should be capable of commonsense justification to non-specialists. This means that the *substantive effect* of analytical techniques should be capable of explanation in plain English, even if the *process* of calculation is understood only by specialists.

The written and oral evidence already quoted indicates that either the formula has failed criteria 2, 4 and 7 or that no-one wants has emerged from anywhere to offer the necessary “reasoning” and “explanation”. As witness A10 observed, the formula suffers from a vacuum of information and a vacuum of understanding. My explanation for the inactivity is that the DoH backrooms and one or two university tea-rooms now realise that such reasoning and explanation might reveal that the formula is “not fit for purpose”.

It is hardly surprising that the ACRA of 1998/9 did not seriously question the mathematics of the DoH-commissioned work of University of York health economists at the heart of the “national formula”. Of its 25 members, 20 were directly or indirectly employed by the NHS. Of the remaining five, probably only 2 had appreciable expertise in mathematical statistics (and of the two, 1 was the leader of York economics group). For ACRA’s own Technical Advisory Group, the corresponding numbers were 20, 15, 2, 1 respectively. All four chairmanships have been given to NHS executives. The main change from 1999 is that ACRA and its Technical Advisory Group now accommodate three DoH economists and one from the Scottish Office. How does all that square with the assurances given to the Health Committee about “independence” of its “external” advisory group? All good people no doubt, but — independent? — external?

Within such groups, there may have been little difficulty in persuading any doubters that the discipline of econometrics had a sufficiently “established academic pedigree” to satisfy ACRA’s essential criterion of technical robustness. Econometrics is a discipline that marries standard statistical methods to the economic concepts of demand and supply. Here “demand” is here broken down as “need” that has already influenced utilisation of healthcare, plus “unmet need” that would do so if it were encouraged plus what might be called unjustified demand for healthcare resources by some social classes. The term “supply” comprises the local and regional factors that result in inequality of access either at the level of electoral wards or larger areas such as PCTs. The bold claim being made for the current formula by its strongest defenders is that it has largely eliminated the biases resulting from everything apart from pure need. (There is no reason to think they do not actually believe it.) There are other equally honourable

defenders who accept the formula without understanding any of the technicality, because they suspect that any alternative would result in a less "fair" allocation of resources or, even worse, open the Pandora's Box of value judgements (about the relative priority of different sorts of healthcare and the definition of "fairness") that the utilisation-based approach manges to keep a lid on.

In 1982, a mathematically distinguished professor of economics in the University of California-Los Angeles gave a public lecture entitled "Let's Take the Con out of Econometrics" that appeared in *The American Economic Review*, **79**, pp.31-43. Edward Leamer's lecture was both readable and deadly serious. He repeated his profession's chestnuts that "Econometricians, like artists, tend to fall in love with their models" and that "There are two things you are better off not watching in the making: sausages and econometric estimates" but went on with

"This is a sad and decidedly unscientific state of affairs we find ourselves in. Hardly anyone takes data analyses seriously . . . we preen and strut our *t*-values."

and more relevant here (even though *t*-values did play a major role in the ISD construction)

". . . the fundamental problem facing econometrics is how adequately to control the whimsical character of *inference*, how sensibly to base inferences on opinions when *facts* are unavailable. At least a partial solution to this problem has already been formed by practicing econometricians. A common reporting style is to record the inferences implied by alternative sets of opinions. It is not unusual to find tables that show how an inference changes as variables are added to or deleted from the equation. This kind of sensitivity analysis reports special features of the mapping from the space of *assumptions* to the space of inferences. The defect of this style is that the coverage of assumptions is *infinitesimal [my italics]* . . . . What is needed instead is a more complete, but still economical way to report the mapping of assumptions into inferences."

When Leamer wrote "when facts are not available" he was not referring to data. Here, "facts" would be the "information" in ISD's observation that "those allocating resources do not have sufficient information to measure need directly" (a quotation wrongly attributed to oral witness A2 by the Health Committee), in contrast to the "data" that are the plethora of socio-economic variables that ISD chose to deploy in lieu of facts. Here, the central "inference" is the formula itself and the claims made for it. It is ISD's "assumptions" that need to be examined in the framework that Leamer provided.

The first assumption that is questioned by many, including economists, is that it is reasonable to think we can get a sufficiently precise or unbiased estimate of "need" (for financial cake-cutting) by

utilisation-based econometric modelling in the real world that is the NHS of England. The answer to that, whatever it may be, must remain a matter of opinion or judgement because there is no evidence that the enterprise has either succeeded or failed.

The second assumption relates to Leamer's "infinitesimal" : the simple linear Gauss shape of the crucial indices in the formula is just one of the practically infinite number of shapes that were not explored for the simple reason that such exploration would have been beyond reason, even beyond the accessible finances of DOH. Many of these alternative assumptions would have been equally consistent with the data to which they were applied but very different in their financial consequences. As the Health Committee pointed out, judgements made in order to bring out a formula "have a direct effect on the level of funds that are allocated to PCTs." That is where faith comes in — faith that the choices made have produced a "fair" formula.

Machinating machinery

At the time of writing this, I hear a Radio 4 Today interview with Tim Holt, President of the Royal Statistical Society and one-time National Statistician for the ONS. The issue of the day is no less the future of national statistics and how to restore public trust in them. Holt is telling the interviewer that he thinks that the present proposals for reform — removal of government interference by putting things in the hands of a Board of Statistics — do not go far enough, because the definition of "national statistics" will include the statistics produced by a department of state only if its Secretary of State agrees to it. Others are saying the same as Holt. This is how Michael Prest reported the matter in the January 2007 issue of Prospect:

"The crux of the argument is the extent to which ONS statisticians — whose competence and integrity are widely respected — will have the final word on statistical matters. William McLennan, former head of the Central Statistics Office (forerunner of the ONS), has fiercely attacked the government in a letter to the *Financial Times*, arguing that the proposed board will not be free from ministerial meddling and will have excessive powers to direct what statisticians do. It is expected that the ONS will be re-labelled a non-ministerial department subject to the oversight of a ministerial department — which, funnily enough, will probably be the Treasury."

Any hope that the NHS will get an honest formula (based on direct measurement of health need rather than socio-economic proxies) probably rests on the outcome of the infighting to which Holt, McLennan

and Prest allude. A healthy outcome would force a change in the departmental machinery — the removal of ministerial machinations in the unhealthily narrow contractual arrangements by which departments bring in external expertise. Fingers crossed! A somewhat disturbing feature of the Health Committee's report is its honourable assessment that it is not qualified to judge whether the "concerns" about the formula are justified — raising the question "If not a Select Committee of Parliament, who?". A job for a Board of Statistics?

Mervyn Stone,
January 2007.