Research Report DCSF-RW007

# Options for the Funding Formula for Children's Social Services

*Roy Carr-Hill and Paul Dixon*
*Centre for Health Economics, University of York*

*Charlie Owen*
*Thomas Coram Research Unit*
*Institute of Education, University of London*

department for
children, schools and families

Research Report No DCSF-RW007

# *Options for the Funding Formula for Children's Social Services*

*Roy Carr-Hill and*
*Paul Dixon*
*Centre for Health Economics, University of York*

*Charlie Owen*
*Thomas Coram Research Unit*
*Institute of Education, University of London*


**ISBN 978 1 84775 017 4**

**TABLE OF CONTENTS**

**LIST OF TABLES**

## EXECUTIVE SUMMARY

This report presents the findings of a study of the pattern of social services for children and young people up to the age of 18 in England. There clearly are wide variations in spend per capita between local authorities.

### What we know from previous work

Previous research has shown that factors such as broken homes, overcrowding and poverty are unambiguous risk factors associated with the use of children's PSS. Given policy changes, it might be expected that, in addition to the deprivation factors identified in previous studies, the prevalence of "children in need" would be extended to embrace factors associated with the health of the child and its family, and the prospects for the child's development. The role of ethnicity is complex: the limited research that exists suggests that it is mixed-race families rather than families in any one ethnic group that are more likely to require services.

Similar factors have been included in the formulae for all four countries of the UK, but equally similar issues have recurred in developing and implementing the formula. These are: the availability of up-to-date data for the indicators that are used at the different levels; the materiality and sensitivity of the various indicators that are included in the formulae proposed; and the issue of unmet need. The move from census-based formulae to those based at least in part on updateable data like the claimant counts or the IMD Scores is also evident.

### Unmet need

In other sectors, attempts have been made to take into account to identify and take account of unmet need. Essentially, there are three approaches:

- a normative assessment of what factors should be included to address issues of unmet need, and then agreement over their weight;
- using an additional population survey that identifies need independently of utilization; and, finally,
- statistical adjustments to the formula.

The first two are impracticable in this context: the first because it is unlikely that a consensus would be reached among LAs; the second because there is no independent population survey. The first statistical approach is based on a demonstration that the use of services among most deprived areas is less than one would expect relative to an independent measure of need (or an independent measure of deprivation). The problem in this case is that there is no obvious independent measure of need. An alternative is to use the 'spline' regression technique, where, for example, the square of an already included variable is defined for only the most deprived segment (the 'spline') of the population. A prior issue is whether there are any patterns in the residuals for which such an approach might be appropriate

A second approach involves arguing that the average value of the slopes relating cost to need obtained from the results of the model within each authority is not the best for the purposes of setting allocations, but that instead the average of the slopes in the most 'progressive' authorities (those where the gradient from least deprived areas to the most deprived areas is the steepest) should be used. The problem is the same; there is no theoretical justification for any of the exclusions proposed.

**Data sources and approach**

The two main types of data required are: data on service activity; and data on the characteristics of small areas that may give rise to the need for services. Standard sources were used for the latter including census, claimant counts and IMD scores.

For service activity, a possible survey of individual clients was considered but ruled out because of clashes with data collection for CIN 2005. The final agreement was to explore the following options:

- the national CIN 2003 data covering all 141 authorities at postcode district level
- data from a selected number of Local Authorities at the synthetic ward level
- individual level analysis of CIN 2003 data with socio-economic information attributed from the postcode district level
- combination of individual level CIN 2003 with GHS or HSE data

**Small Area Analysis of CiN 2003 Data Set**

There was a concern that postcode districts were too large and would therefore be too heterogenous. In fact, with the single exception of the proportion of ethnic minorities, we find that postcode districts are *more* homogenous than synthetic wards.

<u>Dependent variables:</u>
Three variables were derived from the CIN data:

- the number of clients originating from a postcode district per thousand inhabitants aged 0-19 in the district
- two versions of the cost of providing services to clients originating from a postcode district per thousand inhabitants aged 0-19 in the district

The cost variables are preferred because they correctly reflect the workload of social services. The first version of the cost variable uses the costs per child as reported in the CIN census - deflated by the area cost adjustment for children's social services. The second takes the same costs, and deflates them as before, but then computes national average costs for service combinations. Unit costs were computed for the 50 distinct care combinations in the data set. These national average unit costs are then assigned to all clients receiving the care combinations and the costs summed for each postcode district.

<u>Supply Variables:</u>
There are two supply issues: the likelihood of a child being referred by the parents (or even self referred) in the first place; and the level and type of effort by social workers. After discussion, the variable used has been the accessibility of the catchment population of children to the services, measured by the mean distance between the centroid of each postcode district and the nearest area office for a social services authority.

Exploratory Analysis:
The cost variables showed very high levels of skewness and kurtosis, which implied that the chances of reaching a specified model were slim. At the same time, several of the independent variables were highly correlated with the dependants suggesting that the model would provide powerful predictions.

A variety of preliminary analyses using OLS were carried out experimenting with different functional forms. The following variants have been attempted:

- Logarithm of dependent only
- Logarithm of both sides
- Square root of dependent
- Linear dependent and square of significant variables
- Selected interaction terms in the linear model; and
- Re-run with postcode districts assigned to only one local authority

Runs with Supply Variable -
In all runs, the 'supply' variable is always negative implying that those further away from a service provision office use the services less. This caused some surprise but is a consistent result. Given that this effect is also statistically significant (in all except the individual cost OLS run), there is the issue of how to treat that variable: either as a control, in which case its coefficient should be ignored, or as part of the model.

The 'children without good health' variable appears in five out of six runs, the 'combined adult income support' variable in four of the six and 'children in lone parent households', 'lone parents on income support' and 'children in black ethnic groups' in 3 of the six. The pattern of variables appearing in the different runs shows that, overall, the multi-level models are more consistent in terms of the variables included.

Runs without Minimum Distance
Among other dimensions of deprivation, 'children in lone parent households' enters two equations and 'children in routine occupation households' enters only once, whilst the 'children in black ethnic groups' enters five of the six equations. The density variable appears only in the multi-level modelling.

Conclusion

*Including the supply variable (minimum distance to an area office)*
None of the OLS models fit the data very well, and examination of the plots suggests that this is because the models do not really capture the high cost areas, but the square root models appears to be capturing the shape of the distribution of the residuals better than either the untransformed cost dependent or the logarithmic dependent. Essentially the test of specification in OLS is sensitive to the form of the dependent. If the clustering within local authorities is taken into account through using multi-level modelling, however, the runs with linear dependents are well-specified. We therefore recommended the two models in Table A.

**Table A - Recommended models with Minimum Distance**

| | Model I | Model II |
|---|---|---|
| | *Unstand. Coeff.* | *Unstand. Coeff.* |
| **Lone parents on income support** | 41990 | |
| **Children in income support/income based JSA households** | | 5594 |
| **Children without good health** | 19690 | 10550 |
| **Combined adult income support** | 13170 | 15970 |
| **Children in ethnic mixed households** | 10310 | |
| **Children in black ethnic groups** | 4406 | 5418 |

*Without the supply variable (minimum distance to an area office)*
The multi-level model provides a consistent picture of effects and is very well-specified except with the numbers dependent and even the latter is better specified than OLS runs. Thus, in the new model, the deprivation top-up is calculated based on the following four factors:

- the proportion of children without good health;
- the proportion of income support/income-based jobseeker's allowance claimants aged 18 to 64 years;
- the proportion of children of income support/income-based jobseeker's allowance claimants; and
- the proportion of children in black ethnic groups.

**Table B - Recommended Model with 0-19 age group as denominator**

| | *Estimate* | *St. Error (U)* | *Prev. Estimate* |
|---|---|---|---|
| **(Constant)** | 278.4 | 325.7 | 178.7 |
| **Children without good health** | 11890 | 4579 | 11370 |
| **Adults on Income Support/JSA** | 15790 | 3298 | 22420 |
| **Children of Income Support/JSA claimants** | 5947 | 1864 | 5328 |
| **Children in black ethnic groups** | 5378 | 1247 | 4724 |

Overall, the initial combination (income support, poor health and ethnic minorities) appears to be a good balance of variables, although one may prefer to include the 'children in combined income support households' variable rather then the 'adults in combined income support households'.

**Small area analysis of Ward level data from selected Authorities**

The Ordinary Least Squares model [run with ward level cost data] with the cost variable (computed as above) leads to a reasonably specified model as in Table 15, with a subset of the variables included in the postcode district runs. We take that as supportive evidence that the two area bases produce similar results.

**Individual level analysis of CiN 2003 Data**

Although all the independent variables are highly statistically significant, the model is only of very limited explanatory power; always less than 5% R squared whatever combination of variables or functional forms are used. However, given the debate about the relative costs of children from different minority ethnic groups, it is interesting to see that relative to the overall average, most ethnic groups cost less than the average whilst the mixed ethnic group cost more than the average.

**Possible ways of adjusting for unmet need**

Graphs have been plotted comparing the predicted values at the end of the first stepwise run with the predicted values from runs after eliminating any negative or statistically insignificant variables. These, reassuringly, display an almost perfect straight line confirming that the process of eliminating variables does not substantially change the picture. The predicted and actual values have been compared. In each case, these appear to show there is a 'shortfall' in that - in high cost (or client number) areas - the predicted values fall short of those actually observed. Other writers take this to be evidence of 'unmet need' meaning that the estimated equation is not accounting for high costs among presumed deprived populations or areas.

To test for variables that might be reconsidered for the model - and which might correct for any non-linearities - residuals from the recommended model are correlated with the full set of potential need drivers. Only 26 correlations are significant at the 5% level in this exercise and even these 26 have to be treated with extreme caution as there are 150 correlations so one would expect between 7 and 8 to be statistically significant. This was not pursued further.

**Re-estimating with a new base population range**

There was a concern that 18-19 year olds should be excluded from the denominator. The following variants have been attempted:

- Introducing the new density variable (it is not statistically significant)
- Deleting the ethnic black variable (it does not improve specification)
- Restricting the model to the 310 postcode districts with more than 20% of either ethnic Asian or ethnic black children (produces similar results)

The areas with large numbers of 18-19 year olds are where students in redbrick universities live rather than London. The use of the new weights does not make a great deal of difference, although it has worsened the specification of the variables.

The final recommended model with 0-17 year olds as the denominator was as follows (Table C).

**Table C: Multi-Level modelling results with new dependent (NUNIT2CR)**

<u>Random Coefficients</u>

| LEV. | PARAMETER (NCONV) | ESTIMATE | S. ERROR(U) |
|---|---|---|---|
| 2 | Constant Variance at Level 2 ( 7) | 2.27e+06 | 3.544e+05 |
| 1 | Constant Variance at Level 2 ( 9) | 7.753e+06 | 2.409e+05 |

<u>Fixed Coefficients</u>

| PARAMETER | ESTIMATE | S. ERROR(U) |
|---|---|---|
| C31 Constant | -61.66 | 393.4 |
| C11 Children not in good health | 1.608e+04 | 5513 |
| C15 Children in income support households | 1.136e+04 | 2243 |
| C26 Children in black ethnic households | 6129 | 1512 |
| C17 Adults on income support or JSA | 9109 | 3972 |

# OPTIONS FOR THE FORMULA FOR CHILDRENS SOCIAL SERVICES BASED ON ANALYSIS OF THE CHLIDREN IN NEED 2003 DATA SET

## I. INTRODUCTION

### I.1 Purpose and background of study

Purpose

This report presents the findings of a study of the distributional pattern of social services for children and young people up to the age of 18 in England provided by LA social services. The study was one of three commissioned by the Department of Health to produce options for improved and updated formulae for allocating central government funding to councils with social service responsibilities under the Formula Spending Shares (FSS) system.

In 2006/07 the Relative Needs Formula (RNF) replaced the FSS formula. This report presents the background and detailed analyses justifying the replacement of the children's social services formula. Further information on the calculation of RNF formula is available on the Department for Communities and Local Government website, http://www.local.communities.gov.uk/finance/0607/simpguid.pdf.

Background

The Government's vision for children's services, *Every Child Matters*, was published in September 2003 and formed the basis of the new Children Act 2004. The Act covers the universal services which every child accesses (e.g. health, education, leisure), and more targeted services for those with additional needs. The overall aim is to encourage integrated planning, commissioning and delivery of services as well as to improve multi-disciplinary working and increase accountability, with the aim of achieving five key outcomes for all children and young people:

- Be healthy
- Stay safe
- Enjoy and achieve
- Make a positive contribution
- Achieve economic well-being

The social services functions of local authorities arising from the Children Act 1989 remain unchanged, but it is the Government's intention that the way the services are delivered will change as they 'become integrated around the child or young person and their family and carers', and there will be an increased emphasis on early identification and earlier intervention (Every Child Matters: Change for children in Social Care).

Under the 1989 Children Act, a child is in need if:

a) he is unlikely to achieve or maintain, or to have the opportunity of achieving or maintaining, a reasonable standard of health or development without the provision for him of services by a local authority….;

b) his health or development is likely to be significantly impaired, or further impaired, without the provision for him of such services; or

c) he is disabled.

(from section 17(11) of the Act). The Act sets out the principal duties for local authorities (Department of Health, 1989):

a) identification and assessment of potential children in need;
b) prevention of neglect and ill-treatment;
c) provision of family support for children in need who live with their families;
d) providing services for disabled children.

The Children's Social Services (CSS) resources distributed to Local Authorities are designed to support the provision of all services provided for children. This includes adoption and foster care, children in residential care, those on child protection registers, day care and social work support, and associated administration costs.

The current formula for CSS resources is based on the population of children in each Local Authority, weighted by an index of area deprivation developed by the University of York. The index combines five factors: income support, limiting long-term illness, one adult households, children living in flats and population density[1].

The formula also incorporates an adjustment to reflect the varying costs of recruiting and retaining foster carers, based on research from the Thomas Coram Research Unit at the Institute of Education, University of London[2]. This adjustment applies to 19.4% of the children's sub block total, the proportion of CSS expenditure that relates to foster care, and uses two variables: country of birth and social class.

The aim of this research is to produce options for an improved and updated formula for CSS, focussing only on the needs component of the formula, and not on the area cost adjustment for variations in input prices. The research should cover all children needing CSS, including specific consideration of children with physical and learning disabilities and of children from ethnic minorities. All services arranged and funded by local authorities should be covered whether or not provided by the local authority.

The requirement was to develop a formula that provided the best possible reflection of local variations in needs for social care amongst the child population. Options were to be methodologically robust, based on recent data and reasonably simple to implement. The work needed to take account of the wider context of full DfES funding and the boundaries of responsibility for providing and funding services, especially where educational and/or health services can jointly support social services clients and may have principal responsibility for arranging support. Clearly this was an issue for clients with physical disabilities and, in particular, for children with learning disabilities. The options had to be suitable for potential implementation from 2006/7.

[1] See "The Determinants of Expenditure on Children's Personal Social Services" Carr-Hill et al, British Journal of Social Work 29(5): 679, http://bjsw.oupjournals.org/cgi/reprint/29/5/679.pdf

[2] This work is described in the report "Demand and Supply of Foster Care" attached to the invitation to tender document as report 1.

## I.2 Volume of and variations in activity and cost

The latest figures for expenditure at the time of the study on Personal Social Services were for the financial year 2003-04, (CIPFA, 2005) and therefore predate the new Children Act. The net total cost of Children's and Families Services in England for 2003-04 was just over £4 billion, which represents £362.84 net cost per head of population aged under 18. The most costly elements of the Children and Families Services budget were Commissioning and Social Work (£1 billion) and provision for Children Looked After (£1.8 billion), of which children's homes accounted for £870 million and fostering services £800 million. Ward et al (2004) showed the variation between the costs of different placement types. The standard unit cost for maintaining a child for a week in residential care was eight times that of the cost of foster care, 9.5 times that of a kinship placement and 12.5 times that of a placement with own parents.

There were significant geographical variations in net cost per head of population aged under 18, ranging from £258.93 in the English Counties to £573.97 in London Boroughs. The gross cost per week for residential care (own provision) was £1,982 in England, with only small regional variations, ranging from £1907 in Metropolitan Districts to £2,037 in London Boroughs. There was greater regional variation in foster placement costs, from £250 in Metropolitan Districts to £319 in London Boroughs (own provision) and from £737 in English Unitary Authorities to £811 in English counties (other provision). As well as variations according to type of authority there are significant variations between local authorities in the same region. For example the gross cost per week of providing children's homes (own provision) in Southwark is £4,029 compared with £992 in Wandsworth.

As well as variations in costs of care in individual cases, there are regional variations in overall cost. Expenditure on Children's and Families' Services represented 30.2% of the Personal Services Gross Total Costs in Inner London authorities, compared with 19.7% in the English Counties (CIPFA, 2005). Activity rates varied also. The number of children looked after at 31 March 2004 averaged 55 per 10,000 children aged under 18 in England as a whole, but ranged from 75 per 10,000 in London to 42 in the East Midlands and the South East. At the authority level, the range was even greater: 15 per 10,000 in Wokingham and 23 in Windsor and Maidenhead to 137 in Manchester (DfES 2005).

Variations in costs and activity rates may be the result of numerous factors, such as local policy and priorities, costs of inputs, efficiency and effectiveness of services, quantity and quality of services provided and local accounting practices. Unlike universal services such as education, the provision of social services depends on eligibility criteria and interpretation of the relevant legislation. Differences in activity rates, for example, may be due to fewer children in need or may be the result of different interpretation of the legislation, and potentially rationing of scarce resources; lower costs may reflect cheaper inputs or more efficient use of inputs, or may result from providing a poorer quality service.

Factors associated with admission into care are reported in DfES Statistics of Education which showed that for the majority of young people (63%) abuse or neglect was the main category of need for children looked after at 31st March 2004 (DfES Statistics of Education: Children looked after by Local Authorities Year Ending 31 March 2004, Volume 2: Local Authority Tables. March 2005). Family dysfunction and family in acute stress accounted for another 17% of children/young people being looked after, absent parenting 8%, parental illness or disability 6% and the child or young person's disability 4%. For 3% of children or young people socially unacceptable behaviour was given as the main category of need. Low income was a factor in less than 1% of cases. These proportions were similar throughout the country, except for London where larger numbers of unaccompanied child asylum seekers affected the figures.

There has been some debate over the role of ethnicity as a risk factor for admission into care. There is no clear evidence that some ethnic groups are more at risk than others with the exception of children of mixed ethnic parentage who display higher admission rates than others.

### I.3 Arrangement of the report

The report first reviews in the next section what can be learnt from the literature and the formulae currently in use in the four nations of the UK. It then turns to the range of potential data sources for the modelling (Section III). The main sets of analyses, using data from the 2003 CiN Census on postcode districts (areas defined by the first part of the postcode) are reported in Section IV. There was a concern over the use of postcode districts as the area base because they are larger than electoral wards which have been the conventional units for small area analysis and therefore probably more heterogenous. In addition to analyses to check for heterogeneity (see section IV.2), this concern prompted a further set of data collection and analysis using ward level data from a sample of LAs (Section V). A completely different approach to the modelling - using data on individuals - is described in Section VI, together with our attempts to combine those data with data on children from the Health Survey for England. Methods for identifying unmet need and their relevance to this situation are considered - with supporting analyses - in Section VII. The last section of the report (VIII) reports the effect of changing the upper age limit of clients included in the analysis. The main set of analyses had taken 19 as the upper limit as there are substantial numbers of clients of that age in the CiN data. During the consultation phase of the work we were asked to investigate the effect of lowering that limit to 17.

## II OTHER MATERIAL AND MAIN ISSUES ARISING

### II.1 Literature on need drivers for PSS for children and young persons

<u>Prior to Children Act 1989</u>

There is a small body of research that has sought to explain patterns of admission into care. Bebbington and Miles (1989) surveyed of 13 of the 108 social service authorities, including 2 Inner London Boroughs, 2 Outer London Boroughs, 4 Metropolitan Districts and 5 Shire Countries. Information on family backgrounds was sought for 2528 children in care. Information on the parental family was unavailable for 356, so the effective sample was 2165 cases. Their circumstances were compared with the characteristics of a sample of 5407 children aged under 17 and not in care drawn from the 1985 General Household Survey.

Bebbington and Miles estimated the effect of a wide range of factors on the probability of admission into care. The broad conclusions of their analysis were that children admitted into care come from atypical families. Table 2.1 summarizes the key factors identified.

**Table 1 - Comparison of 'Typical' Children and Children in Care**

| | 'Typical' | General Household Survey | 'Children in Care' | Bebbington & Miles |
|---|---|---|---|---|
| **Social Security** | No dependence | 76% | On income support | 75% |
| **Family composition** | 2-parent family | 89% | Single adult | 45% |
| **Number of children** | 3 or less | 91% | 4 or more | 24% |
| **Ethnic group** | White | 94% | Mixed | 6% |
| **Tenure status** | Owner occupied | 67% | Privately rented | 66% |
| **Ratio persons: rooms** | Under 1 | 93% | One or more | 28% |

Source: Bebbington and Miles, 1989, Page 355

Their analysis of relative risks yielded the following conclusions:

*Broken Families* - Living with one adult only is the single greatest risk factor: nearly half of all children entering were living with one adult only, compared with just 7% of other children.
*Housing Conditions* - Living in crowded accommodation is the next most significant indicator: children living in such homes were 3_ times more likely to enter care than people living in a home with more rooms than people.
*Receipt of Benefits* - Children from homes where the head of household received supplementary benefit were three times more likely to come into care.
*Ethnic Origin* - Single-race from ethnic minorities are not over-represented amongst children entering care. On the other hand, a child of mixed race was 2 _ times as likely to enter care as a white child.
*Mothers Under 21* - This doubles the odds that a child will enter care.
*Large Family* - Coming from a family of 4+ children only has a comparatively small effect on the risk of entry, although it is associated with many factors that do raise the risk, like overcrowding.

Overall, Bebbington and Miles contrasted the 1 in 7,000 chance of a child from a 'typical' family being admitted into care with the 1 in 10 chance of child with multiple 'poor' characteristics being admitted into care.

The 1989 results of Bebbington and Miles can be compared with an earlier survey carried out in 1962 by Packman *et al* (1986) or about 4500 cases. This suggests that:

- Entry into care was even more closely associated with 'deprived' families in 1987 than it was in 1962, despite the increase in the proportion of behaviourally disturbed and delinquent children groups, which have less than the average levels of deprivation associated with those entering care.
- The factor that most highly correlated with entry had changed from unemployment in 1962 to broken (or 'non-nuclear') family in 1987; and there had been an increase in the proportion of children living in broken homes.

Children came into care at that time (before the 1989 Children Act) by one of three routes: voluntarily; following a criminal offence (mainly boys over 12); or compulsorily in the interests of the welfare (typically slightly younger children who were more likely to be girls). Bebbington and Miles (1989) document the characteristics of children admitted into care by each of these main routes and found that, whilst there were differences between the groups, they show similar pattern of ‘deprivation’ (as measured by the variables discussed above).

**Table 2 - Family characteristics of children by legal category on entering care, compared with all children (percentages)**

| | Children Entering Care | | | General Pop. |
|---|---|---|---|---|
| | Voluntary | Court Orders | | |
| | | Offenders | Others | |
| **Broken (Single Parent) Family** | 76 | 57 | 69 | 15 |
| **Household head gets income support** | 71 | 48 | 76 | 26 |
| **Not owner occupied home** | 80 | 68 | 85 | 28 |
| **Crowded home (one or more persons per room)** | 55 | 50 | 67 | 21 |
| **mixed ethnic origin** | 6 | 5 | 5 | 1 |
| **(Sample size)** | (1659) | (174) | (593) | (5274) |

Source: Bebbington and Miles, 1989, Page 355

In a study of admission into care in Essex, Wedge and Mantle (1991) found that social workers cited disruptive family relationships as a contributory factor in over half of all admissions, and Bebbington and Miles (1989) noted that ‘broken family’ had replaced unemployment as the factor most highly correlated with entry into care. Parents’ own deprivation or ill-health were each mentioned as contributing to about 15% of Essex admissions, but it is noteworthy that social workers seldom mentioned low income, poor housing, unemployment or cultural difficulties. A subsequent study by Stone (1990) of short term fostering in Newcastle reports that social workers considered that three fifths of the children of all ages in her sample had experienced abuse or neglect at some time. Research elsewhere demonstrates that the needs of many children admitted into the care system are related as much to material deprivation and lack of family support as much as wilful neglect or maltreatment. Compulsory separation of children from their families has in general been found to be harmful and only necessary in a minority of cases (Holman, 1980; Department of Health and Social Security, 1985; Packman *et al*, 1986; Parker and other, 1991; Department of Health, 1991).

There has been some analysis of the role of ethnicity in the risk of admission into care. Although Rowe et al (1989) find some ethnic minority groups over-represented in care, it is not clear whether this is because of ethnicity *per se* or because of deprivation amongst the ethnic groups. Bebbington and Miles (1989) sought to identify the impact of ethnicity independent of other factors, and found that children of mixed ethnic parentage exhibited remarkably high admission rates compared to other ethnic groups, particularly amongst pre-school children. These findings were confirmed by Tizzard and Phoenix (1993).

Finally, Bebbington and Miles also carried out an analysis of 1981 census data to construct a ward based index of adverse social conditions for children. They included the following indicators in an index of deprivation:

- Population density (persons per hectare)
- Proportion of children in households not in self-contained accommodation

- Proportion of children in households lacking basic amenities
- Proportion of children in crowded households (1+ person per room)
- Proportion of children in single parent households
- Proportion of children where the household head was born in the New Commonwealth or Pakistan

After confirming with principal component analysis that these six indicators could in conjunction reasonably be considered as forming a single dimension of deprivation, they constructed a deprivation index by summing the standardized score on each indicator. The highest scoring 1,689 (20%) local authority wards on this index were identified as ‘poor’ wards. More than one half of children admitted to care in the 13 local authorities came from ‘poor’ wards, although they contained only one third of all children in the population. In a subsequent paper (Bebbington and Miles 1988), they show that the rate entry into care in areas with many poor wards is higher than would be predicted from family circumstances might be important determinants of entry into care.

There have been no other published reports on population need for children, although there is some material from other analyses carried out to generate formulae for the four nations of the UK.

Conclusions from the pre-1989 literature

The main theme emerging from previous work is clear - that factors such as broken homes, overcrowding and poverty are unambiguous risk factors associated with the use of children’s PSS. The role of ethnicity is complex because the limited research that exists suggests that it is mixed-race families rather than families in any one ethnic group that are more likely to require services. However, all the studies described here predated the 1989 Children Act in England, which considerably extended the role of social service departments. In particular, it might be expected that, in addition to the deprivation factors identified in previous studies and discussed above, the prevalence of “children in need” would be extended to embrace factors associated with the health of the child and its family, and the prospects for the child’s development.

Children Act 1989

Aldgate and Stratham (2000) carried out an overview of the group of studies undertaken to explore the effectiveness of the Children Act 1989; and Aldgate and Tunstall’s own studies on the implementation of the Children Act 1989, S.17 show how social services have responded to evidence of 'need' in implementing the Children Act. For example, Dickens et al (2007) present findings from a study of children who started a period of being looked after by 24 local authorities in England during the 6 months from October 2000 to March 2001. They found considerable variation between authorities in their rates of children starting to be looked after, and explored reasons for these differences.

Whilst these studies are of considerable value in showing the different ways in which social services have reacted to the Children Act and their relative effectiveness, our purpose here is rather different: to identify the factors that *should* affect the relative allocations to different authorities and the weight that should be placed upon them.

Equally, at the time we were undertaking these studies there was a major DH research initiative on costs and outcomes of children's services, one of the purposes of which was to explore reasons for differences in unit costs between authorities. In particular, Beecham (2000) demonstrated the difficulties of assessing unit costs as part of the ongoing Kent work on providing standard unit costs.

Whilst, in this study, we have used the unit costs with which we were provided (based of course on the Kent work), there has been substantial research showing which kinds of factors affect those costs. Thus, recent studies have described the factors that inhibit parental capacity (e.g. Cleaver et al, 1999) or contribute to social exclusion (e.g. the debate on teenage pregnancy). Ward et al (2004) after describing the costs of different types of child care and analysed the factors affecting them; and Selwyn et al. (2004) analysed the costs of adoption in more depth. Some of the findings of Ward et al (2004) would appear to be directly relevant to this research:

- Child related factors include: age, disability, emotional or behavioural difficulties, and offending behaviour. The circumstances of asylum seeking children were also found to produce different cost pathways.
- The children in their study fell into eleven groups categorised by single or multiple combinations of the above factors. They developed a Cost Calculator based on sixteen possible needs groups.
- Children who displayed none of these additional characteristics cost substantially less to look after than those who displayed one of them; costs were found to be even higher for those children who displayed combinations of two or more characteristics. A very small number of children with exceptionally high needs could skew the costs of the looked after population in an authority.

All of these factors in the studies by Ward et al were of course measured at the individual level. The difficulty is that, if we had been able to carry out an individual study based on interviews with social workers, we would have found that information on those factors is not routinely recorded or, if and where it is, would not be made available because of confidentiality. The issue for us, therefore, was the possibility of obtaining corresponding reliable measures at a small area level; sadly, apart from age and disability (measured by limiting long term illness), there is no data at the small area level on these factors.

## II.2 Review of current formulae in the UK

### II.2.1 England

The first formula in England was that developed by Carr-Hill, Rice and Smith in 1995, based on a little over 1,000 wards from 25 authorities using multi-level modelling. The variables included are:

- Population density
- Children in flats
- Children in Lone parent households
- Children with Limiting Long Term Illness
- Income Support and JSA claimant rate

This formula which was implemented from 1996-97 relied to a large extent on census data that are of course only available every ten years: an issue has become of increasing concern. However, it was one of the first formulae to include ward-level income support data that is available on an annual basis.

An attempt was made in 2003 to re-calibrate the model using the costed activity data from the 1996 work together with 2001 Census data for the needs drivers. It was hoped that the same variables would appear but with different coefficients. Unfortunately, a model with a square root functional form was the only specified statistical model produced with the 1996 dependent variable and updated indicators of need. It was not possible to implement this model during the then formula freeze; and the 1995 model continued to be used until last financial year.

### II.2.2 Northern Ireland and Wales

The approaches in Northern Ireland and Wales have been similar to that in England in that they statistically analyse data on small areas.

In Northern Ireland, the most recent formula proposed for the Family and Child Care Programme of Care includes the following four variables:

- Children in income support households
- Proportion of 16-18 year olds not in full time education
- Social environment score
- Children in owner occupation (negative)

Source: Additional Needs Analysis for the Family and Child Care Programme of Care (POC3) Dixon, Carr-Hill and Spollen 2004).

In Wales, the additional needs component of the formula includes the following four variables

- Children in families claiming IS, JSA or Tax Credits
- Children in Enumeration divisions where density is above average
- Children in social rented housing
- Children in overcrowded housing

Source - Chris Williams ORS: RSS Careers Day Wednesday 23rd November 2005 Statistics in the Workplace, NHS Performance Statistics, Welsh Assembly Government

### II.2.3 Scotland

Scotland uses an entirely different approach to developing a formula for relative Grant Aided Expenditure (GAE) assessments - the client group approach. This methodology is based on a primary indicator of client numbers, and secondary indicators which seek to capture any "per client" variations in costs. Secondary indicators are selected on the basis of whether they explain significant variations in expenditure at the **local authority level**. In the case of children's social services, the primary indicator is the number of children aged 0-15; and the secondary indicator for children in residential care is the average of two indexes. These are the Number of 0-15 Year Olds Living in

Lone Parent Families and the Number of Dependants of Income Support / Job Seekers Allowance Claimants.

The client group method has the virtue that (compared to many other systems in use in the UK) it is readily understood and easily updated. However, the identification and calculation of secondary indicators suffers from a fundamental difficulty. In summary it is that the variations in local authority expenditure may be due to many factors other than legitimate variations in costs. These include variations in policy, variations in efficiency and variations in accounting methods. As presently used, secondary indicators are likely to capture all of these elements, an outcome which may bias GAEs in favour of certain classes of authority.

Duncan and Smith (1995) show how - even in a relatively simple context - it is exceedingly difficult to disentangle needs effects from other determinants of variations in local authority spending if one continues to base secondary indicator choice on expenditure data recorded at the local authority level. For example, one must accommodate the fact that local authority expenditure may in the past have been capped, that previous central government grant affects spending, and that previous levels of spending may in turn have influenced current grant receipts. Moreover, one should in principal recognize that variations in pressures from other services may influence variations in spending on - say - education.

II.2.4 UK formulae

Despite different approaches, similar factors have been included in the formulae for all four countries of the UK (see Figure 2). A variable associated with income support or job seekers allowance has been included in each of the formulae; a variable associated with the type of housing in three of the formulae; and a lone parent variable in the formulae for England and Scotland. Population density was also included in the formulae for England and Wales.

**Box 1 - Comparison of Formulae between the Four Nations of the United Kingdom**

| | **England 1996** | **Northern Ireland** | **Scotland** | **Wales** |
|---|---|---|---|---|
| **Income Support/ JSA** | IS/JSA | Kids in IS households | IS/JSA | IS/JSA/ Tax credits |
| **Lone Parents** | Lone Parents | | Lone Parents | |
| **Type of housing** | Children in Flats | Owner Occupation (negative) | | Overcrowded and Social Rented housing |
| **Pop. Density** | Pop. density | | | Pop. density. |
| **Other** | Limiting Long term illness | Not in fulltime education; and social environment score | | |

At the same time, there have been similar problems. These are: the availability of up-to-date data for the indicators that are used at the different levels; the materiality and sensitivity of the various indicators that are included in the formulae proposed; and the issue of unmet need. The move from census-based formulae to those based at least in part on updateable data like the claimant counts or the IMD Scores is evident from the brief review above. The next two sections consider the other issues.

## II.3 Materiality and sensitivity of formulae

No formula can cover the diversity of situations of all children in all local authorities without being far too complex for implementation (and where, for reasons of both accountability and transparency, it is also seen to be important that the formula should be as simple as possible). There, therefore, has to be some prioritisation among possible refinements to the various formulae. A major factor in this process of prioritisation would be the relative spend on different categories of children.

The Children in Need surveys of all service provision during a week provide an example of the distribution of expenditure. Table 3 shows the average cost of Children in Need to a Local Authority in 2000. These averages have been calculated by taking total costs and averaging them out over all children in need receiving a service in the week. The average cost of a Child in Need is £175 per week, of which £70 is costed staff and centre time, £100 is ongoing expenditure, and £5 miscellaneous expenditure. It seems clear from the table that whilst miscellaneous and one-off costs should not be ignored, variations between authorities in those costs should be seen as less important in terms of refinement than variations in the other two categories.

**Table 3 - Average cost (£/week) per child receiving a service based on a sample week in February 2000 England £ per week**

| | Children Looked After | Children Supported in Families or Independently | Total Children in Need |
|---|---|---|---|
| | *Amount* | *Amount* | *Amount* |
| **Costed staff / centre time** | *100* | *60* | *70* |
| **Ongoing costs** | *325* | *20* | *100* |
| **One-off costs** | *10* | *5* | *5* |
| **Total costs** | *435* | *85* | *175* |

*These figures are estimates based upon the actual figures received from 137 Local Authorities. Figures may not add due to rounding.*

## II.4 Unmet need

In principle, of course, all children in need of services should receive services; but there will be exceptions and, basing a formula on an analysis of utilisation will exclude those whose needs are not met. This would not matter if unmet need was distributed proportionately to the existing pattern of utilisation, but that is rather a large assumption. Unmet need generally has two forms: lack of access to or provision of any service, or provision of inadequate service. Thus the current range of children receiving social services may exclude some of some sub-groups, for example those living in mobile homes, or because of cultural barriers to access; and current practices with existing clients may not reflect the full range of needs-related factors. We set out to explicitly search for any 'unmet needs' anomalies and especially in the deprived areas due to the likely patchy coverage of the poorest (because of frequent mobility or because of the difficulty for social workers of tracking children and families in disjointed or fragile households).

In other sectors, attempts have been made to identify and take account of unmet need. Essentially, there are three approaches:

- a normative assessment of what factors should be included to address issues of unmet need, and then agreement over their weight;
- using an additional population survey that identifies need independently of utilisation; and, finally,
- statistical adjustments to the formula.

The first involves largely normative judgements on the causes and location of unmet need and can result in rather arbitrary corrections depending on who is involved. The second is based on exploiting population surveys, but the kinds of children who escape the 'net' of social services will almost certainly also escape a typical social survey (see Carr-Hill, 2005), and it is not clear how one would organize a one-off survey to 'capture' them; the only possibility would be a census of the WHOLE population to assess each child's need, but this is clearly beyond the scope of the present project. The third approach encompasses a group of statistical techniques intended to adjust the coefficients in allocation formulae derived from the small area approach (see below). It has become increasingly sophisticated.

Thus, an approach that has been adopted in the health care sector is to argue that, if unmet need is concentrated in areas with higher deprivation scores, then one would expect the nature of the relationship between the need/deprivation index and utilisation to change at higher levels of deprivation. In some analyses, there does indeed appear to be an inflection point in the relationship[3] and this has been used as the basis for a possible adjustment to the formula derived through simple consideration of the utilisation data. This approach has been applied in Scotland and England and the present authors are applying them during the present development of health and social services resource allocation formulae in Northern Ireland (see for example Sutton and Locke and McConnachie and Sutton).

Two statistical procedures have been proposed for adjusting for unmet need.

The *first* involves a demonstration that the use of services among most deprived areas is less than one would expect relative to an independent measure of need (and an independent measure of deprivation). The problem in this case is that there is no obvious independent measure of need and all possible measures of deprivation have been included in the model. An alternative is to use the 'spline' regression technique, where another variable or, for example, the square of an already included variable is defined for only the most deprived segment (the 'spline') of the population. The issue is to establish whether there are any patterns in the residuals for which such an approach might be appropriate

A radical interpretation of the unmet need approach would be to argue that all variables that enter with the 'wrong' sign in the initial models (using a stepwise procedure) are in fact indicators that are 'controlling' for 'unmet need'. For example, in the present exercise the initial model for the cost variable in the Ordinary Least Squares run includes Households with 3 census deprivation measures with a highly significant but negative coefficient (see Annex IV and V). On this basis the correct

[3]Although this did not appear to be the case for an analysis carried out by two of the proposers of the utilisation of children's services in Northern Ireland,

model is the full model (after a stepwise procedure), and the most appropriate coefficients are those that are in the ‘right’ direction in that model. This was not seen as acceptable to the Local Authority representatives.

A *second* approach to identifying the presence and likely extent of unmet need involves arguing that the average value of the slopes relating cost to need obtained from the results of the model within each authority is not the best for the purposes of setting allocations, but that instead the average of the slopes in the most ’progressive’ authorities (those where the gradient from least deprived areas to the most deprived areas is the steepest) should be used. The procedures followed here for examining the possibility of excluding outliers are a less explicit version of that approach. The problem is the same; there is no theoretical justification for any of the exclusions proposed.

None of these approaches are without methodological or conceptual difficulties and will be applied in this context with caution (see also Stone, 2005). It is particularly difficult that there is no independent survey measure of children in need[4] Nevertheless, various attempts along these lines been made in section VII.

## III. DATA SOURCES AND APPROACH

### III.1 Choice of level of analysis

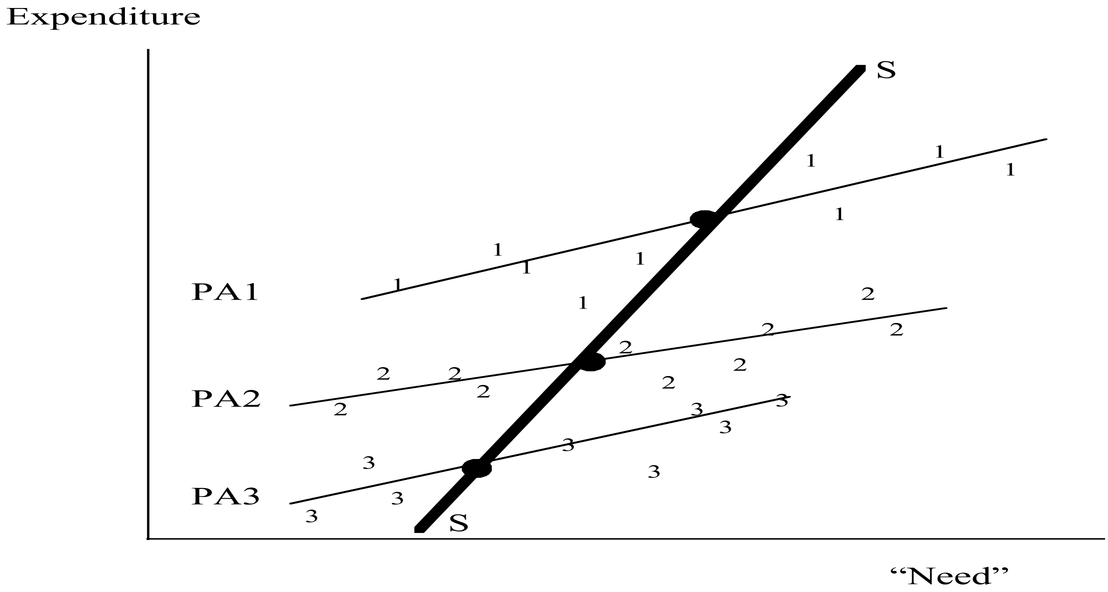
Standard spending assessments were based upon correlational and regression analysis at Local Authority level. At the time of the 1996 review the Department accepted that that approach was flawed because of the difficulty of interpreting correlations at that (aggregated) level. This is known as the ecological fallacy and is illustrated in Figure 1. In this example there are three local authorities. The numbers in the diagram refer to small areas (wards) within each authority. Needs are measured using Census or similar data. The pattern of expenditure responses of each authority to variations in needs within their authority are roughly similar, as shown by the slopes of the regression lines for each authority. However, authority LA1 devotes a higher level of resources to the services than LA2, which in turn devotes more than LA3. The *average* needs and costs of each authority are indicated by the black circles. If these are used in a regression, the thick regression line SS may result. This line bears no relation to actual responses to needs within Local Authorities, and is mainly determined by variations in expenditure policy *between* Local Authorities.

If phenomena of this sort exist, the use of aggregate local authority expenditure data in a regression analysis may be principally capturing historical spending variations between Local Authorities rather than genuine responses to needs. If we are searching for some "standard" response to needs, we should be seeking to identify the individual slopes of the sort LA1, LA2 and LA3. The government then has to select a particular slope as the "standard"; and the assumption is that the national average of individual authority slopes should be favoured. As can be seen from the diagram, this is most emphatically *not* achieved by using aggregate data. Instead, it is necessary to identify the average of the slopes found *within* local authorities.

[4] Although using population based survey measures to supplement routine administrative data is always problematic when considering deprived sections of the population.

The commissioning of the review of the potential use of multilevel models for the Standard Spending Assessment by the DETR indicates that some of these criticisms are acknowledged to have *prima facie* validity. In particular, it is recognised that it is important to incorporate more sensitive measures of workload closer to the field.

**Figure 1 - The 'ecological fallacy' explained**




For this reason, although there are authority level data on teenage pregnancy, truancy, juvenile offending, and infant mortality; and health authority data on use of mental health services and, to a limited extent, on substance addiction which might well account for the differences between small areas as well as between authorities, the argument is that some, perhaps most, of the correlation between these data and authority level expenditure is due to factors unrelated to needs. If it were possible to obtain data on those factors at small areas level then we would certainly recommend that they should be considered for the small area analysis; but this is only true for a small number of them. Equally, although there are some factors that have been identified in the literature as accounting for some of the differences in the take-up of children's services in the field, they are not amenable to (routine) measurement at either level.

## III.2 Standard data sources available at the Small Area level

For the purposes of small area analyses, there are two main types of data are required: data on service activity; and data on the characteristics of small areas that may give rise to the need for services.

<u>III.2.1 Activity data</u>

Data on the volume of services supplied to individuals and small areas are often collected directly from local authorities by projects developing allocation formulae. However, in this case the DH and DfES have (since 2001) been conducting the biennial Children in Need Census - a survey covering ALL provision paid for on behalf of children in need, whoever provided the service, over one week - whether directly by the Local Authority or by the private or voluntary sector under commissioning arrangements. Returns therefore had to be made by these other agencies to the Social Services to ensure that all activity was accounted for. The census records considerable detail of the services provided to each client, so that it is easy to distinguish between Children Looked after and Children Supported Independently or in Families. Out of the 150 Local Authorities, there were no returns from four of them, and five others had to be dropped because of poor data quality or because they were too small.

Although the census provides a detailed snapshot of all clients in a single week, it only contains limited information on a young person's care history. A separate set of central returns, the annual form 903 submissions, record the separate episodes of care over a year for children who are being looked after.

III.2.2 Data on potential need drivers

At present there are three main sources of small area data on the factors that may influence the need for services: the decennial population census; annual summaries of the numbers in receipt of state benefits, such as income support, working family tax credit and disability allowances, and the various dimensions of the Index of Multiple Deprivation.

***Census Data 2001***

All the data for 2001 has now been released. The current set of Standard Tables tends to use adults and households as its bases, but a new set of Theme tables provides more detailed information on the numbers of children in different household configurations and social circumstances.

***Benefits and Tax Credit Data - Claimants counts***

Samples of claims for most forms of benefits are extracted on a regular basis for the purpose of providing statistical summaries. The original claims are postcoded and up-to-date counts are released at geographical areas down to the level of wards (and postcode districts). Some of the counts specifically refer to children, such as children in lone parent premium claimant households, children in income support households and children in working family tax benefit households.

***Index of Multiple Deprivation***

Although the present allocation formula project does not have the resources to translate material such as education and crime data to suitable base for small area modelling, this work has been undertaken by the team developing the Indices of Multiple Deprivation (IMD) for 2004. Both the overall and domain scores of the IMD are considered as possible need drivers in the modelling.

There are a number of other sources that might be relevant for the present purposes:

***DfES and DH Statistics***

Hospital episode statistics are available for small geographical areas, but, as yet, there is little other national DoH material at such a low level. Most data collected by the DfES is aggregated to the catchment areas of schools and it would be a considerable and imprecise exercise to attribute these to smaller areas.

***National Surveys***

Several national surveys have the capacity to be used to provide limited information on people in receipt of services, and more widely, in conjunction with surveys of clients, on the proportion of people not receiving services. Surveys that cover topics relating the present exercise include:

- The General Household Survey (surveys of 17,000 households annually except 1997-98)
- The Health Survey for England has been carried out annually since 1993
- The Housing Condition Survey

However, sample sizes of all these surveys are too small to enable direct attribution of the results to sufficiently small areas to use in the modelling. They have more potential in modelling the relation between individual and household characteristics and reported service use - especially when a sample of non-clients from these surveys can be matched to a sample of clients from social services data.

The variables finally considered as possible candidates for a resource allocation formula - chosen from a much larger pool of variables - are shown in Annex I.

## III.3 Possible approaches to Small Area analyses

The tender specification, quite rightly, excluded regression of past expenditure or service receipt at local level; it suggested that options for the revised formula should be based upon analyses of individual data and, if appropriate, small area analysis. There were two possible approaches to collecting the small area data: a small area analysis based on Children In Need surveys; and a small area analysis based on a cross-sectional download of records from Local Authorities combined with estimates of time spent on different categories of case.

### III.3.1 A small area analysis based on CIN 2003

The 1996 'York' formula for Children's Social Services was based on a small area analysis at electoral ward level. One possibility here would be to use the data collected in the Children in Need Censuses over the last three years. These data are available at postcode district level. This was in fact the main vehicle for analysis and is considered in detail in section IV. An alternative was to use ward codes for comparison with previous formulae and this is discussed in Section V.

III.3.2 A Small Area analysis based on a download of clients

The approach used by the York team in 1995/96 was to take a cross-sectional download of individual data from Local Authority computer systems classified into six categories of case (Children Looked After by the Local Authority, those in Foster Care, Children on the Child Protection Register, Children with Disabilities, Other). Estimates of the time spent on each category of case were based on a separate analysis of the activities (classified into meeting with clients, telephones, court appearances, writing up reports, etc.) in a representative cross-section of case files and interviews with social workers about the average amount of time spent on each specific type of task.

There is no need to repeat such a survey of social workers in order to estimate the cost of services to clients as the CiN Census contains these details. However, there is an argument for carrying-out a survey of clients, or their proxies, in order to get household and other socio-economic details that are *not* recorded on the CiN Census.

## III.4 A possible survey of individual clients

The project proposal considered the merits and disadvantages of attempting a survey of clients. One of our main concerns with approaching clients directly is that because of the concerns about confidentiality any final sample would be very biased. We concluded that because of economies of scale and because of the importance of obtaining reasonable quality data, the only feasible way to carry out this survey would be to approach social workers - and the project budget would limit the survey to a sample of local authorities. The question of designing a suitable sample was discussed early on in the project, when it was agreed that we need to cover rural and urban areas and areas with large and small numbers of ethnic minorities. It was also envisaged that it might be necessary to further stratify according to whether a Local Authority had a high or low proportion of children with physical and learning disabilities. There are therefore four - possibly eight - categories of local authorities

Again, the possible approach to sampling was discussed during the tendering and in the initial stages of the project. The survey planning was eventually discontinued when we realised that in order to meet the reporting deadline, our survey would have had to be carried out at during the phase of preparations for data collection for CIN 2005 Census and this was seen as inappropriate both practically and in terms of the impact upon Local Authorities.

## III.5 Agreed final approaches

The purpose of this exercise was to present options for the Relative Needs formula for Children's Social Services to replace the formula developed in 1996. The original brief involved a small area analysis and an individual survey. For a variety of reasons the latter was not possible, especially given the constraints imposed by the overlap with CIN 2005. The final proposal was to explore the following options

- the national CIN 2003 data at postcode district level (section IV)
- data from a selected number of Local Authorities at the synthetic ward level

- individual level analysis of CIN 2003 data with socio-economic information attributed from the postcode district level[5]
- combination of individual level CIN 2003 with GHS or HSE data
- possible ways of adjusting for Unmet Need

The analysis has to be multi-variate to separate out the effects of different socio-demographic characteristics of individual children, the characteristics of the social services provision and the characteristics of the area.

It was also agreed that model search would be restricted to variables with positive coefficients - i.e. those in the expected direction - and that any powerful variables with a potentially counter intuitive effect would be considered as part of the discussion of unmet need.

## IV ANALYSIS OF CIN 2003:

### IV.1 The Data Set

The CIN 2003 Census is the third in a series that started in 2000 and gives a detailed record of the clients of family and children's social services for a week in February 2003. The 2003 census is the first in the series to collect information on all clients rather than a sample. The data set holds details on 378,049 clients in 146 local authorities. The information on each client includes:

- ethnicity
- religion
- age
- sex
- primary need code
- postcode district of residence (or postcode district of pre-care address for children being looked after)
- a series of codes indicating any special needs that may account for the child being known to social services
- the daily cost of care for the census week
- types of workers and units providing services to the child
- details of any placements, including respite care, occurring on any of the days of the census week.

The cost data is extensive including the costs of social worker input, day care and management overheads, as well as the costs of placements. All costs are local.

The basic characteristics of the clients covered by the 2003 CIN Census are shown in Tables 4 to 6. Boys predominate throughout the age range but especially in the older age groups (Table 4). Only just over 70% are clients are classified as white; and although another 11% have ethnic group Not Stated, over 15% of clients are Asian, Asian British, Black or Black British or Mixed which is approximately double their representation in the overall population (Table 5).

---

[5] In addition, it was proposed that specific analyses of the same kind will be carried out for children from ethnic minorities and other sub-groups that can be identified; as the main analyses were judged unsuccessful, this was not pursued.

**Table 4 - Age and Sex of Clients in CIN 2003 Census**

| Age | Female | | Male | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| **0-4** | 43917 | *46.30* | 50931 | *53.70* | 94848 | *100* |
| **5-9** | 38797 | *43.74* | 49907 | *56.26* | 88704 | *100* |
| **10-14** | 44448 | *43.39* | 57981 | *56.61* | 102429 | *100* |
| **15-19** | 35501 | *42.03* | 48960 | *57.97* | 84461 | *100* |
| **All ages** | 162663 | *43.91* | 207779 | *56.09* | 370442 | *100* |

**Table 5 - Ethnicity of Clients in CIN 2003 Census**

| Ethnic group (summary) | N | % |
|---|---|---|
| **Asian or Asian British** | 16847 | 4.46 |
| **Black or Black British** | 24969 | 6.60 |
| **Mixed** | 16670 | 4.41 |
| **Not Stated** | 40489 | 10.71 |
| **Other ethnic groups** | 10783 | 2.85 |
| **White** | 268291 | 70.97 |
| **Total** | 378049 | 100.00 |

For just over four-fifths of the clients on the register, there was no funded activity during the census week (Table 6); foster care constituted nearly half of the funded activity; the net largest component was residential home.

**Table 6 - Main Costed Care Components for Clients in CIN 2003 Census**

| Main costed care component in census week | N | % |
|---|---|---|
| **No regular funded care** | 303001 | 80.15 |
| **Adoption allowances** | 5731 | 1.52 |
| **Section 17 payments** | 3423 | 0.91 |
| **Section 24 payments** | 1556 | 0.41 |
| **Foster care** | 36905 | 9.76 |
| **other payments** | 9859 | 2.61 |
| **payments while placed for adoption** | 1545 | 0.41 |
| **Residence orders** | 3812 | 1.01 |
| **Residential home** | 12217 | 3.23 |
| **Total** | 378049 | 100.00 |

This contrast is important. Thus, although only about one sixth of all those 'on the books' were Being Looked After, with the remainder Supported in Families or Independently, nearly all those Being Looked After were active cases - in the sense that there had been some action by a social worker or a payment during the census week - compared to only just over half of the others (see Box 2).

Box 2 - Description of Children in Need census 2003

In the "Children in Need" census week, there were 381,500 Children in Need known to Local Authorities as requiring some form of Social Services provision, or about 2,500 per local authority. 17% of these Children in Need were Children Looked After (64,000), and the remaining 83%, nearly 320,000 children, were Children Supported in Families or Independently (CSF/I).

During the census week 231,500 children had active work undertaken on their behalf by Social Services or received some payment from their authority, for example in connection with residential, fostering or adoption placement. Of these 231,500 children, 59,000 children were Children Looked after and the remaining 172,500 were children supported in their families or independently.

The proportion of children receiving a service in the week was much higher for Children Looked After (92%) than children supported in their families or independently (54%). Although there are several caveats in the report, the figures suggest that each of the 150 Local Authority Social Services Children and Families teams expend resources on an average of about 1,500 children per week.

The Children in Need census asked for the activity on children to be allocated according to three main categories (intake/referral, initial and ongoing work) which approximate to categories in the "Framework for the Assessment of Children in Need and their Families (Department of Health et al, 2000)". The breakdown in Table 7 shows that, averaged out over the children in question, intake/referral activity amounts to about 1 hour per week per child, rising to 1.9 hours per week for initial work and 3.8 hours per week for ongoing work. The averages for Children Looked After are consistently higher than for children supported in their families or independently.

**Table 7 - Average hours of work per child receiving a service based on a sample week in February 2000 (England, Averages)**

| | **Intake/Referral Work** | **Initial Work** | **Ongoing Work** |
|---|---|---|---|
| **Children Looked After** | *1.2* | *2.5* | *5.3* |
| **Children Supported in Families or Independently** | *1.0* | *1.8* | *3.3* |
| **Total costs** | *1.0* | *1.9* | *3.8* |

*These figures are estimates based upon the actual figures received from 137 Local Authorities. Figures may not add due to rounding. A child may appear in more than one category during the week.*

Altogether it is clear that the Being Looked After category is very different; and could be treated separately. But, because of the obvious possibilities of substitution between foster care and residential care, the approach agreed with the Department was to include *all* categories of care in the cost variable, and to separately estimate an adjustment for foster costs (see separate report).

## IV.2 Homogeneity and Heterogeneity

In order to conduct small area modelling, each client on the CiN Census has to be linked to a geographical location. The most detailed geographical identifier on the CiN database is the postcode district (the first part of the postcode). These postcode districts will be the basis for incorporating socio-economic data as needs drivers - both from the 2001 Census and other sources.

The size of the postcode districts was an initial concern because, in using the small area analysis approach, it has always been presumed that the smaller the area the better, in order that the characteristics of the area are as homogenous as possible thereby reducing the risk of the ecological fallacy (that an association observed at the areas level does not reflect a 'real' relationship at the individual or household level). Prior to receipt of the CIN Census data we had intended to conduct the small area modelling at ward (or synthetic ward) level; and, if necessary, attribute ward level values to individual client data in order to carry out individual level modelling. Because the only geographic identifier in the CIN data set is the postcode district (the first part of the postcode) of residence (or pre-care residence for looked after children), this would have required obtaining ward codes from LAs and matching ward codes to CIN records. This did not prove possible (see Annex I.1). The problem is obtaining ward codes from LAs in the first place. Ward information was obtained from some LAs (see section V below), though this will mainly be as a check on the bulk of the analyses, which has been conducted at postcode district level.

As postcode districts generally refer to larger areas and populations than electoral wards we were concerned that their possible socio-economic diversity might undermine the modelling (let alone to use as the basis for attributing characteristics to individuals). To test for possible problems we carried out preliminary analyses of the relative social homogeneity of wards and postcode districts using output area data from the 2001 population census (see Annex I.2).

To test social heterogeneity of wards and postcode districts, 8 need indicators for census output areas were obtained. Although these indicators were chosen for ease of computation at output area level, several of them have in fact appeared in previous formulae or been strong candidates for inclusion. We compute the standard deviation in the values of these indicators for the output areas within each ward and postcode district. We then averaged these standard deviations for the wards and postcodes districts in each type of authority. We expected the larger populations (and areas) of postcode districts, compared to wards, to result in their being more heterogeneous. An example is given in Table 8 for unitary authorities (tables for each class of authority are in the Annex I.2). Across all classes of authority, with the single exception of the proportion of ethnic minorities, postcode districts are in general *more* homogenous than synthetic wards.

**Table 8 - Within ward and postcode district variability for unitary authorities**

| **Unitary authorities** | | | |
|---|---|---|---|
| **Number of wards = 1058** | **Mean ward** | **SD within** | **SD within** |
| **Number of postcode districts =406** | **Value** | **Wards** | **PC districts** |
| **Percentage non-white** | 5.80% | 4.00% | 5.05% |
| **Percent working age with LLTI** | 8.19% | 1.05% | 1.04% |
| **Percent 16-74 with no qualifications** | 29.10% | 2.72% | 2.70% |
| **Percent households in flats** | 14.56% | 7.35% | 6.96% |
| **Percent no car households** | 23.94% | 3.93% | 4.06% |
| **Percent households in owner occupation** | 71.78% | 6.11% | 5.00% |
| **Percent LP households with kids** | 6.51% | 1.93% | 1.65% |
| **Percent households, all adults unemployed with kids** | 4.78% | 2.23% | 1.98% |

Clearly the exception is important and, given the large size of the CIN 2003 data set we propose to address this in two ways:

- First, through a variety of sub-group analyses in order to see whether the selection of postcode districts that are more homogeneous in terms of ethnic minorities gives a different result (see section VIII.4 for findings)
- Second, through a comparison with analysis at the level of synthetic electoral wards from a smaller set of Local Authorities who agree to give us the original data where the whole postcode will usually have been recorded.

Analyses have been carried out using all postcode districts and a subset of postcode districts that are most homogenous with respect to the proportion of ethnic minorities.

## IV.3 Dependent variables

The modelling mostly uses three variables derived from the CIN data set[6] as dependents:

- the number of clients originating from a postcode district per thousand inhabitants aged 0-19 in the district
- two interpretations of the cost of providing services to clients originating from a postcode district per thousand inhabitants aged 0-19 in the district

The two cost variables are preferred because they more accurately reflect the workload of social services. The first version of the cost variable uses the costs per child as reported in the CIN census - deflated by the area cost adjustment for children's social services. The second takes the same costs, and deflates them as before, but then computes national average costs for service combinations - giving us an average for, say, children who attend day care and have some form of domiciliary support; and an average for someone in supported living etc. In this way unit costs are computed for the 50 distinct care combinations that occur in the data set. These national average unit costs are then assigned to all clients receiving the care combinations and the costs summed for each postcode district as before.

There are, of course, several factors that affect costs in different Local Authorities - for example, regional price variations, differences in workforce and salaries, differences in patterns of placements for looked after children. But one of the advantages of carrying out analysis within a multi-level analysis framework is that those variations - which are all at Local authority level or above - are factored out.

## IV.4 Supply variables

The costs of children's social services within an authority can also be affected by 'supply' factors such as the relative likelihood of the child being referred by different sources, secondly the pattern of services used by different Area Offices within an Authority and thirdly the level and type of effort of social workers. It was therefore agreed that we would develop measures of access and supply that should allow us to test whether there are effects due to proximity to services or service substitution.

[6] See Annex I for a description of the data set.

Children can be referred to social services by the parents or by other professionals or there could be self-referral. In principle, therefore, there might be substitution effects between different types of services at all geographical levels, and in particular at the Area Office level. Initially, therefore, we extracted nearly all of the addresses of the area offices but then took the view that there was no particular point in contacting them (or the Finance Departments) to find out the patterns of staffing and costings for those Area Offices for three reasons:

- accounting practices in ascribing costs - and even staffing costs - to those offices will be variable;
- it seems rather unlikely that will be a 'supply' effect at area or patch level determined by an *absolute* lack of staff or resources at a Local Area Office - in other words if a Local Authority is made aware of a child in difficulties, they will ensure that one of the Area Offices (if there is more than one) does something (we realise not necessarily the 'right' thing - see below)
- whilst there might well be a supply effect of that kind at Authority level which would influence overall expenditure - an absolute lack of resources leading to a decision not to put a child in residential home for example - it is unlikely that this would affect an Area Office except by chance (it happens to be one of the children on their list who needs residential care at the end of the financial year), and of course Authority level effects are, through the techniques adopted, taken out of the analysis relating needs variables to expenditure on children's services.

Instead, we decided that the best surrogate for a possible within- Authority 'supply' variable that could reflect both the likelihood of a child being referred by the parents (or even self referred) in the first place and possibly also the level and type of effort by social workers, would be the accessibility of the catchment population of children to the different area offices. This has been captured by the mean distance between the centroid of each postcode district and the nearest area office for a social services authority. It has been calculated from Census populations and the postcodes of the area offices. On the whole, our a priori was that there would not be an effect.

## IV.5 Structure of data and statistical techniques

*Hierarchies and levels*

Given that there are 141 authorities with usable data and, potentially, nearly 500 patches, the most appropriate method of analysis is multi-level modelling with either three levels (postcode district, patch and Authority) or two levels (postcode district and Authority). However, given the relative lack of familiarity of many Local Authority officials with that method, when a model has been developed using that method, it has also been re-estimated using Ordinary Least Squares and including dummy variables for the Local Authorities.

*Functional forms*

In principle, the most appropriate specification of the model depends on the distributions of all the variables in the model. There is a theoretical question here - whether it is possible to apply an estimated non-linear formula directly to Local Authority level data. In principle, one could apply a non-linear formula at any level; but it becomes very messy to compute and if done uncritically, the non-linearities may lead to less than credible allocations at the extremes of the range. We have therefore given preference to a linear formula but some of the utilisation data in particular may have distributions that will not model satisfactorily without transformation.

*Endogeneity*

If the supply variables are endogenous in the data - that is, if there is evidence of reverse 'causation' between the dependent variable and supply variables - this will involve two stage least squares.

*Criteria for assessing statistical appropriateness of models*

Models that are plausible in terms of the nature and sign of the variables are examined for their statistical properties. This includes what is called a specification test and the size of their R-squared statistic.

Specification tests are intended to test whether or not there are any variables that have been omitted from the model; and whether the functional form is appropriate. No one statistical test covers both these issues comprehensively. The one used here is the original Ramsey Reset test which involves including the square of the predicted value from the original model as an independent variable. It was emphasised that neither of these specification tests should be treated as the sole or unique criterion. Indeed there are several examples of models which fail this criterion being used successfully for resource allocation.

The R squared value measures the proportion of variance in the dependent variable that has been accounted for by the variables that have been included in the model[7]. Once again, it was emphasised that this value should not be treated as the sole or unique criterion and it could be argued that at least as much attention should be given to the plausibility of the variables.

## IV.6 Initial exploratory analysis

The basis for the small area analysis is CIN 2003. There are 380,000 individual children records in the national data set, and these combine to 2,210 postcode districts. There were usable data only for 141 local authorities, with 4 of the authorities not making returns and inadequate data from 5 of the authorities (either because they were too small or because the data were of poor quality). These were combined with needs variables including education data (KS2 examination results attributed to postcode districts) and the access variable computed from the postcode distribution of clients relative to the location of social work offices for children's and young person's services.

A variety of exploratory analyses have been carried out. These include examining:

- the distributions of the dependent variables and their implications for analysis;
- correlations and inter-correlations.

[7] Note that, because they were on a different scale it was not appropriate to compare the R squared where the dependent was unlogged with one where the dependent was logged. The actual and predicted values in the log runs will accordingly be unlogged and compared.

IV.6.1 Distributions of the dependent variables

Across all 141 authorities, the cost variable has substantial skewness (i.e. the distribution slopes to one side) and kurtosis (i.e. the distribution is more pointed or flatter than the classic bell curve) with the distributional statistic at least 75 times the standard error in both cases. The same statistics for the transformed variables (logged or square root), although not that badly distributed, are also at least 15 times their standard error. For example, there are ten postcode districts with costs less than £100 and 18 with more than £15,000. With these values it is unlikely that one will achieve a well-specified model (i.e. a model where, at least in statistical terms, there are no omitted variables and no measurement error) without excluding some outliers. Whilst such exclusions can be justified statistically - because of the poor distributions - there is rarely ever a theoretical reason to exclude them (unless one suspects a mistake in the data) so there is always a sense of arbitrariness.

In contrast, if we look at the skewness and kurtosis *within* each authority (Annex II), the cost variable appears to be relatively well-behaved, with only a dozen authorities having a value for skewness more than three times the standard error, and 31 authorities having a kurtosis statistic more than three times its standard error. This arises because the mean values of the cost variables are very different between Local Authorities. All except two of the authorities that have a significantly large skewness statistic also have a significantly large kurtosis statistics. At the same time, the relatively well-behaved distributions of the cost variable within authorities compared to the overall skewness and kurtosis when all 141 authorities are considered together suggests that multi-level modelling may lead to a better specified model as that modelling framework is based on the better behaved distributions of the costs per capita between each set of small area (postcode districts) of the 141 authorities. On this basis it did not seem appropriate to experiment with excluding outliers.

IV.6.2 Correlations and inter-correlations

The full list of independent variables is given in Annex III. Several of the independent variables are correlated more than 0.5 with the cost variables, which suggests that there will be a powerful predictive model. Some of the inter-correlations between the independent variables are very high (see Table 9).

**Table 9 - Correlations between Density and Other Independent Variables**

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| **NEWDENS** | 1.000 | -0.313 | 0.404 | 0.469 | 0.469 | 0.375 | 0.396 | 0.357 | 0.173 |
| **MINDIST** | -0.313 | 1.000 | -0.102 | -0.137 | -0.145 | -0.124 | -0.118 | -0.136 | -0.060 |
| **INCSUP** | 0.404 | -0.102 | 1.000 | 0.952 | 0.962 | 0.841 | 0.854 | 0.758 | 0.767 |
| **Lone parents on inc support** | 0.469 | -0.137 | 0.952 | 1.000 | 0.978 | 0.804 | 0.817 | 0.762 | 0.712 |
| **Children in IS hholds** | 0.469 | -0.145 | 0.962 | 0.978 | 1.000 | 0.817 | 0.831 | 0.788 | 0.709 |
| **Adults on job seekers allowance** | 0.375 | -0.124 | 0.841 | 0.804 | 0.817 | 1.000 | 0.990 | 0.869 | 0.761 |
| **Adults – income based JSA** | 0.396 | -0.118 | 0.854 | 0.817 | 0.831 | 0.990 | 1.000 | 0.875 | 0.741 |
| **Children in income based JSA hholds** | 0.357 | -0.136 | 0.758 | 0.762 | 0.788 | 0.869 | 0.875 | 1.000 | 0.642 |
| **Prop of econ act 16-24yr olds unemployed** | 0.173 | -0.060 | 0.767 | 0.712 | 0.709 | 0.761 | 0.741 | 0.642 | 1.000 |

Note: the significance level has been omitted because all correlations are significant at better than 0.001
Column Titles: A - NEWDENS; B - MINDIST; C -INCSUP; D - Lone parents on income support; E - Children in IS hholds; F - Adults on job seekers allowance; G - Adults - inc based JSA; H - Children in inc based JSA hholds; I - Prop of econ act 16-24yr olds unemployed

There was a specific interest in the role of density. This is not a new issue, Annex IV is the summary of a technical paper which explored the relationship between population density, the other variables in the previous (1996) model and need for children's social services, which suggested that density was playing a crucial but difficult to understand role. In the current analysis, however, the correlations between density and the dependent variables (Table 10) are not very strong (about 0.275 (or accounting for only about 8% of joint variance) compared to the values for the other variables entered into the equations. It is not the high inter-correlations between density and other needs variables that will stop density entering the equations; it is because it is not correlated with the dependent in the first place. Nevertheless, as density appears in the current formula, it was entered in some initial runs.

**Table 10 - Correlations between density and dependent variables (Postcode District Level)**

| | New Density | Min. Distance | Income Support | Lone parents on income support | Children in IS house-holds |
|---|---|---|---|---|---|
| **NDEP2** | 0.275 | -0.244 | 0.606 | 0.629 | 0.629 |
| **UNITCST2** | 0.233 | -0.170 | 0.583 | 0.586 | 0.597 |

| | Adults on job seekers allowance | Adults - income based JSA | Children in income based JSA house-holds | Prop of econ act 16-24yr olds unemployed |
|---|---|---|---|---|
| **NDEP2** | 0.443 | 0.463 | 0.482 | 0.419 |
| **UNITCST2** | 0.462 | 0.472 | 0.468 | 0.456 |

## IV.7 Initial multivariate analysis

A variety of preliminary analyses using OLS have been carried out experimenting with different functional forms. The following variants have been attempted:

- Logarithm of dependent only
- Logarithm of both sides

- Square root of dependent
- Linear dependent and square of significant variables
- Selected interaction terms in the linear model; and
- Re-run with postcode districts assigned to only one local authority

Audit trails for these exist. OLS models with a transformed dependent variable (either logarithm or square root) perform better on purely statistical grounds than those using the untransformed dependent: the square root model is in fact the only specified model. However, the variables that are included with significant coefficients in the model with untransformed dependent are the same as those included with the square root model.

Initial runs showed that the main problem remains the lack of specification of the model, indicating omitted variables or the wrong functional form. This was a surprise because of the high level of R squared obtained in all models.

In order to account for this and/or try and explain this away, we searched for possible outliers. Examples of analyses carried out are appended to this report. In these, we have been concentrating on high value residuals and on authorities that have counter-intuitive correlations between postcode district activity and probable need drivers. Some of these results are due to questionable data for single postcode districts; some to problems with the entire data set from an LA; and some to the form of the relation between possible need drivers.

On this basis we have examined the possibility of excluding outliers from the analysis, on the grounds that they might account for the difference between the specification of the model with untransformed and square root dependents. A variety of arbitrary exclusions of local authorities and of postcode districts have been tried; in particular, runs have been attempted excluding 173 postcode districts, but none of the runs are specified. But because there was no clear evidence about the quality of the raw data to exclude any of the postcode districts and the statistical data did not show any clear advantage in excluding any of them, none have been dropped.

Despite a variety of exclusions, therefore, attempts with different combinations of variables, runs estimated in OLS with either individual costs or national cost weights with a linear dependent remain unspecified, whilst those with a square root dependent are specified.

An alternative approach was to use multi-level modelling in which the clustering of postcode districts within Local Authorities is directly incorporated into the structure of the analysis. Effectively, the software searches for a 'gradient' (in inverted commas because in multi-dimensional space) which is closest to the gradients *within* each Local Authority. Given we have shown that the skewness and kurtosis when calculated *within* Local Authorities is considerably smaller than when calculated *across all* Local Authorities, this is likely to lead to a better specified. In fact, in the multi-level modelling runs, both linear dependent variables including the National Unit Cost dependents, are well-specified and the square root run just unspecified.

Full results are attached as Annex V, providing a variety of options. In all three OLS options, R squareds are above 60%, higher than the typical values of 45% obtained in the 1996 modelling,

## IV.8 Initial recommended set of options

The pattern of variables appearing in the different runs (see Table 11) shows that, overall, the multi-level models are more consistent in terms of the variables included. The 'children without good health' variable appears in five of the six, the combined adult income support variables in four of the six. A fuller set of analysis is given in Annex VI.

It should be noted that, in all runs, the 'supply' variable (mindist) is always negative implying that those further away from a service provision office use the services less. Given that this effect remained negative (and statistically significant in all except the individual cost OLS run), there was the issue of how to treat that variable: either as a control, in which case its coefficient should be ignored, or as part of the model.

**Table 11 - Independent Variables appearing in Different Options (with min. dist.)**

| Variable | Ordinary Least Squares | | | Multi-Level model | | |
|---|---|---|---|---|---|---|
| | *A* | *B* | *C* | *A* | *B* | *C* |
| **Children in lone parent households** | ✓ | ✓ | × | × | ✓ | × |
| **Lone parents on income support** | ✓ | × | × | ✓ | ✓ | × |
| **Children not in good health** | ✓ | ✓ | × | ✓ | ✓ | ✓ |
| **Adults on income support or income based JSA** | × | ✓ | ✓ | ✓ | × | ✓ |
| **Children in social rented households** | × | × | ✓ | × | × | × |
| **Children with limiting long-term illness** | × | × | ✓ | × | × | × |
| **Children in black ethnic groups** | × | × | ✓ | ✓ | × | ✓ |
| **Children in mixed ethnic groups** | × | × | × | ✓ | × | × |
| **Children in income support/income based JSA households** | × | × | × | × | × | ✓ |

Column headings
A: Costs of each individual Case in CIN 2003
B: Square Root of Cost A
C: Numbers weighted by National unit Costs

## IV.9 Runs without Minimum Distance

The preliminary results presented in May 2005 included the 'supply' variable minimum distance to an area office; on request, we were asked to exclude the minimum distance variable but include population density.

Accordingly, the equations were re-estimated excluding minimum distance *but including density*. The three dependents considered are client numbers, client numbers weighted by the national cost for the type of case and actual local cost (deflated by the area cost adjustment). The models were estimated using both Ordinary Least Squares and Multi-Level Modelling. Unfortunately it was later discovered that the density variable had been incorrectly calculated and so the full report on these results is included in Annex V. When the correct density variable was included, it was not statistically significant and gave the following results (Table 12).

**Table 12 - Recommended Model from CiN 2003 Small Area Analysis**

| | *Estimate* | *St. Error (U)* | *Prev. Estimate* |
|---|---|---|---|
| **(Constant)** | 278.4 | 325.7 | 178.7 |
| **Children without good health** | 11890 | 4579 | 11370 |
| **Adults on Income Support/JSA** | 15790 | 3298 | 22420 |
| **Children of Income Support/JSA claimants** | 5947 | 1864 | 5328 |
| **Children in black ethnic groups** | 5378 | 1247 | 4724 |

This was the recommended model for resource allocation for the need/ deprivation component:

- the proportion of children without good health;
- the proportion of income support/income-based jobseeker's allowance claimants aged 18 to 64 years;
- the proportion of children of income support/income-based jobseeker's allowance claimants; and
- the proportion of children in black ethnic groups.

## V. SMALL AREA ANALYSIS OF WARD LEVEL DATA FROM SELECTED AUTHORITIES

The previous English children and families social services allocation formula was computed using small area modelling methods with data at electoral ward level - with some amalgamation of rural wards with small populations. The only geographical identifier on the CIN 2003 data set was the postcode district and it proved impossible to obtain ward codes for sufficient of the client lists held by LAs to make this a viable approach. Nevertheless, in order to confirm that similar results would be obtained at ward level we have attempted to obtain ward codes matching the CIN dataset from a sample of the local authorities that supplied the CIN data to the DH.

Because no conversion from wards to synthetic wards has been released by ONS for 2001 wards, the analysis has been at electoral ward level. Descriptive statistics are given in Annex V. This was seen only as a confirmatory analysis.

The main difficulties in acquiring the data from LAs were that the original CIN files had not been kept, staff had moved, or the authorities were unable to interrogate their version of the central database in order to match their CIN submissions to their local client record systems. These problems particularly applied to London authorities and we only managed to get the ward codes or full postcodes from one inner London and two outer London authorities.

In the event, twenty-four authorities provided usable files of ward codes that could be matched to the CIN2003 data set. Some of the matching is approximate as the local authorities do not have the client ID codes that are used in the central version of the CIN data set and the central version does not retain the codes used by the local authorities when they supplied the data. Hence ward codes have been matched into the file using data such as the date of birth of the child, the date of first referral, and client sex.

The total number of wards in the data from these LAs is 2014. Once again the distribution of the dependent variable across all wards in this subset of Local Authorities is poor (Annex VI, Table VI.1) with a skewness nearly 40 times its standard error (2.086 compared to 0.055) and a kurtosis more than 100 times its standard error (10.675 compared to 0.109); but the distribution within each authority with under half (11) of the authorities having a skewness more than three times its standard error and even fewer (9) having a kurtosis more than three times its standard error (see Annex VI). Data from two of the authorities (with codes 511 and 820) have a particularly poor distribution

**Table 13 - Ward Level Linear Run with adjusted Cost Dependent**

| | Unstandardised Coefficients | | Stand. Coeff. | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| **(Constant)** | -574.0 | 252.9 | | -2.27 | .023 |
| **Children in social rented households** | 3766.8 | 687.0 | .199 | 5.48 | .000 |
| **Children not in good health** | 8770.2 | 3218.4 | .077 | 2.73 | .006 |
| **Adults on Job-Seekers Allowance** | 44850.2 | 7582.5 | .204 | 5.92 | .000 |
| **Children in income support/income based JSA households** | 6302.6 | 1588.9 | .216 | 3.97 | .000 |
| **Reset Test Statistics** | 0.0000325 | .000 | .169 | 2.47 | .014 |

a Dependent Variable: WCDEP2

The Ordinary Least Squares model with the cost variable (computed as above) leads to a reasonably specified model as in Table 13, with a subset of the variables included in the postcode district runs. We take that as supportive evidence that the two area bases produce similar results.

## VI. INDIVIDUAL LEVEL ANALYSIS OF CIN 2003 DATA

### VI.1 Analyses using CiN Census data and attributed characteristics

Because the CIN 2003 data set is an individual level data set, we can carry out a proxy individual level analysis (ILA) using potentially all 300,000 children, together with the socio-economic data that have been attached to their postcode district. Clearly this will not provide direct information on the child as had been proposed originally through interviewing the social worker working with each child. However, it has to be remembered that the collection of data from the social workers responsible for the child was itself proxy information and, given potential social worker reluctance -even without CIN 2005 - it would have been difficult to collect information on a large representative sample. Moreover, the sheer size of the sample, even if we restrict the sample to children from postcode districts that are relatively homogenous in respect of the proportion of ethnic minorities, means that the estimates will be much more robust and that many more sub-group analyses can, in principle, be carried out.

The analyses used socio-economic information attributed to individual children based on the postcode district in which they live (Table 16). Although all the independent variables are highly statistically significant, the model is only of very limited explanatory power; always less than 5% R squared whatever combination of variables or functional forms are used[8]. However, given the debate about the relative costs of

[8] It should be noted that this was a concern of the researchers both during and after the tendering process. First, it should be recognised that, in general one would expect small area analysis to have a higher R squared than any individual analysis. This is because much of the random variation between individuals is 'ironed out' through the aggregation process. Second, the packages received by each child are different and, although there are individual characteristics associated with being in receipt of care, there is far less research about the characteristics that indicate different types of care (see review of literature in section II). This is in contrast to the situation with personal social services for older people, where there only a limited number of packages of care that are relatively well defined and where there is also some differentiation between the package most likely to be received by the young old and the older old. In the latter situation it is plausible to hope for and obtain a high R squared; but

children from different minority ethnic groups, it is interesting to see that relative to the overall average, each of the identified ethnic groups (Asian British, Black British, Other Ethnic Groups) cost less whilst Mixed Ethnic group does cost more.

## VI.2 Combination of Individual Level CIN 2003 with HSE data

The analysis of a combination of individual level CiN 2003 with HSE data was originally proposed when individual survey data on clients could have been combined with a national data set on children to explore the factors associated with a child being in receipt of social services. The only possible parallel here would have been to combine a CIN 2003 file with characteristics attributed from postcode districts with a sample from HSE or GHS with individual characteristics. Preliminary analyses showed a very low explanatory power so that the results were only of very limited value and the approach was discontinued.

**Table 14 - Results of Individual Level Analysis**
(A) Model Summary

| Mode | R | Adjusted R | Std. Error of the Estimate | |
|---|---|---|---|---|
| 1 | .094 | .009 | .009 | 5 |
| 2 | .139 | .019 | .019 | 5 |

(B) Coefficients

| | Unstandardised | | Standardized | t | Sig. |
|---|---|---|---|---|---|
| | | | | | |
| **B** | Std. Error | Beta | | | |
| **(Constant)** | -46.1 | 6.0 | | -7.66 | .000 |
| **NGENDER** | 20.3 | 1.8 | .019 | 11.59 | .000 |
| **RAGEGRP** | 38.0 | .8 | .079 | 47.80 | .000 |
| **ASANBRIT** | -49.2 | 4.4 | -.019 | -11.06 | .000 |
| **BLCKBRIT** | -10.9 | 4.0 | -.005 | -2.75 | .006 |
| **MIXEDETH** | 63.0 | 4.3 | .024 | 14.52 | .000 |
| **NOTSTATE** | -91.6 | 3.0 | -.053 | -30.42 | .000 |
| **OTHERETH** | -56.7 | 5.5 | -.018 | -10.32 | .000 |

a Dependent Variable: COST_TOTAL

# VII. POSSIBLE WAYS OF ADJUSTING FOR UNMET NEED

There are several possible ways of approaching unmet need as discussed in section II.4 above. The initial attempts here simply examined how the predicted values are related to the actual values of the dependent variables to see if there is any 'shortfall' in the predictions compared to the actual values. This leads on to two other possible analyses. The first approach ideally appeals to an independent measure of 'need' (in this case for children's social services) and examines whether there are any other variables associated with that independent measure that can be brought into the analysis; in the absence of such an independent measure, the approach would be to examine whether the residuals are correlated with any of the independent variables to see whether there are any candidates for re-including one or other of the variables that

with children, the individual level modelling is almost certain to have a much lower R squared than the small area modelling.

have been excluded during the process of eliminating variables. The second is the so-called variations approach in which a group of authorities is selected where the apparent gradient in the allocation of budget within authority is much steeper than the national average gradient, in order to see whether another model (essentially other sets of variables) are more appropriate.

### VII.1 Comparing predicted and actual values

Graphs have been plotted comparing the predicted values at the end of the first stepwise run with the predicted values from runs after eliminating any negative or statistically insignificant variables. The predicted and actual values have also been compared. The former graphs, reassuringly, display an almost perfect straight line confirming that the process of eliminating variables does not substantially change the picture. However, in each case, the latter graphs show that there is an apparent 'shortfall' in that - in high cost (or client number) areas, the predicted values fall short of those actually observed. Other writers have taken this to be evidence of 'unmet need' meaning that the estimated equation is not accounting for high costs among presumed deprived populations or areas.

In order to test this, we have identified the postcode districts that are high cost (or have high numbers). These are listed below each pair of graphs in Annex VII, with an example shown here in Figure 1 and compared with the IMDTOTAL score (Table 15). It is clear that they are not located in any specific region nor are they concentrated amongst the most deprived areas (according to the IMDOTAL score).

**Figure 1 - Plots for unit cost dependent**

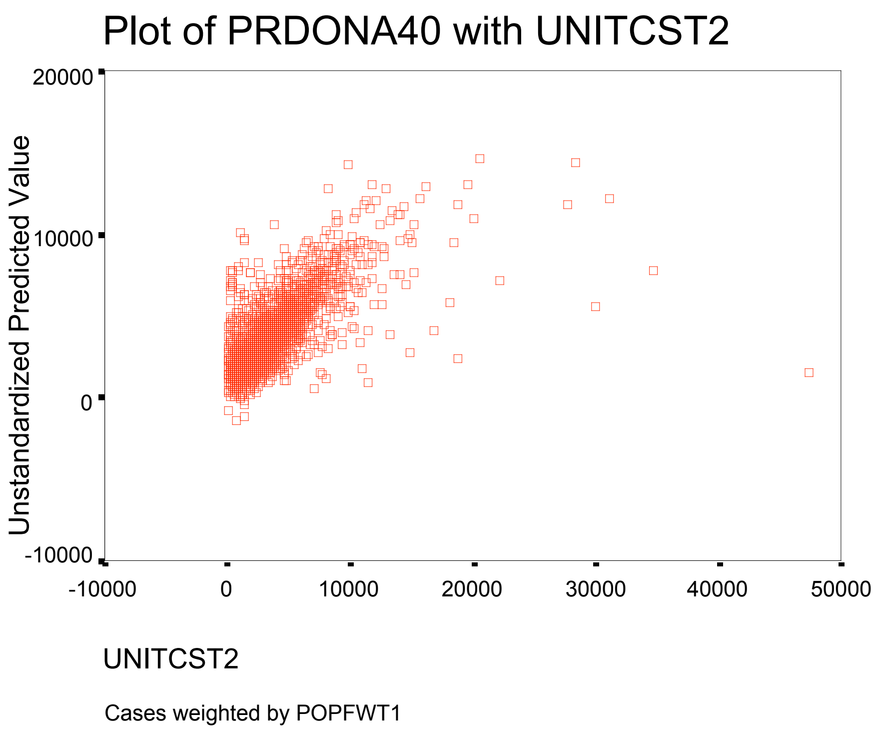


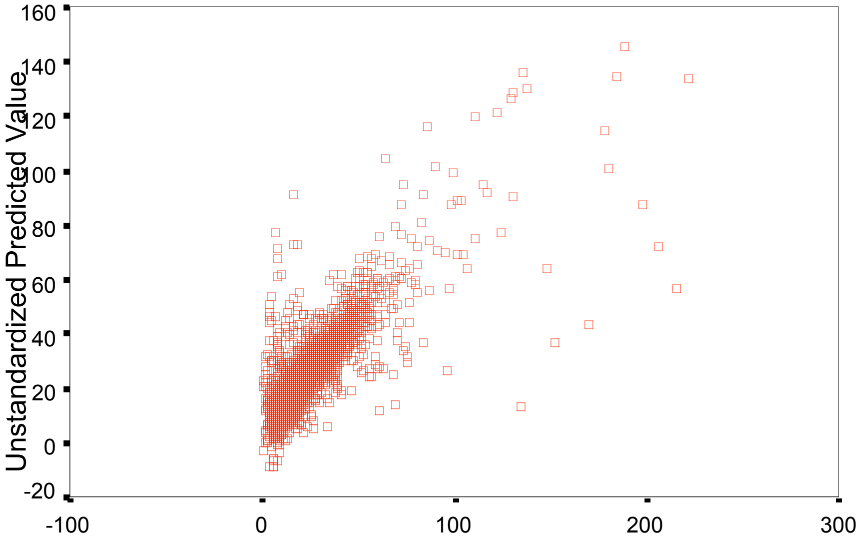
**Table 15 - Local authority base of postcode districts with high costs**

| LA_ID | PCDIST | UNITCST2 | IMDTOTAL |
|---|---|---|---|
| 205 | DN1 | 18472.92 | 55.95 |
| 214 | HU6 | 15137.99 | 43.60 |
| 215 | HU1 | 27733.07 | 62.60 |
| 215 | HU2 | 19563.43 | 63.98 |
| 215 | HU3 | 15254.45 | 57.17 |
| 306 | M11 | 15654.19 | 71.05 |
| 306 | M7 | 22115.90 | 49.58 |
| 316 | L20 | 29963.60 | 51.79 |
| 407 | CV7 | 47370.47 | 16.43 |
| 509 | LE1 | 28423.39 | 58.61 |
| 606 | LU2 | 16864.27 | 16.97 |
| 624 | PE7 | 18756.20 | 13.70 |
| 704 | E9 | 34702.49 | 43.94 |
| 705 | NW10 | 15015.43 | 32.73 |
| 707 | W10 | 16110.12 | 43.05 |
| 713 | NW6 | 31131.78 | 30.53 |
| 713 | W10 | 20607.94 | 43.05 |
| 720 | SE19 | 18054.90 | 26.01 |
| 909 | BS2 | 18791.94 | 50.09 |
| 913 | PL1 | 20033.41 | 47.28 |

Number of cases read: 20 Number of cases listed: 20

More specifically, given the specific characteristics of children's social services, one would expect that if there were unmet need it would arise at first entry into contact with children's social services, so that the most important graphs to examine are those related to the client-numbers dependent (Figure 2). In this case there does appear to be a concentration in two of the London based Local Authorities, i.e. code numbers 703 and 713 but that, once again, these do not appear to be those parts of those authorities where the deprivation scores are very high. Moreover, whilst those two authorities account for 13 of the 28 cases identified as potential 'shortfalls' in terms of numbers, none of the postcode districts from authority no.703 and only two of the postcode districts from authority code no. 713 appear as potential 'shortfalls' for the other two dependents (Table 16). Similarly, there is only limited consistency in terms of the other postcode districts that appear with the three different dependents. On this basis, there is, therefore insufficient evidence to propose any specific adjustment for the observed shortfalls, mainly because they do not appear to be related to deprivation.

Plot of PRDON68 with NDEP2




NDEP2

Cases weighted by POPFWT1

**Table 16 - Local authority base of postcode districts with large numbers of clients**

| LA_ID | PCDIST | NDEP2 | IMDTOTAL |
|---|---|---|---|
| 205 | DN1 | 106.90 | 55.95 |
| 215 | HU1 | 206.72 | 62.60 |
| 215 | HU2 | 130.32 | 63.98 |
| 306 | M11 | 105.13 | 71.05 |
| 316 | L20 | 152.34 | 51.79 |
| 404 | CV6 | 169.79 | 31.27 |
| 407 | CV7 | 135.09 | 16.43 |
| 509 | LE1 | 198.16 | 58.61 |
| 703 | SE10 | 129.96 | 30.68 |
| 703 | SE12 | 110.72 | 23.69 |
| 703 | SE13 | 222.46 | 28.78 |
| 703 | SE18 | 135.68 | 35.35 |
| 703 | SE2 | 137.74 | 32.82 |
| 703 | SE28 | 130.67 | 34.51 |
| 703 | SE3 | 122.22 | 25.45 |
| 703 | SE7 | 185.19 | 35.01 |
| 703 | SE8 | 188.56 | 36.41 |
| 704 | E9 | 215.68 | 43.94 |
| 705 | W11 | 148.09 | 27.59 |
| 707 | W10 | 116.65 | 43.05 |
| 712 | SW4 | 110.47 | 28.21 |
| 712 | SW8 | 103.88 | 33.44 |
| 713 | NW6 | 180.74 | 30.53 |
| 713 | W10 | 178.54 | 43.05 |
| 713 | W11 | 114.83 | 27.59 |
| 713 | W2 | 102.01 | 30.55 |
| 909 | BS2 | 124.89 | 50.09 |
| 913 | PL1 | 101.09 | 47.28 |

Number of cases read: 28 Number of cases listed: 28

## VII.2 Residual Analysis

When manual or automated stepwise regression methods are used to develop models, the correlations between possible need drivers may cause variables to be dropped at an early stage when they might be able to make a contribution to the final model. To test for variables that might be reconsidered for the model - and which might correct for any non-linearities - residuals from the recommended model were correlated with the full set of potential need drivers.

The only correlations significant at the 5% level in this exercise are shown in Table 17 (the full set is in Annex VIII) and even these 26 have to be treated with caution as there are 150 correlations so one would expect between 7 and 8 to be statistically significant. If we take the more conservative 1% level, then only 11 are statistically significant; and, of those, only the correlations of children in lone parent households and children in social rented households with the residual from the national unit cost run are positive and so could, in principle, be considered as candidates for this treatment. But as this run is badly mis-specified, this is inappropriate.

**Table 17 - Significant correlations between Residuals and Candidate 'Needs Drivers'**

| | | **numbers** | **Raw local cost** | **National Unit Cost** |
|---|---|---|---|---|
| **Mindist** | Distance from centroid of postcode district to head office | Neg** | Neg* | Neg** |
| **Ethasn** | Proportion of ethnic Asian adults | Neg** | Neg** | Neg** |
| **Ethnw** | Proportion of non-white adults | - | Neg* | Neg* |
| **Kethnw** | Proportion of children in non-white households | | | Neg** |
| **Kethasn** | Proportion of children in ethnic Asian households | Neg* | Neg** | Neg** |
| **Klonepar** | Proportion of children in lone parent households | - | - | Pos* |
| **Ksocrent** | Proportion of children in social rented households | - | -- | Pos* |
| **Knocenth** | Proportion of children in households without central heating | - | - | Neg* |
| **Unempl1** | Proportion of working population unemployed | Neg** | Neg* | Neg* |
| **Ypunemp2** | Proportion of young people unemployed | | | Neg* |
| **Students** | Proportion of population that are students | Neg** | Neg** | Neg* |
| **Ypecact** | Proportion of young people economically active | Pos* | Pos* | Pos** |
| **Kjsa_f** | Children in income based jsa households | | | Neg* |

Key * Statistically significant at conventional 5% level
** Statistically significant at 1% level

### VII.3 High Gradient Models

The second subsidiary set of analyses concerns the extent to which there might be a specific group of authorities who are responding more 'aggressively' and possibly more appropriately to needs gradients. This has been examined in two ways based on the range or predicted and actual costs within each Authority (not attached) as follows:

- by comparing the ranges of predicted and actual costs (and numbers) with the minimum in that authority and taking those authorities where that ratio is more than 5
- by comparing the ranges of predicted and actual costs within each authority with the national average range and minimum and taking those authorities where that ratio is more than 2.5 (2.25 for the numbers dependent)

The results are included in Annex IX (including the numbers of postcode districts involved and the local authorities from which they are drawn). The pattern of variables entering the different (partial) models shown in Table 18 is clearly not consistent so that no attempt has been made to pursue this analysis.

**Table 18 - Variables Entering the Different Partial Models (all OLS)**

| | Internal Comparison | | | National Comparison | | |
|---|---|---|---|---|---|---|
| | A | B | C | A | B | C |
| **Adults on Income Support** | | | | Y | | |
| **Children without good health** | Y | | | | | |
| **Children black ethnic groups** | | | | Y | Y | |
| **Children with Limiting Long Term Illness** | | | | Y | | |
| **Children in income support households** | | | | | Y | Y |
| **Children in Lone Parent Households** | Y | Y | | | | |
| **Lone Parents in Income Support** | | Y | | | | |
| **Children with LLTI** | | | | | | Y |
| **Children in poor health** | | | | | | Y |

A - Local Actual Cost; B - National Unit Cost; C - Numbers

## VIII RE-ESTIMATING WITH A NEW CLIENT AGE THRESHOLD

This section reports on runs with a new dependent variable where the denominator is the numbers of children 0-17 in the postcode district rather than the number 0-19 in the postcode district. The change in threshold was suggested during the consultation period. The previous threshold of 19 was used because the CiN data set included a substantial number of clients aged between 17 and 19. However, there is a concern that the higher threshold will include large numbers of students in the population denominator for some areas and artificially deflate costs and activity per head of population.

### VIII.1 New variables

The effect on the variables is shown in Table 19. The major difference between the new variable and the old variable is that the minimum cost per postcode district is now 44 rather than 200. The ratio of numbers of 0-19 year olds to the numbers of 0-17 year olds in the postcode district is given by AGEINFLT. This has an average of 1.1116, which is very close to the value you would expect - 20/18 or 1.1111 - if there had been no change in birth rate, neither immigration nor emigration, and no deaths. Even though there obviously have been some deaths, the slightly higher value is to be expected, given that (a) I think the birth rate has been slowly declining (b) immigration of young families.

The effect on the average value of the unit cost is to inflate it by approximately the same factor of 1.1116 (weighting by cost makes a bit of difference but not much; the ratio of nunitc2r:unitc2r is 1.1227).

**Table 19 - Descriptive Statistics of Age Variables**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| **K0_17R** | 2210 | 43.84 | 33552.05 | 4675.2003 | 3535.23217 |
| **K0_19R** | 2210 | 200.16 | 36683.15 | 5171.5362 | 3905.25522 |
| **AGEINFLT** | 2210 | 1.03 | 22.72 | 1.1116 | .22375 |
| **NUNITC2R** | 2210 | 35.16 | 62763.22 | 4155.6803 | 3838.95950 |
| **UNITC2R** | 2210 | 32.00 | 47496.40 | 3701.5289 | 3203.51644 |

Nevertheless there clearly are some curious values; there is at least one postcode district that has 22 times as many 0-19 year olds as it has 0-17 year olds. That can obviously only be a student district. The twenty seven postcode districts where the ratio is more than 1.5 are shown in Table 20. It can be seen that all are in well-known university towns and the prize goes to B4 in Birmingham with hardly an under 18 year old in sight but a large number of 18 and 19 year olds. Only four of the 27 postcode districts are in Central London.

**Table 20 - Postcode Districts with large numbers of 18 and 19 year olds relative to those under 18**

| LA_ID | LAN1 | PCDIST | AGEINFLT | UNITC2R | NUNITC2R |
|---|---|---|---|---|---|
| 107 | NEWCASTLE UPON TYNE | NE1 | 2.66 | .12 | .05 |
| 107 | NEWCASTLE UPON TYNE | NE2 | 1.91 | .91 | .53 |
| 207 | SHEFFIELD | S1 | 3.92 | .12 | .03 |
| 207 | SHEFFIELD | S10 | 1.62 | 2.04 | 1.40 |
| 212 | LEEDS | LS2 | 3.57 | .33 | .10 |
| 212 | LEEDS | LS6 | 1.72 | 1.65 | 1.06 |
| 215 | KINGSTON UPON HULL UA | HU1 | 2.26 | .04 | .02 |
| 306 | MANCHESTER | M1 | 7.23 | .21 | .03 |
| 306 | MANCHESTER | M14 | 1.56 | 2.04 | 1.45 |
| 306 | MANCHESTER | M15 | 1.72 | .49 | .32 |
| 316 | LIVERPOOL | L1 | 1.92 | .14 | .08 |
| 316 | LIVERPOOL | L3 | 1.82 | .36 | .22 |
| 406 | BIRMINGHAM | B1 | 2.11 | .16 | .09 |
| 406 | BIRMINGHAM | B15 | 2.08 | .77 | .41 |
| 406 | BIRMINGHAM | B4 | 22.72 | .19 | .01 |
| 507 | DERBY UA | DE1 | 1.56 | .44 | .31 |
| 509 | LEICESTER UA | LE1 | 1.50 | .21 | .15 |
| 512 | NOTTINGHAM UA | NG1 | 1.70 | .13 | .09 |
| 512 | NOTTINGHAM UA | NG7 | 1.56 | 2.25 | 1.59 |
| 512 | NOTTINGHAM UA | NG9 | 1.69 | .23 | .15 |
| 608 | OXFORDSHIRE | OX1 | 2.01 | 1.00 | .55 |
| 702 | CAMDEN | WC1E | 2.49 | .08 | .04 |
| 702 | CAMDEN | WC1H | 1.61 | .38 | .26 |
| 707 | KENSINGTON & CHELSEA | W2 | 1.57 | .09 | .06 |
| 713 | WESTMINSTER | SW7 | 2.21 | .21 | .11 |
| 814 | SOUTHAMPTON UA | SO14 | 1.51 | .89 | .65 |
| 909 | BRISTOL UA | BS1 | 1.99 | .17 | .10 |

Number of cases read: 27    Number of cases listed: 27

At the same time a new weight variable (the number of the target population in the postcode district) has to be computed. The difference between the previous one based on 0-19 year olds and the new one based on 0-17 year olds is shown in Table 21.

**Table 21 - Old and New Weight Variables**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| **POPFWT1** | 2210 | .04 | 7.09 | 1.0000 | .75514 |
| **POPFWT2** | 2210 | .01 | 7.18 | 1.0000 | .75617 |

The new weight has a slightly wider range; but the correlation between the two weights is 0.998.

## VIII.2 Modelling with the reduced age range

The OLS results with backward elimination are given in Table 19; the results of putting the new variable in the preferred multi-level are in Table 23.

**Table 22 - OLS Regression with new dependent (NUNIT2CR), new weight**

| | Unstandardised Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|
| | *B* | *Std. Error* | *Beta* | | |
| **(Constant)** | -1220.3770 | 358.9517 | | -3.3998 | 0.0007 |
| **ISJSA_FF** | 872.8624 | 3508.8831 | 0.0162 | 0.2488 | 0.8036 |
| **ISKIDS3A** | 17347.1912 | 1813.2841 | 0.6737 | 9.5667 | 0.0000 |
| **Children with LLTI** | 25412.3412 | 7974.5229 | 0.0808 | 3.1867 | 0.0015 |
| **RESETEX4** | 0.0001 | 0.0000 | 0.5739 | 9.5776 | 0.0000 |

**Table 23 - Multi-Level modelling results with new dependent (NUNIT2CR)**

**Random Coefficients**

| LEV. | PARAMETER (NCONV) | ESTIMATE | S. ERROR(U) |
|---|---|---|---|
| 2 | Constant Variance at Level 2 ( 7) | 2.27e+06 | 3.544e+05 |
| 1 | Constant Variance at Level 1 ( 9) | 7.753e+06 | 2.409e+05 |

**Fixed Coefficients**

| PARAMETER | ESTIMATE | S. ERROR(U) |
|---|---|---|
| C31 Constant | -61.66 | 393.4 |
| C11 Children not in good health | 1.608e+04 | 5513 |
| C15 Children in income support households | 1.136e+04 | 2243 |
| C26 Children in black ethnic households | 6129 | 1512 |
| C17 Adults on income support or JSA | 9109 | 3972 |

### VIII.3 Runs in subsets of areas with high proportion of ethnic groups

Runs have been attempted for 310 postcode districts where there are more than 20% of ethnic Asian or ethnic black children. The two basic variables children with limiting long term illness and children in lone parent households appear with similar coefficients but neither of the ethnic minority variables appear (see Table 24). This confirms that a similar model applies but that the ethnic minority variable is required.

**Table 24 - Model limited to postcode districts with more than 20% ethnic Asian or ethnic black children (n=310)**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| **1 LA Dummies** | .634 | .402 | .257 | 3582.36592 |
| **+Children in poor health** | .724 | .524 | .404 | 3209.14500 |

d Dependent Variable: NUNITC2R

Coefficients

| | | Unstandardised Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| **Model** | | *B* | *Std. Error* | *Beta* | | |
| **1** | **(Constant)** | 5104.181 | 725.841 | | 7.032 | .000 |
| **3** | **(Constant)** | -6942.817 | 1753.252 | | -3.960 | .000 |
| | **Children in lone parent HHs** | 24171.476 | 3912.994 | .513 | 6.177 | .000 |
| | **Children in poor health** | 279969.281 | 82963.960 | .232 | 3.375 | .001 |

a Dependent Variable: NUNITC2R
Reset Test 0.0000844 Significance 6.312

## VIII.4 Commentary

In the OLS run, as previously, backward elimination gives the same three variables the income support variable for children, the combined income support variable for adults and children with limiting long term illness. The model is *badly* mis-specified, with a t-test of nearly 10. In the MLN run, all four coefficients are easily statistically significant as before; but this time the model is *not well* specified - although better specified than the OLS model - with a Reset statistic of 3.24 (3.021E-05/9.319E-06).

The following variants have been attempted:

- Introducing the new density variable (it is not statistically significant)
- Deleting the ethnic black variable (it does not improve specification)
- Omitting the B4 postcode district in Birmingham - on the grounds that it is an outlier in terms of the inflation rate - slightly improves specification to 2.99 (2.875E-05/9.619E-06), but shifts the coefficients round quite substantially.
- Restricting the model to the 310 postcode districts with more than 20% of either ethnic Asian or ethnic black children (produces similar results)

## VIII.5 Conclusion

Overall, in all OLS options, R squareds are above 60%, higher than the typical values of 45% obtained in the 1996 modelling; and the models are generally well specified.

The suggestion that the model might be biased by the inclusion of 18 and 19 year olds in the population base through giving undue weight to student towns has been investigated. It transpires that the areas with large proportions of 18-19 year olds are where students in redbrick universities live rather than London. The use of the new weights brought about through changing the age range used as the base (from 0-19 to 0-17) does not make a great deal of difference to the values of the coefficients, although it has worsened the specification of the model. This has been the model adopted for allocation.

## IX UNDERSTANDING CHANGES OVER THE LAST TWENTY YEARS

The following table compares the factors included in the 1980s SSA formula, the 1996 formula and the two variants of the 2006 formula.

**Table 25 - Comparing Factors included in Formulae over last Twenty Years**

| | 1980s (1981 Census data) | 1996 (1991 Census data) | 2006 (2001 Census data; with distance) | 2006 (2001 Census data; w/o distance)) |
|---|---|---|---|---|
| **Source** | B&M | CH, D | CH, D and O | CH, D and O |
| **Social Security** | On income support | IS + JSA claimant rate | Combined adult IS | Combined IS |
| **Family composition** | Single adult | Lone Parent | Lone Parent on IS | |
| **Number of children** | 4 or more | | | |
| **Ethnic group** | Mixed | | Mixed + Black ethnic | Black Ethnic |
| **Tenure status** | Privately rented | | | |
| **Ratio persons: rooms** | One or more | | | |
| | | | | |
| **Type of Housing** | | Kids in flats | | |
| **Illness** | | Kids w/LLTI | Kids w/o good health | Kids w/o good health |
| **Population Density** | | Pop. density | | |

In the 1980s, the proportion of households with large numbers of children, and the ratio of persons to room were important but not later; private renting was important in the 1980s, children in flats in the 1990s but not in 2000s. In contrast, from middle of 1990s, children not in good health or with limiting long term illness have appeared in the formulae, together with an ethnicity variable. These changes could have arisen for one or more of the following reasons:

- Changing economic and social conditions
- Changes in relative inequalities
- Changes in Household structure
- Changing attitudes
- Change in social policy, and especially the Children Act, 1989, with its extended concept of need

In order to explore this, the following sub-sections explore the changes in the variables included in the models and the changes in the distribution of the values of those variables.

Changes in variables

The 'Children Living in Flats' variable has not been included in the current models because of the perverse incentive it creates for authorities, whose priority is NOT to house children in flats. The 'children with long term limiting illness' variable is replaced by the 'children without good health' which covers a similar group of children. The other addition this time was an ethnicity variable.

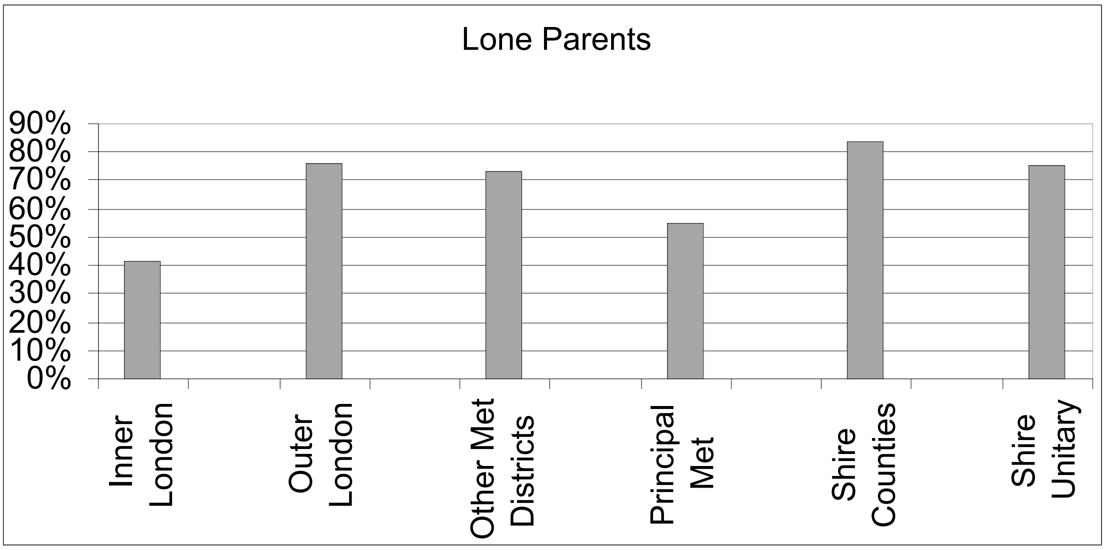
The old CSS FSS included two variables (density and children living in flats) which had a strong urban bias, this meant that the removal of one of these variables was bound to have an affect on the distribution away from urban areas. The ‘Children in Black Ethnic Groups’ has an urban bias but not to such a strong extent as the ‘Children in Flats’ variable.

The overall similarity between the types of variables used in the new formula indicates that it is not solely a change in the types of variables used in the CSS FSS which is responsible for the change in the distribution of the CSS FSS. However, some change can be attributed to the removal of the ‘Children in Flats’ variable and the addition of ‘Children in Black Ethnic Groups’ variable, which has a much urban (or London) bias.

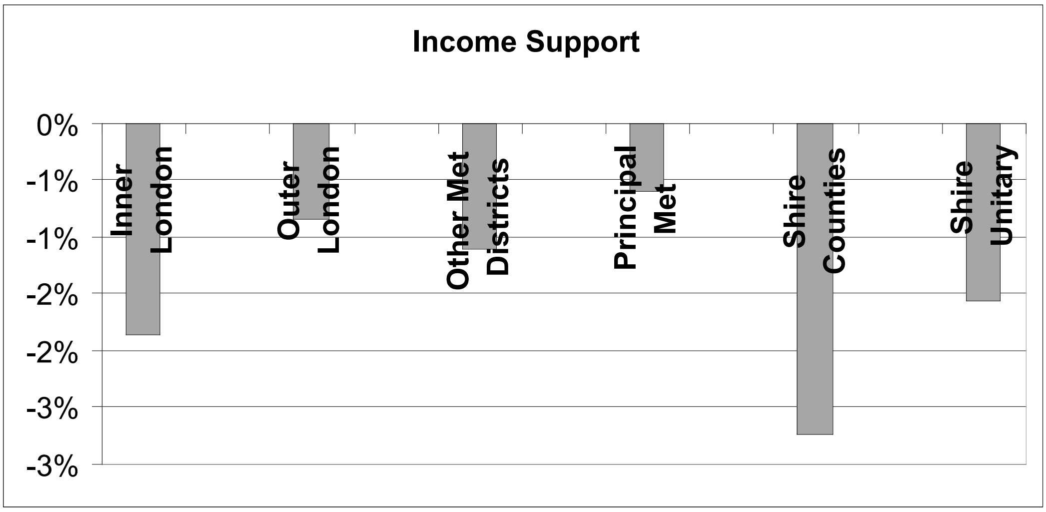
Change in the geographical distribution of the values of variables

This section looks specifically how variables have changed in the time between the two censuses; and in particular at three variables that can be compared over time, viz. lone parent families, population density and children living in families in receipt of Income Support. The changes over time suggest that the deprivation variables included in the formulae are no longer mostly restricted to urban areas.

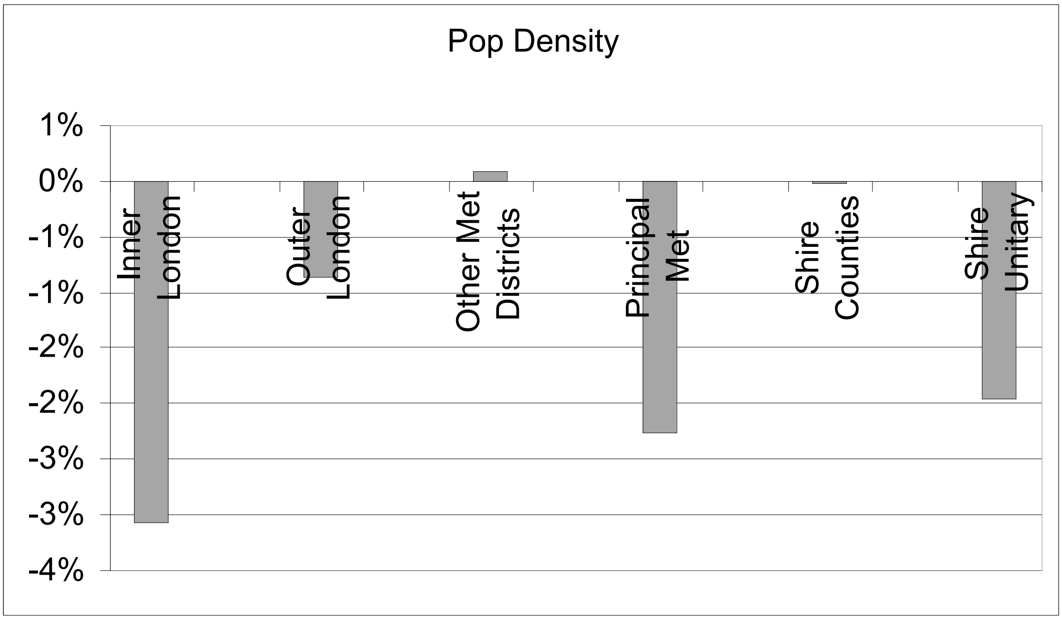
The number of lone parent families increased the least in Inner London; this reflects the fact that in 1991 lone parent families were mainly concentrated in London. In 2001 the lone parent family was no longer a solely urban phenomenon. This may help to explain some of the reason why funding has moved away from Inner London authorities who would have benefited greatly from the previous formula, with the distribution of lone parent families more evenly spread across the country, we would expect that London would no longer be the major beneficiary of such a variable.




1. The number of children living in a household where a parent is claiming income support has decreased across the country. However in Inner London and the Shire Counties there has been a larger decrease. This may help to explain why there has been a movement of funding away from Inner London boroughs. A bigger drop in one type of authority compared to another would cause their share of the CSS FSS to decrease at a greater rate.




The greatest decrease in population density has been in Inner London. This will account for some of the redistribution of funding. With other authorities seeing an increase or much smaller decrease in density compared to London. This demonstrates another decrease in the bias towards London in the FSS variables, contributing to an overall decrease in the share of the FSS which a London authority receives.




Overall these changes in variables, and in the distribution of the values of those variables across the country, can be summed up as reducing the urban bias of the formula.

## ANNEXES



## TABLES IN ANNEXES

**Annex I - Independent Variables in postcode district level file for analyses**

```
Name      Position  Label

PCDIST          1 Postcode district
LA_ID           2
NCASES          3 These vars have been reweighted to deal with
missing postcodes and partial postcode districts
NCLIENTS        4 do not assume they can be used without modification
to compute rate per area. Use NDEP1.
MISSPCLA        5
INAREALA        6
MISSWT          7
INCSUP          8 Adults on inc support
LONPIS          9 Lone parents on inc support
KIS            10 Children in IS hholds
JSA            11 Adults on job seekers allowance
INCJSA         12 Adults - inc based JSA
KJSA           13 Children in inc based JSA hholds
NPERS          14 Residents in pcdist
K0_16          15 Number of people aged 0-15 (i.e. under 16 in
postcode district)
K0_19          16 Number of people aged 0-19
IMDHOUSE       17 IMD housing deprivation
IMDTOTAL       18 IMD overall score
IMDINC         19 IMD income score
IMDEMPLY       20 IMD employment score
IMDHLTH        21 IMD health score
IMDEDUC        22 IMD education score
IMDCRIM        23 IMD crime score
IMDENVIR       24 IMD environment score
IMDCHPOV       25 IMD child poverty score
IMDOPPOV       26 IMD older persons poverty
YPECACT        27 16-24yr olds economically active
YPUNEMP1       28 Prop of all 16-24yr olds unemployed
YPUNEMP2       29 Prop of econ act 16-24yr olds unemployed
YPSTUDNT       30 Prop of 16-24yr olds who are students
STUDENTS       31 Prop of all popln who are students
UNEMPL1        32 Prop of all popln who are unemployed
KFLATS         33 Children in multiple occupancy dwellings
KFLOOR5        34 Children living on 5th floor or above
KNOCENHT       35 Children in housing with no CH
KNOCAR         36 Children in no car HHs
KTWOCAR        37 Children in 2car HHs
KOWNOCC        38 Children in owner occupation
KSOCRENT       39 Children in social rental
KLONEPAR       40 Children in lon par HHs
KNINFAM        41 Children not in families
KPORHLTH       42 Children in poor health
KNTGDHLT       43 Children without good health
KPRCARE        44 Children providing informal care
KCHLLTI        45 Children with LLTI
KNOEMPL        46 Children in HH where noone employed
KNEVWKED       47 Children in HH where noone ever worked
DEP1           48 HHs with one of census dep measures
```

```
DEP2            49 HHs with 2 census dep measures
DEP3            50 HHs with 3 census dep measures
DEP4            51 HHs with 4 census dep measures
YPNOQUAL        52 16-19 yr olds with no educ quals
ETHNW           53
ETHMIX          54 Adult mixed ethnic groups
ETHASN          55 Adult Asian ethnic groups
ETHBLK          56 Adult Black ethnic groups
ETHCHIN         57 Adult Chinese & other non white ethnic groups
KETHNW          58
KETHMIX         59 Children mixed ethnic groups
KETHASN         60 Children Asian ethnic groups
KETHBLK         61 Children Black ethnic groups
KETHCHIN        62 Children Chinese & other non white ethnic groups
NEWNOS1         63
NEWNOS2         64
NDEP1           65 USE THIS AS DEP VAR FOR CLIENT COUNT (no. of
                   clients per 1000 0-19 yr olds)
PERSONS         66
COUNTY          67
OLDV4           68
CNAME           69
OLDV4N          73
DIFFLA          74
NUMLAS          75
POPFWT          76
DUM             77
POPFWT1         78 USE THIS WEIGHTING VARIABLE FOR EACH CASE
                   (corrected num of 0-19 yr olds in each pc district)
NPCDS           79
LANUM           80 USE THIS AS SECOND LEVEL CONTROL VARIABLE (id
                   number for LA)
```

**ANNEX II - Postcode district level analyses of CIN 2003 Census data.**

## AII.1 Attributing Ward Codes to CIN data

Prior to receipt of the CIN Census data we had intended to conduct the small area modelling at ward level; and, if necessary, attribute ward level values to individual client data in order to carry-out individual level modelling. We realised that the CIN Census data did not contain a ward code for each client, but were intending to request these codes from LAs and match them with the CIN data. This matching would have been relatively simple if each case on CIN2003 had a unique client ID that was shared with LAs. However, on receipt of the CIN data we find that it does not contain such an ID and understood that the CIN Census team would use some combination of date of birth, date and referral and other variables from the data set when they wanted to query information on individual cases with the LAs.

We checked to see how many variables from the data set would be needed to create a unique ID. As an example, if we combine date of birth, date of referral and sex, we create a code that is never unique in an LA, but which would produce an acceptably small number of ambiguities in more than half of the LAs. The table below summarises the numbers of ambiguous codes per LA.

**Table AII.1 - Numbers of LAs where combinations of selected variables would create ambiguous client IDs.**

| Number of ambiguous cases if date of birth, date of referral and sex are used to construct an ID | Number of LAs |
|---|---|
| Less than 50 | 78 |
| 50 - 99 | 31 |
| 100 - 199 | 21 |
| 200 or more | 16 |

The problem is obtaining ward codes from a sufficient number of LAs in the first place. We have obtained ward information from some LAs, though this will mainly be as a check on the bulk of the analyses, which has been conducted at postcode district level.

## AII.2 - Note on Heterogeneity

Initially we suspected that postcode districts were too large and socially heterogeneous to use in small area modelling, let alone to use as the basis for attributing characteristics to individuals.

However we have carried out a series of checks on the social composition of these districts and find that in respect of a typical set of need drivers they are often no more heterogeneous than wards.

If we first consider the numbers of wards and postcode districts in each type of authority, we see that ratio of the number of wards per LA to the number of postcode districts increases from 1.5 in inner London to 4.2 in the counties (Table AI.2) - though it must be remembered that these ratios are based on standard and not synthetic wards and the ratios would decrease for rural areas if synthetic wards were used.

**Table AII.2 - Numbers of wards and postcode districts by type of local authority**

| Authority type | Number of LA.s | Number of wards | Number of PC districts | Ratio wards to PC districts |
|---|---|---|---|---|
| **All Inner London LA.s** | 13 | 230 | 152 | 1.5 |
| **All Outer London LA.s** | 20 | 403 | 170 | 2.4 |
| **Metropolitan Districts** | 36 | 826 | 462 | 1.8 |
| **Unitary authorities** | 46 | 1058 | 406 | 2.6 |
| **Counties** | 34 | 5375 | 1293 | 4.2 |

*The Isles of Scilly have been excluded from this table*

To test social heterogeneity of wards and postcode districts we construct 8 census based need indicators for census output areas. These indicators were chosen because they are easy to compute for census output areas, not because they had special relevance to children's services - though several of them have appeared in previous formulae or been strong candidates for inclusion.

Variables used in test

- Percentage non-white
- Percentage working age with LLTI
- Percentage aged 16-74 with no qualifications
- Percentage households in flats
- Percentage no car households
- Percentage households in owner occupation
- Percentage lone parent households with children
- Percentage households with children and all adults unemployed

We compute the standard deviation in the values of these indicators for the output areas within each ward and postcode district. We then average these standard deviations for the wards and postcodes districts in each type of authority.

We expected the larger populations (and areas) of postcode districts, compared to wards, to result in their being more heterogeneous. However, no large or clear effects are found. In the inner London boroughs (Table AII.3a), the average standard deviations for 6 of these indicators are <u>less</u> for postcode districts than wards. In outer London (Table AII.3b), the within postcode district variability is greater for only one indicator - the proportion of non-white residents. The effect is more as predicted for metropolitan districts (table AII.3c), where all but one of the indicators shows greater variability in postcode districts - but the differences between the district and ward values are not great. In unitaries (Table AII.3d), the trend is reversed and all but two indicators are more variable within wards. Surprisingly, for counties (Table AII.3e) all but one of the indicators, the percent of non-white residents, are on average less variable within postcode districts than within wards.

Despite the very similar average heterogeneity of wards and postcode district analysis, if we are to proceed with a postcode district level small area analysis, we might want to exclude those LAs with the highest within postcode district variability - or at least compare results when these are excluded. We need to take particular note of the variability in the proportion of the population in ethnic minority populations.

**Table AII.3a - Within ward and postcode district variability for inner London LAs**

| **All Inner London LA.s** | | | |
|---|---|---|---|
| **Number of wards = 230** | **Mean ward value** | **SD within wards** | ***SD within pcdists*** |
| **Number of postcode districts =152** | | | |
| Percentage non-white | 29.57% | 10.50% | *10.10%* |
| Percent working age with LLTI | 8.41% | 2.88% | *3.16%* |
| Percent 16-74 with no qualifications | 22.01% | 8.48% | *8.51%* |
| Percent households in flats | 72.14% | 18.72% | *15.18%* |
| Percent no car households | 50.40% | 10.49% | *10.38%* |
| Percent households in owner occupation | 39.43% | 15.63% | *15.23%* |
| Percent LP households with kids | 8.05% | 4.68% | *4.24%* |
| Percent households, all adults unemployed with kids | 7.60% | 4.88% | *4.17%* |

**Table AII.3b - Within ward and postcode district variability for outer London LAs**

| **All Outer London LA.s** | | | |
|---|---|---|---|
| **Number of wards = 403** | **Mean ward value** | **SD within wards** | **SD within PC dists** |
| **Number of postcode districts =170** | | | |
| Percentage non-white | 26.99% | 3.45% | *4.49%* |
| Percent working age with LLTI | 7.28% | 0.60% | *0.56%* |
| Percent 16-74 with no qualifications | 24.91% | 1.83% | *1.69%* |
| Percent households in flats | 30.85% | 5.40% | *5.33%* |
| Percent no car households | 28.38% | 2.29% | *2.23%* |
| Percent households in owner occupation | 68.09% | 4.49% | *3.99%* |
| Percent LP households with kids | 7.24% | 1.91% | *1.57%* |
| Percent hholds, all adults unemployed with kids | 6.11% | 1.92% | *1.68%* |

**Table AII.3c - Within ward and postcode district variability for metropolitan districts**

| **Metropolitan Districts** | | | |
|---|---|---|---|
| **Number of wards =826** | **Mean ward value** | **SD within wards** | **SD within PC dists** |
| **Number of postcode districts = 462** | | | |
| Percentage non-white | 8.77% | 6.73% | 7.43% |
| Percent working age with LLTI | 10.24% | 0.91% | 1.06% |
| Percent 16-74 with no qualifications | 35.94% | 2.77% | 3.08% |
| Percent households in flats | 14.02% | 6.51% | 6.56% |
| Percent no car households | 33.81% | 3.19% | 3.35% |
| Percent households in owner occupation | 65.35% | 5.07% | 5.21% |
| Percent LP hholds with kids | 8.04% | 1.70% | 1.72% |
| Percent hholds, all adults unemployed with kids | 6.86% | 2.14% | 2.08% |

**Table AII.3d - Within ward and postcode district variability for unitary authorities**

| Unitary authorities | | | |
|---|---|---|---|
| **Number of wards = 1058** | **Mean ward value** | **SD within Wards** | **SD within PC districts** |
| **Number of postcode districts =406** | | | |
| | | | |
| Percentage non-white | 5.80% | 4.00% | 5.05% |
| Percent working age with LLTI | 8.19% | 1.05% | 1.04% |
| Percent 16-74 with no qualifications | 29.10% | 2.72% | 2.70% |
| Percent households in flats | 14.56% | 7.35% | 6.96% |
| Percent no car households | 23.94% | 3.93% | 4.06% |
| Percent households in owner occupation | 71.78% | 6.11% | 5.00% |
| Percent LP households with kids | 6.51% | 1.93% | 1.65% |
| Percent hholds, all adults unemployed with kids | 4.78% | 2.23% | 1.98% |

**Table AII.3e - Within ward and postcode district variability for counties**

| Counties | | | |
|---|---|---|---|
| **Number of wards =5375** | **Mean ward value** | **SD within wards** | **SD within PC districts** |
| **Number of postcode districts =1293** | | | |
| | | | |
| Percentage non-white | 2.47% | 2.23% | 3.48% |
| Percent working age with LLTI | 7.34% | 1.02% | 0.82% |
| Percent 16-74 with no qualifications | 27.30% | 2.73% | 2.26% |
| Percent households in flats | 9.52% | 7.44% | 6.06% |
| Percent no car households | 16.93% | 3.95% | 3.39% |
| Percent households in owner occupation | 75.38% | 6.15% | 4.56% |
| Percent LP households with kids | 4.83% | 1.66% | 1.38% |
| Percent hholds, all adults unemployed with kids | 3.11% | 1.76% | 1.60% |

## Missing and invalid postcode districts in the CIN 2003 data set

One potential obstacle to a postcode district analysis is the number of missing and invalid postcodes on the CIN 2003 census. The total number of clients on the data set is 378049, and when blank and invalid postcode districts are removed this reduces to 330479 - a loss of 12.58%.

As can be seen from Table AII.4, the 47,570 missing postcodes are not evenly distributed throughout the local authorities. Three of the authorities have missing or invalid postcodes for 80% or more of their clients (12,140 clients in all); whereas 68 authorities have less than 5% missing or invalid postcode districts.

**Table AII.4 - Numbers of local authorities by percent of missing or invalid postcodes**

| Percent of missing or invalid postcodes | N of LAs | Percent of LAs | Cumulative N of LAs |
|---|---|---|---|
| **under 5%** | 68 | 46.6 | 68 |
| **5% - 9.9%** | 28 | 19.2 | 96 |
| **10% - 19.9%** | 29 | 19.9 | 125 |
| **20% - 49.9%** | 15 | 10.3 | 140 |
| **50% - 79.9%** | 3 | 2.1 | 143 |
| **80% and over** | 3 | 2.1 | 146 |

Table AII.5 shows the distribution of LAs we would achieve if we limited the analysis to those with less than 5, 10 and 20 missing or invalid postcodes. It is worth noting that the number of inner London boroughs is reduced to 2 if we have a 5% cut-off, but is restored to 5 and 10 with 10% and 20% thresholds.

A related concern is that missing or invalid postcodes might excessively reduce the number of data points (small areas) within each local authority. Table AII.6 shows the effects of removing authorities with (up to) 5, 10 and 20% missing and invalid postcodes and only counting valid postcodes as potential data points. In all three cases, no authorities have less than 10 postcode districts and the vast majority of authorities have more than 20 districts. From these figures it looks a though we should be able to use the CIN2003 at postcode district level to give at least 50% coverage of local authorities - though we might want to restrict the number further by selecting those in which postcode districts are (internally) most socially homogeneous. We would certainly want to restrict the attribution for the individual level work to these more homogeneous areas. The main practical difficulty of postcode district level work is in obtaining need drivers to suitable boundaries. The administrative data, such as claimant counts may have to be commissioned specially. Census data that is released for census output areas can be aggregated to very close approximations postcode districts - as in these tests, but more approximate weighted averaging may have to be used with those data that are only released at ward level.

**Table AII.5 - Types of LAs by levels of missing or invalid postcodes**

| Type of LA | Number of LAs with these percent missing Postcodes | | | |
|---|---|---|---|---|
| | less than 5% | less than 10% | less than 20% | All LAs |
| Inner London Boroughs | 2 | 5 | 10 | 13 |
| Outer London Boroughs | 7 | 13 | 15 | 19 |
| Unitary Authorities | 24 | 32 | 40 | 46 |
| Metropolitan Districts | 18 | 22 | 30 | 36 |
| Counties | 17 | 24 | 30 | 32 |
| Total | 68 | 96 | 125 | 146 |

**Table AII.6 - Numbers of valid postcode districts per LA CIN2003 data**

| | LAs with this % of missing and invalid postcodes and given number of postcode districts | | | | |
|---|---|---|---|---|---|
| **Number of postcode districts in CIN2003** | **less than 5%** | **less than 10%** | **less than 20%** | | |
| | **N of LAs** | **N of LAs** | **N of LAs** | **N of LAs** | **% of LAs** |
| **less than 10** | 0 | 0 | 0 | 2 | 1.4 |
| **10 – 19** | 3 | 5 | 5 | 13 | 9.0 |
| **20 – 29** | 10 | 13 | 19 | 28 | 19.3 |
| **30-49** | 17 | 22 | 28 | 30 | 20.7 |
| **51-99** | 25 | 36 | 46 | 49 | 33.8 |
| **100 or more** | 13 | 20 | 27 | 23 | 15.9 |
| **All LAs** | 68 | 96 | 125 | 145 | 100.0 |

## ANNEX III - Descriptives including Skewness and Kurtosis overall and for each Local Authority

| | **N** | **Minimum** | **Maximum** | **Mean** | | **Std. Deviation** | **Variance** | **Skewness** | | **Kurtosis** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | 2210 | 0 | 54540.7 | 4201.25 | 68.35 | 3213.09 | 10323932 | 3.260 | 0.0521 | 27.745 | 0.104 |
| **LA_ID** | **Statistic** | **Statistic** | **Statistic** | **Statistic** | **Std. Error** | **Statistic** | **Statistic** | **Statistic** | **Std. Error** | **Statistic** | **Std. Error** |
| 104 | 13.895 | 0.00 | 9895.27 | 4619.74 | 584.12 | 2177.35 | 4740854.11 | 0.344 | 0.599 | 0.383 | 1.158 |
| 106 | 8.941 | 1164.43 | 2707.51 | 1859.65 | 209.78 | 627.26 | 393457.00 | 0.281 | 0.719 | -1.868 | 1.404 |
| 107 | 12.351 | 511.87 | 5850.55 | 3430.74 | 461.19 | 1620.80 | 2626977.18 | -0.054 | 0.630 | -0.625 | 1.217 |
| 108 | 8.763 | 1371.50 | 16468.47 | 4621.08 | 1065.10 | 3152.88 | 9940644.20 | 2.767 | 0.725 | 14.461 | 1.417 |
| 109 | 7.464 | 553.44 | 4561.16 | 3157.54 | 558.75 | 1526.57 | 2330413.56 | -0.517 | 0.773 | -1.448 | 1.534 |
| 110 | 13.824 | 3017.50 | 9945.89 | 5228.08 | 352.23 | 1309.62 | 1715108.55 | 0.643 | 0.601 | 2.775 | 1.160 |
| 111 | 4.614 | 2009.85 | 8700.18 | 5514.37 | 1042.01 | 2238.15 | 5009315.89 | 1.054 | 0.946 | 2.039 | 2.164 |
| 112 | 7.353 | 1222.72 | 10204.85 | 4754.37 | 1108.88 | 3006.82 | 9040982.46 | 0.801 | 0.778 | -0.117 | 1.546 |
| 113 | 6.888 | 308.65 | 6295.47 | 4239.68 | 779.45 | 2045.69 | 4184840.98 | -0.945 | 0.799 | 0.626 | 1.602 |
| 114 | 9.076 | 124.15 | 7205.62 | 2732.34 | 406.83 | 1225.65 | 1502217.13 | 0.209 | 0.715 | 3.171 | 1.394 |
| 116 | 23.125 | 962.77 | 10031.86 | 3307.97 | 452.01 | 2173.65 | 4724738.00 | 1.951 | 0.480 | 4.601 | 0.933 |
| 117 | 4.687 | 677.19 | 4965.30 | 3900.28 | 644.49 | 1395.27 | 1946788.21 | -1.798 | 0.940 | 9.482 | 2.128 |
| 204 | 10.600 | 27.93 | 5682.89 | 3738.11 | 501.95 | 1634.20 | 2670615.67 | -0.662 | 0.671 | -0.109 | 1.300 |
| 205 | 14.324 | 173.31 | 16040.54 | 4247.35 | 642.10 | 2430.12 | 5905479.59 | 2.752 | 0.592 | 16.303 | 1.143 |
| 206 | 12.419 | 4.06 | 4809.96 | 2444.71 | 416.35 | 1467.22 | 2152732.80 | -0.195 | 0.628 | 0.407 | 1.214 |
| 207 | 24.244 | 1211.36 | 12222.31 | 5374.42 | 654.28 | 3221.53 | 10378236.88 | 0.419 | 0.470 | -0.906 | 0.914 |
| 209 | 26.248 | 854.66 | 10503.50 | 5313.00 | 523.62 | 2682.63 | 7196524.68 | 0.296 | 0.454 | -0.870 | 0.883 |
| 210 | 9.643 | 1225.96 | 5310.95 | 3054.00 | 390.08 | 1211.33 | 1467331.24 | 0.140 | 0.697 | -0.447 | 1.356 |
| 211 | 20.147 | 0.00 | 7219.08 | 3901.00 | 478.49 | 2147.72 | 4612717.77 | -0.086 | 0.510 | -0.903 | 0.989 |
| 212 | 35.195 | 1055.40 | 10854.79 | 4470.07 | 523.22 | 3104.04 | 9635074.87 | 0.863 | 0.397 | -0.355 | 0.776 |
| 213 | 15.449 | 351.82 | 6450.00 | 4827.60 | 430.41 | 1691.74 | 2861982.16 | -0.997 | 0.573 | 0.215 | 1.107 |
| 214 | 14.309 | 0.00 | 7454.81 | 2252.21 | 457.66 | 1731.16 | 2996904.03 | 1.616 | 0.592 | 3.070 | 1.143 |
| 215 | 12.687 | 751.84 | 16495.32 | 8089.12 | 986.87 | 3515.16 | 12356379.61 | 0.822 | 0.623 | 0.431 | 1.203 |
| 216 | 8.296 | 0.00 | 8360.03 | 4674.04 | 670.26 | 1930.53 | 3726927.06 | -0.053 | 0.741 | 1.295 | 1.455 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 217 | 7.372 | 255.69 | 8629.90 | 4446.09 | 1009.74 | 2741.51 | 7515869.93 | 0.641 | 0.777 | 0.399 | 1.544 |
| 218 | 26.247 | 0.00 | 4471.94 | 2010.93 | 238.01 | 1219.33 | 1486775.09 | 0.594 | 0.454 | -0.508 | 0.883 |
| 219 | 8.061 | 1279.46 | 5403.24 | 2773.02 | 485.56 | 1378.60 | 1900548.34 | 0.222 | 0.750 | -1.586 | 1.475 |
| 304 | 13.478 | 356.77 | 5048.12 | 3785.16 | 378.22 | 1388.57 | 1928134.20 | -1.074 | 0.607 | 0.372 | 1.173 |
| 305 | 9.177 | 1330.62 | 6492.41 | 2556.27 | 335.40 | 1016.05 | 1032364.25 | 1.028 | 0.711 | 5.724 | 1.387 |
| 306 | 20.645 | 560.68 | 19868.99 | 7149.53 | 662.85 | 3011.75 | 9070646.02 | 0.555 | 0.505 | 1.618 | 0.979 |
| 307 | 11.810 | 417.70 | 5470.51 | 2729.37 | 423.27 | 1454.63 | 2115935.02 | 0.404 | 0.642 | -0.238 | 1.241 |
| 308 | 11.153 | 934.25 | 5787.18 | 3918.88 | 311.89 | 1041.58 | 1084893.21 | 0.483 | 0.657 | 0.552 | 1.272 |
| 309 | 10.774 | 3386.37 | 9342.95 | 7146.46 | 630.91 | 2070.87 | 4288500.01 | -1.020 | 0.666 | -0.095 | 1.291 |
| 310 | 13.683 | 0.00 | 11789.92 | 4602.01 | 1024.75 | 3790.55 | 14368261.13 | 1.135 | 0.603 | -0.280 | 1.165 |
| 311 | 10.826 | 2077.19 | 7254.06 | 4682.24 | 583.65 | 1920.37 | 3687825.57 | -0.135 | 0.665 | -1.315 | 1.288 |
| 312 | 10.150 | 219.07 | 3628.43 | 1245.16 | 299.41 | 953.92 | 909966.78 | 1.243 | 0.683 | 1.952 | 1.325 |
| 313 | 14.794 | 507.37 | 6014.43 | 3707.80 | 339.21 | 1304.73 | 1702309.43 | 0.524 | 0.584 | -0.107 | 1.127 |
| 315 | 8.219 | 1279.85 | 8501.00 | 4740.82 | 713.29 | 2044.96 | 4181866.00 | 0.605 | 0.744 | 0.234 | 1.461 |
| 316 | 22.408 | 56.70 | 25942.43 | 4739.85 | 742.86 | 3516.47 | 12365533.23 | 1.482 | 0.487 | 3.593 | 0.945 |
| 317 | 13.747 | 360.03 | 7957.72 | 3884.91 | 618.03 | 2291.47 | 5250819.70 | 0.458 | 0.602 | -0.368 | 1.163 |
| 318 | 8.769 | 1013.65 | 5295.34 | 3889.41 | 418.72 | 1239.92 | 1537406.40 | -1.127 | 0.725 | 1.145 | 1.417 |
| 319 | 15.558 | 574.34 | 10643.87 | 5136.55 | 839.51 | 3311.33 | 10964873.49 | 0.507 | 0.571 | -0.844 | 1.104 |
| 320 | 31.522 | 718.54 | 6015.07 | 2532.49 | 263.74 | 1480.72 | 2192535.72 | 1.102 | 0.417 | 0.217 | 0.815 |
| 321 | 6.231 | 744.66 | 4022.51 | 3604.70 | 218.49 | 545.39 | 297450.33 | -2.189 | 0.832 | 20.798 | 1.699 |
| 322 | 9.471 | 1449.41 | 4179.78 | 2251.15 | 382.37 | 1176.71 | 1384655.62 | 1.135 | 0.702 | -0.511 | 1.367 |
| 323 | 56.163 | 381.73 | 4932.25 | 2220.30 | 133.61 | 1001.32 | 1002633.58 | -0.013 | 0.319 | -0.425 | 0.627 |
| 324 | 8.191 | 1587.12 | 6051.33 | 5256.33 | 316.69 | 906.37 | 821501.94 | -2.035 | 0.745 | 11.617 | 1.464 |
| 325 | 6.384 | 1481.38 | 8843.40 | 5905.62 | 1026.65 | 2593.91 | 6728348.67 | -0.396 | 0.824 | -1.095 | 1.674 |
| 404 | 23.342 | 316.01 | 13423.53 | 3537.81 | 323.73 | 1564.07 | 2446307.55 | 0.531 | 0.478 | 3.118 | 0.929 |
| 406 | 55.521 | 0.00 | 14076.96 | 5579.69 | 422.32 | 3146.78 | 9902197.68 | 1.023 | 0.320 | 0.553 | 0.631 |
| 407 | 15.821 | 2258.03 | 54540.70 | 3591.32 | 739.21 | 2940.23 | 8644932.30 | 18.955 | 0.567 | 427.562 | 1.096 |
| 408 | 14.444 | 1698.01 | 6291.32 | 3047.32 | 356.27 | 1354.00 | 1833321.96 | 1.828 | 0.590 | 3.129 | 1.139 |
| 409 | 14.559 | 3643.49 | 9987.27 | 5574.83 | 430.02 | 1640.82 | 2692281.18 | 1.645 | 0.588 | 3.064 | 1.135 |
| 410 | 9.810 | 0.00 | 8879.38 | 3907.06 | 1073.55 | 3362.53 | 11306587.89 | 0.666 | 0.692 | -1.379 | 1.346 |
| 411 | 13.082 | 170.83 | 12480.67 | 5673.18 | 654.40 | 2366.88 | 5602127.18 | -0.274 | 0.615 | 0.227 | 1.188 |
| 412 | 11.930 | 1525.17 | 18139.16 | 5646.03 | 1046.66 | 3615.17 | 13069490.23 | 1.236 | 0.639 | 2.473 | 1.235 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 413 | 38.278 | 0.00 | 11830.91 | 2496.62 | 226.12 | 1399.01 | 1957219.02 | 1.391 | 0.382 | 8.074 | 0.747 |
| 414 | 11.737 | 4258.41 | 22835.87 | 6178.52 | 532.59 | 1824.59 | 3329135.67 | 5.457 | 0.643 | 72.468 | 1.244 |
| 415 | 7.968 | 546.51 | 7585.43 | 4363.75 | 777.09 | 2193.62 | 4811975.38 | 0.434 | 0.753 | -0.156 | 1.484 |
| 416 | 25.148 | 0.00 | 9941.13 | 2695.21 | 264.14 | 1324.59 | 1754536.58 | 0.550 | 0.462 | 3.059 | 0.899 |
| 417 | 12.946 | 155.21 | 5546.39 | 1644.95 | 284.61 | 1024.05 | 1048685.77 | 1.628 | 0.617 | 5.302 | 1.193 |
| 418 | 8.402 | 1326.01 | 12298.50 | 3558.93 | 732.78 | 2124.01 | 4511398.05 | 3.233 | 0.737 | 19.848 | 1.446 |
| 503 | 29.662 | 41.58 | 4631.94 | 2070.27 | 172.13 | 937.48 | 878864.42 | 0.011 | 0.429 | 0.059 | 0.837 |
| 504 | 31.739 | 0.00 | 6630.18 | 3237.42 | 304.11 | 1713.28 | 2935333.71 | 0.738 | 0.416 | -0.253 | 0.812 |
| 506 | 34.181 | 314.26 | 9571.11 | 2962.56 | 256.85 | 1501.67 | 2255000.57 | 1.254 | 0.402 | 3.869 | 0.786 |
| 507 | 11.289 | 1289.44 | 9444.35 | 6367.65 | 772.10 | 2594.14 | 6729581.48 | -0.484 | 0.654 | -1.062 | 1.265 |
| 508 | 29.014 | 134.60 | 8034.01 | 2285.91 | 254.38 | 1370.20 | 1877449.98 | 0.809 | 0.433 | 0.226 | 0.845 |
| 509 | 15.260 | 4319.37 | 28721.60 | 6958.82 | 778.58 | 3041.43 | 9250322.03 | 5.995 | 0.576 | 55.262 | 1.113 |
| 510 | 1.670 | 1223.12 | 1436.31 | 1409.64 | 86.15 | 111.34 | 12396.58 | . | . | . | . |
| 511 | 35.048 | 412.78 | 14555.86 | 4050.47 | 349.62 | 2069.81 | 4284133.98 | 1.781 | 0.397 | 7.079 | 0.777 |
| 512 | 13.658 | 7277.27 | 25200.43 | 8727.94 | 527.97 | 1951.22 | 3807262.94 | 7.264 | 0.604 | 81.555 | 1.166 |
| 606 | 50.541 | 795.02 | 12982.35 | 2936.49 | 232.95 | 1656.08 | 2742603.53 | 1.134 | 0.335 | 2.177 | 0.659 |
| 607 | 34.843 | 503.37 | 17253.59 | 4954.63 | 611.25 | 3608.09 | 13018337.48 | 0.835 | 0.399 | -0.327 | 0.779 |
| 608 | 28.928 | 0.00 | 6884.85 | 2558.97 | 332.73 | 1789.57 | 3202567.35 | 0.965 | 0.434 | 0.446 | 0.846 |
| 609 | 31.551 | 360.11 | 7784.14 | 1985.57 | 203.01 | 1140.30 | 1300289.50 | 0.696 | 0.417 | 0.062 | 0.814 |
| 611 | 10.363 | 3892.43 | 8053.79 | 4914.77 | 471.14 | 1516.66 | 2300269.14 | 1.766 | 0.677 | 2.145 | 1.313 |
| 612 | 23.549 | 266.50 | 5395.10 | 1853.24 | 302.16 | 1466.30 | 2150030.04 | 1.030 | 0.476 | 0.046 | 0.925 |
| 613 | 11.225 | 0.00 | 38853.43 | 4858.71 | 1375.75 | 4609.29 | 21245519.49 | 2.946 | 0.655 | 22.042 | 1.268 |
| 614 | 5.735 | 0.00 | 1957.28 | 1253.88 | 295.68 | 708.08 | 501370.65 | -1.135 | 0.861 | -0.311 | 1.795 |
| 615 | 7.187 | 259.87 | 6679.20 | 2731.96 | 858.13 | 2300.55 | 5292536.25 | 1.433 | 0.785 | 0.965 | 1.565 |
| 616 | 6.726 | 2580.10 | 8759.11 | 4769.24 | 881.51 | 2286.23 | 5226837.73 | 1.216 | 0.807 | 0.230 | 1.623 |
| 617 | 6.278 | 4016.88 | 5090.41 | 4543.84 | 187.96 | 470.96 | 221801.52 | 0.352 | 0.830 | -1.931 | 1.691 |
| 618 | 6.263 | 415.32 | 2507.46 | 2294.82 | 162.47 | 406.60 | 165321.29 | -5.382 | 0.830 | 45.232 | 1.694 |
| 619 | 7.505 | 137.13 | 3565.59 | 2073.48 | 343.64 | 941.38 | 886197.71 | 0.364 | 0.772 | 1.409 | 1.530 |
| 621 | 7.574 | 3959.66 | 10941.87 | 6848.71 | 903.21 | 2485.70 | 6178712.52 | 0.389 | 0.769 | -0.540 | 1.522 |
| 622 | 7.329 | 134.92 | 5399.33 | 3101.48 | 624.10 | 1689.55 | 2854592.98 | 0.037 | 0.779 | -1.322 | 1.549 |
| 623 | 26.015 | 1247.99 | 8024.59 | 3047.08 | 258.52 | 1318.57 | 1738625.64 | 1.085 | 0.455 | 1.436 | 0.886 |
| 624 | 8.160 | 778.05 | 20499.78 | 4964.84 | 676.29 | 1931.89 | 3732196.70 | 6.542 | 0.746 | 89.741 | 1.467 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 702 | 7.894 | 1209.21 | 10669.02 | 7149.36 | 718.02 | 2017.30 | 4069506.21 | -0.870 | 0.756 | 0.791 | 1.491 |
| 703 | 11.077 | 1678.89 | 11386.19 | 6480.22 | 618.67 | 2059.01 | 4239541.41 | 0.846 | 0.659 | 3.561 | 1.276 |
| 704 | 11.067 | 211.63 | 44325.80 | 8158.54 | 5234.81 | 17414.63 | 303269224.12 | 2.000 | 0.659 | 2.407 | 1.276 |
| 705 | 6.345 | 5163.52 | 14509.34 | 8938.85 | 669.57 | 1686.57 | 2844529.52 | 0.633 | 0.826 | 1.602 | 1.680 |
| 706 | 7.637 | 3866.47 | 18103.28 | 11983.85 | 1114.71 | 3080.44 | 9489094.46 | 0.301 | 0.766 | 2.441 | 1.516 |
| 707 | 5.794 | 579.39 | 24999.71 | 11998.45 | 3791.63 | 9126.63 | 83295341.03 | 0.440 | 0.857 | -0.750 | 1.782 |
| 708 | 12.001 | 2518.35 | 12828.75 | 8589.88 | 672.81 | 2330.81 | 5432652.44 | -0.266 | 0.637 | 0.776 | 1.232 |
| 709 | 12.342 | 4479.83 | 18907.09 | 8595.47 | 572.02 | 2009.60 | 4038480.15 | 1.545 | 0.630 | 9.554 | 1.218 |
| 710 | 11.685 | 1535.30 | 9358.86 | 8075.77 | 481.73 | 1646.69 | 2711576.83 | -1.697 | 0.644 | 3.078 | 1.246 |
| 711 | 10.760 | 75.32 | 7537.61 | 5841.09 | 421.93 | 1384.04 | 1915574.32 | -2.918 | 0.667 | 18.116 | 1.292 |
| 712 | 9.940 | 6249.70 | 15724.85 | 9676.90 | 678.96 | 2140.56 | 4581992.62 | 0.097 | 0.689 | 3.182 | 1.338 |
| 713 | 5.827 | 36.22 | 49518.73 | 14304.20 | 3734.48 | 9014.85 | 81267468.20 | 1.748 | 0.855 | 15.965 | 1.775 |
| 716 | 9.083 | 2879.31 | 8135.92 | 6003.41 | 681.95 | 2055.30 | 4224278.16 | -0.023 | 0.714 | -2.317 | 1.394 |
| 717 | 15.055 | 2666.76 | 16907.18 | 9110.09 | 1038.48 | 4029.35 | 16235625.50 | 0.479 | 0.579 | -0.402 | 1.119 |
| 718 | 10.846 | 1243.37 | 10408.73 | 4692.38 | 966.09 | 3181.61 | 10122611.97 | 0.641 | 0.665 | -1.152 | 1.287 |
| 719 | 12.651 | 450.65 | 9558.05 | 7159.17 | 659.64 | 2346.21 | 5504716.11 | -0.927 | 0.623 | 1.322 | 1.205 |
| 720 | 13.722 | 247.34 | 14699.78 | 4580.56 | 1070.78 | 3966.48 | 15732936.18 | 1.713 | 0.602 | 3.242 | 1.164 |
| 721 | 17.092 | 3762.12 | 7236.44 | 5283.66 | 221.71 | 916.60 | 840148.58 | 0.136 | 0.548 | -0.165 | 1.061 |
| 722 | 14.273 | 3737.77 | 7212.30 | 5196.39 | 343.01 | 1295.89 | 1679330.01 | 0.102 | 0.593 | -1.926 | 1.145 |
| 723 | 13.757 | 368.02 | 12015.01 | 7191.22 | 993.58 | 3685.24 | 13581008.97 | 0.014 | 0.602 | -1.245 | 1.163 |
| 724 | 10.607 | 0.00 | 17421.71 | 13675.21 | 1215.41 | 3958.48 | 15669530.14 | -1.655 | 0.671 | 3.757 | 1.300 |
| 725 | 10.102 | 4156.03 | 10751.42 | 5933.72 | 340.48 | 1082.13 | 1170999.90 | 0.664 | 0.684 | 6.812 | 1.328 |
| 726 | 10.620 | 1208.01 | 7878.20 | 3442.09 | 667.31 | 2174.69 | 4729256.64 | 1.269 | 0.670 | 1.081 | 1.299 |
| 727 | 12.288 | 2630.33 | 6904.91 | 4683.69 | 346.55 | 1214.81 | 1475754.32 | 0.994 | 0.631 | 0.551 | 1.220 |
| 728 | 10.477 | 2470.44 | 13140.69 | 6947.43 | 855.99 | 2770.73 | 7676941.50 | 0.528 | 0.674 | 0.470 | 1.307 |
| 729 | 6.742 | 287.61 | 9091.74 | 4072.08 | 792.96 | 2058.90 | 4239048.64 | 1.931 | 0.806 | 7.956 | 1.621 |
| 730 | 8.487 | 866.44 | 6233.92 | 4617.74 | 516.87 | 1505.79 | 2267389.14 | -0.676 | 0.734 | 0.877 | 1.439 |
| 731 | 15.296 | 2869.76 | 7919.45 | 5111.27 | 457.09 | 1787.68 | 3195802.58 | 0.453 | 0.575 | -1.095 | 1.112 |
| 733 | 7.448 | 0.00 | 6040.12 | 2792.08 | 389.36 | 1062.62 | 1129158.99 | 0.382 | 0.774 | 4.097 | 1.536 |
| 735 | 11.119 | 2922.96 | 18525.47 | 8315.87 | 823.94 | 2747.42 | 7548293.75 | -0.039 | 0.658 | 4.002 | 1.273 |
| 803 | 5.781 | 328.98 | 6007.30 | 3290.08 | 600.15 | 1443.05 | 2082397.78 | -0.041 | 0.858 | 2.068 | 1.785 |
| 805 | 48.930 | 157.16 | 6827.97 | 3152.43 | 220.14 | 1539.89 | 2371273.66 | 0.434 | 0.340 | 0.198 | 0.668 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 807 | 34.207 | 0.00 | 11531.87 | 3343.87 | 239.78 | 1402.40 | 1966712.21 | 0.897 | 0.402 | 3.792 | 0.786 |
| 809 | 16.776 | 71.40 | 5604.98 | 2931.00 | 338.28 | 1385.53 | 1919691.89 | 0.622 | 0.553 | -0.240 | 1.069 |
| 810 | 6.736 | 635.90 | 10652.28 | 3727.85 | 952.03 | 2470.86 | 6105139.83 | 2.006 | 0.806 | 5.702 | 1.622 |
| 811 | 6.153 | 912.49 | 10719.80 | 4308.26 | 756.60 | 1876.79 | 3522333.25 | 1.721 | 0.836 | 16.416 | 1.713 |
| 812 | 59.691 | 17.04 | 5644.32 | 2108.29 | 201.15 | 1554.06 | 2415102.41 | 0.843 | 0.309 | -0.295 | 0.610 |
| 813 | 9.009 | 1728.18 | 9420.65 | 4048.74 | 821.09 | 2464.49 | 6073699.24 | 1.829 | 0.717 | 2.951 | 1.399 |
| 814 | 10.296 | 3152.90 | 9397.29 | 5624.79 | 495.23 | 1589.04 | 2525056.77 | 0.837 | 0.679 | 3.347 | 1.317 |
| 815 | 22.075 | 0.00 | 8831.44 | 3606.48 | 515.90 | 2423.93 | 5875451.63 | 0.768 | 0.490 | -0.086 | 0.951 |
| 816 | 10.210 | 3853.00 | 8397.37 | 5709.65 | 646.46 | 2065.66 | 4266936.85 | 0.667 | 0.681 | -1.742 | 1.322 |
| 817 | 20.827 | 699.74 | 5746.75 | 2795.62 | 236.55 | 1079.55 | 1165419.34 | 0.361 | 0.503 | -0.139 | 0.975 |
| 820 | 64.839 | 0.00 | 21631.89 | 3433.24 | 375.02 | 3019.78 | 9119043.47 | 3.498 | 0.297 | 17.361 | 0.587 |
| 821 | 13.405 | 583.07 | 5226.88 | 2344.41 | 355.57 | 1301.86 | 1694842.09 | 1.088 | 0.608 | 1.410 | 1.175 |
| 902 | 22.171 | 5.59 | 8139.15 | 2786.34 | 364.30 | 1715.31 | 2942285.28 | 1.137 | 0.489 | 1.741 | 0.950 |
| 904 | 26.397 | 160.79 | 6364.68 | 2866.37 | 318.44 | 1636.08 | 2676741.46 | 0.496 | 0.452 | -0.787 | 0.881 |
| 905 | 23.308 | 0.00 | 5686.37 | 3241.47 | 366.42 | 1769.02 | 3129434.45 | -0.225 | 0.478 | -1.211 | 0.929 |
| 908 | 7.708 | 1290.95 | 4069.28 | 3562.46 | 204.94 | 568.98 | 323733.81 | -1.119 | 0.763 | 4.136 | 1.509 |
| 909 | 18.025 | 1106.96 | 22743.21 | 5263.51 | 802.92 | 3408.88 | 11620494.61 | 3.328 | 0.536 | 19.351 | 1.037 |
| 910 | 8.434 | 10.19 | 7701.05 | 3053.01 | 823.37 | 2391.17 | 5717708.63 | 1.372 | 0.736 | 1.723 | 1.443 |
| 911 | 11.996 | 497.69 | 5380.29 | 1915.09 | 455.59 | 1577.96 | 2489963.64 | 1.861 | 0.637 | 2.667 | 1.232 |
| 913 | 11.717 | 1682.81 | 19607.44 | 7016.19 | 1425.27 | 4878.80 | 23802649.36 | 1.313 | 0.644 | 2.793 | 1.245 |
| 914 | 5.620 | 3681.38 | 8654.94 | 5600.04 | 821.12 | 1946.55 | 3789072.49 | 1.179 | 0.868 | 0.750 | 1.821 |

**ANNEX IV - The Role of Density and Its Possible Substitutes in the Children's Personal Social Services - SSA:**
**Executive Summary of a 2001 report by Paul Dixon and Roy Carr-Hill for the SSA County Council Network (References are to the sections of that report)**

**AIV.1**. The purpose of this exercise was to re-examine the role of density in the models that had been developed as a basis for the formulae used to distribute Children's SSA revenues. These formulae were based on linking data on utilisation extracted from 25 authorities (and 1030 electoral/synthetic wards) with Census SAS data.

**AIV.2**. After extensive data exploration, we had settled on a model including the following variables;

- the proportion of children 0-17 with limiting long term illness;
- the proportion of income support claimants as a proportion of all children;
- the proportion of all dependent children aged 0-18 in lone parent households; and
- the ratio of population to area (persons per hectare).

**AIV.3.** The results and sensitivity analyses between the three different classes of authority are reviewed in Section I (Tables 1+2) and the implications of excluding density from the current formulae with the existing data in Section II (Tables 3+4). These show:

- the coefficients vary substantially between models estimated for the different groups of authorities.
- the introduction of an intermediate patch level systematically reduced the 'power' of the density variable both in all authorities combined and in the separate classes of authority, although density remained just significant in the County authorities.
- the correlations between density and the dependent variable are less strong in urban areas than in County authorities, presumably because urban areas are homogenous in that respect.
- there is a high inter-correlation between population density and the proportion of dependent children living in flats, and much of this is due to differences between the classes of authorities rather than differences between wards.

**AIV.4.** Variability between models estimated for different groups of authorities suggests that different models are appropriate for the different groups of authorities (although, of course, this would be difficult to implement in the context of a national formula).

**AIV.5.** In addition, it is important to understand the implications of the systematic variation in the behaviour of the density variable because, unlike the other drivers that have been identified, there is no clear link between this variable and need for child care services. Indeed, the justification for its inclusion in the formula rests substantially on its explanatory power - and that varies between different groups of authorities. These empirical and theoretical issues have led us to search for explanations for the effect of the density variable.

**AIV.6.** In section IV, we search for an explanation of these differences between authorities with the new data. In addition to the obvious differences in the population densities between the three groups of authorities, there are also very large (tenfold) differences between the three types of authorities in terms of the proportions of dependent children living in flats. Moreover, *at the authority level*, there is a very high inter-correlation of 0.97 between dependent children in flats and population density. Indeed, the latter correlation with an N of 32 cannot be treated as statistically significantly different from 1.0; in other words, in the SSA context, they could have been substituted for each other.

**AIV.7.** The overall effect of population density is to reinforce the inclusion in the model of the variable measuring the proportion of dependent children living in flats. We conclude that, given their high level of inter-correlation, it was inappropriate to include both dependent children living in flats and population density in the same model.

## ANNEX V - Results

## A: Ordinary Least Squares Runs (May 16th 2005)

### Table AV.1 - CIN 2003 Adjusted Cost Dependent: Final R Squared 0.603 Reset 9.106

| | Initial Model | | | | | Final Model | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | T | Sig | B | Std. Error | Beta | T | Sig |
| (Constant) | -1583.3 | 468.9 | | -3.38 | .001 | -1391.6 | 422.9 | | -3.29 | .001 |
| MINDIST | -1.616 | 1.055 | -.027 | -1.53 | .126 | -1.262 | 1.065 | -.021 | -1.19 | .236 |
| Children in lone parent HHs | 6891.3 | 2185.1 | .201 | 3.15 | .002 | 13035.7 | 1624.1 | .381 | 8.03 | .000 |
| Lone parents on inc support | 43394.3 | 14796 | .212 | 2.93 | .003 | 58085.4 | 9891.1 | .283 | 5.87 | .000 |
| Children without good health | 25864.5 | 5134.3 | .176 | 5.04 | .000 | 11444.0 | 4130.3 | .078 | 2.77 | .006 |
| Adult Asian ethnic groups | -5324.7 | 918.6 | -.183 | -5.80 | .000 | | | | | |
| Adults on job seekers allowance | 32175.3 | 7378.7 | .199 | 4.36 | .000 | | | | | |
| HHs with 3 dep measures | -11402.4 | 3701.5 | -.159 | -3.08 | .002 | | | | | |
| Children providing informal care | 21178.9 | 8877.8 | .039 | 2.39 | .017 | | | | | |
| ISKIDS3B | 8790.9 | 3027.3 | .351 | 2.90 | .004 | | | | | |
| Children in HH where noon employed | -6229.7 | 3064.2 | -.212 | -2.03 | .042 | | | | | |

### Table A.V.2 - Square Root Adjusted Cost Dependent Final R Squared 0.638 Reset 0.266

| | Initial model | | | | | Final model | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | T | Sig | B | Std. Error | Beta | T | Sig |
| (Constant) | 25.58 | 6.950 | | 3.68 | .000 | 11.922 | 2.87 | | 4.16 | .000 |
| MINDIST | -0403 | .007 | -.093 | -5.54 | .000 | -0.0353 | .007 | -.082 | -4.84 | .000 |
| CMBINCJS | 68.49 | 25.32 | .182 | 2.71 | .007 | 58.25 | 14.79 | .155 | 3.94 | .000 |
| ISKIDS3B | 59.00 | 19.20 | .322 | 3.07 | .002 | | | | | |
| STUDENTS | -17.99 | 7.91 | -.041 | -2.27 | .023 | | | | | |
| Children in owner occupation | -12.53 | 6.17 | -.088 | -2.03 | .042 | | | | | |
| Children in lone parent HHs | 65.26 | 15.38 | .260 | 4.24 | .000 | 119.23 | 9.03 | .475 | 13.20 | .000 |
| Children without good health | 231.54 | 34.86 | .215 | 6.64 | .000 | 166.08 | 29.64 | .154 | 5.60 | .000 |
| Children in HH where noon employed | -60.36 | 22.54 | -.280 | -2.68 | .007 | | | | | |
| Adult Asian ethnic groups | -29.48 | 6.42 | -.138 | -4.59 | .000 | | | | | |
| Children mixed ethnic groups | 47.85 | 24.13 | .061 | 1.983 | .047 | | | | | |

**Table A.V.3 - Unit Cost Dependent Final R Squared 0.632 Reset 7.022**

| | Initial model | | | | | Final model | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | T | Sig | B | Std. Error | Beta | T | Sig |
| **(Constant)** | -1363.8 | 393.9 | | -3.46 | .001 | -997.6 | 320.5 | | -3.11 | .002 |
| **MINDIST** | -3.061 | .903 | -.057 | -3.39 | .001 | -3.31 | .916 | -.061 | -3.61 | .000 |
| **CMBINCJS** | 33736.1 | 2738.0 | .719 | 12.32 | .000 | 19311.4 | 1505.7 | .412 | 12.83 | .000 |
| **Prop of econ act 16-24yr olds unemployed** | 20619.7 | 7131.2 | .193 | 2.89 | .004 | | | | | |
| **YPUNEMP2** | -22933.0 | 5654.6 | -.364 | -4.06 | .000 | | | | | |
| **Children in social rental** | 2049.4 | 619.6 | .110 | 3.31 | .001 | 4421.3 | 562.1 | .238 | 7.87 | .000 |
| **Children without good health** | 16327.0 | 4651.4 | .122 | 3.51 | .000 | | | | | |
| **Children with LLTI** | 20735.4 | 7684.3 | .074 | 2.70 | .007 | 30253.4 | 7007.5 | .108 | 4.32 | .000 |
| **HHs with 3 dep measures** | -8163.4 | 3528.9 | -.125 | -2.31 | .021 | | | | | |
| **Adult Asian ethnic groups** | -3630.5 | 793.8 | -.137 | -4.57 | .000 | | | | | |
| **Children Black ethnic groups** | 5849.3 | 1287.5 | .163 | 4.54 | .000 | 5880.6 | 1259.1 | .164 | 4.67 | .000 |

## B - Multi level results

**Table A.V.4 - Linear Dependent: Final Pseudo R Squared 0.326 Reset Statistic 0.452**

| Variance Estimates | | | Coefficients | | | | |
|---|---|---|---|---|---|---|---|
| **Basic Model** | | | | **Unstand. Coeff.** | **Std.** | **t** | **Sig.** |
| **LA_ID** | 3665000 | 542000 | **(Constant)** | -191.1 | 376.8 | | |
| **PCDIST** | 9510000 | 295500 | **MINDIST** | -3.089 | 1.091 | | |
| **Final Model** | | | **Lone parents on income support** | 41990 | 14790 | | |
| **LA_ID** | 1593000 | 267400 | **Children without good health** | 19690 | 4848 | | |
| **PCDIST** | 7319000 | 227300 | **Combined adult income support** | 13170 | 3738 | | |
| | | | **Children in ethnic mixed households** | 10310 | 3885 | | |
| | | | **Children in black ethnic groups** | 4406 | 1641 | | |

**Table A.V.5 - Square Root Dependent: Final Pseudo R Squared 0.377 Reset Statistic 3.38**

| Variance Estimates | | | Coefficients | | | | |
|---|---|---|---|---|---|---|---|
| **Basic Model** | | | | **Unstand. Coeff.** | **Std.** | **t** | **Sig.** |
| **LA_ID** | 195.3 | 28.35 | **(Constant)** | 19.69 | 2.687 | | |
| **PCDIST** | 462.8 | 14.38 | **MINDIST** | -0.05407 | 0.00725 | | |
| **Final Model** | | | **Children in lone parent households** | 35.91 | 11.73 | | |
| **LA_ID** | 89.64 | 14.16 | **Lone parents on income support** | 507.1 | 73.13 | | |
| **PCDIST** | 320.2 | 9.945 | **Children without good health** | 234.2 | 31.86 | | |

**Table A.V.6 - National Unit Cost Dependent: Final Pseudo R Squared 0.371 Reset Statistic 0.086**

| Variance Estimates | | | Coefficients | | | | |
|---|---|---|---|---|---|---|---|
| **Basic Model** | | | | **Unstand. Coeff.** | **Std.** | **t** | **Sig.** |
| **LA_ID** | 3303000 | 476700 | **(Constant)** | 601.6 | 335.3 | | |
| **PCDIST** | 7428000 | 230900 | **MINDIST** | -3.448 | 0.9276 | | |
| **Final Model** | | | **Children without good health** | 10550 | 4566 | | |
| **LA_ID** | 1445000 | 229200 | **Children in income support households** | 5594 | 1855 | | |
| **PCDIST** | 5309000 | 164900 | **Combined adult income support** | 15970 | 3280 | | |
| | | | **Children in black ethnic groups** | 5418 | 1240 | | |

**ANNEX VI (A) Summary**

**(Note that all R Squareds in this and in Previous Note are Adjusted R Squareds; note that these models have used an incorrectly calculated density variable)**

**A.VI.1 - Models without Minimum Distance but with Density**

The pattern of variables entering the different models is shown in Table A.VI.1. Density always enters the initial OLS equations but with a strong negative coefficient; but in the multi-level runs it always enters with a weak positive coefficient. Here it is clear that the multi-level models provide much more stable results than OLS (with ten different variables entering the OLS models compared to five for the corresponding multi-level models). Once again this is consistent with the values of the reset test statistics which all show that the models using Ordinary Least Squares are very badly specified, whilst the models estimated within the multi-level framework are well-specified.

In terms of the content / meaning of the variables with significant coefficients, each of the equations includes an income support variable, and an illness variable. Thus, the 'adults on combined income support' variable enters in 5 of the 6 equations and in the sixth it is replaced by the 'adults on income support' variable. In addition, the 'children in combined income support households' enters three of the equations. Similarly, the 'children without good health' enters 5 of the 6 equations and the 'children with limiting long term illness' variable enters the sixth.

**Table A.VI.1 - Variables entering the different models (without minimum distance but with density)**

| | **Ordinary Least Squares** | | | **Multi-Level models** | | |
|---|---|---|---|---|---|---|
| | **A** | **B** | **C** | **A** | **B** | **C** |
| **Adults on Income Support** | Y | | | | Y | |
| **Children without good health** | Y | | Y | Y | Y | Y |
| **Children black ethnic groups** | Y | | Y | Y | Y | Y |
| **Adults on combined income support** | | Y | Y | Y | | Y |
| **Children with Limiting Long Term Illness** | | Y | | | | |
| **Children in combined income support households** | | Y | | | Y | Y |
| **Children in Lone Parent Households** | | | Y | Y | | |
| **Children with LLTI** | | | Y | | | |
| **Children in Routine Occupations Households** | | | Y | | | |
| **Density** | | | | Y | Y | Y |
| | | | | | | |
| **R Squared** | .629 | .612 | .729 | .316 | .365 | .387 |
| **Reset Statistic** | 9.19 | 8.92 | 15.64 | .274 | .419 | 1.565 |

A - Local Actual Cost; B - National Unit Cost; C - Numbers

Among other dimensions of deprivation, 'children in lone parent households' enters two equations and 'children in routine occupation households' enters only once, whilst the 'children in black ethnic groups' enters five of the six equations. The density variable appears only in the multi-level modelling. Overall, the initial combination (income support, poor health and ethnic minorities) appears to be a good balance of variables, although one may prefer to include the 'children in combined income support households' variable rather then the 'adults in combined income support households'. The role of density, however, is still deeply mysterious.

### A.VI(A).2 - Conclusion

*Including the supply variable (minimum distance to an area office)*
None of the OLS models fit the data very well, and examination of the plots suggests that this is because the models do not really capture the high cost areas, but the square root models appears to be capturing the shape of the distribution of the residuals better than either the untransformed cost dependent or the logarithmic dependent[9].

Essentially the test of specification in OLS is sensitive to the form of the dependent. If the clustering within local authorities is taken into account through using multi-level modelling, however, the runs with linear dependents are well-specified. We therefore recommended the two models in Table A.VI.2.

*Without the supply variable (minimum distance to an area office)*
The multi-level model provides a consistent picture of effects and is very well-specified except with the numbers dependent and even the latter is much better specified than the OLS runs. The recommendation from the re-analysis without density in the ML models therefore is that one of those - or a combination of those - should be used as the basis for a formula (see Table A.VI.3.). With density, the recommendation is for the unit cost model[10].

**Table A.VI.2 - Recommended models with Minimum Distance**

| | **Model I** | | **Model II** | |
|---|---|---|---|---|
| | **Unstand. Coeff.** | **Std. Error** | **Unstand. Coeff.** | **Std. Error** |
| **(Constant)** | -191.1 | 376.8 | 601.6 | 335.3 |
| **MINDIST** | -3.089 | 1.091 | -3.448 | 0.9276 |
| **Lone parents on income support** | 41990 | 14790 | | |
| **Children in income support/income based JSA households** | | | 5594 | 1855 |
| **Children without good health** | 19690 | 4848 | 10550 | 4566 |
| **Combined adult income support** | 13170 | 3738 | 15970 | 3280 |
| **Children in ethnic mixed households** | 10310 | 3885 | | |
| **Children in black ethnic groups** | 4406 | 1641 | 5418 | 1240 |

[9] The square root reduces the range of a variable much less than a logarithmic transformation. If the raw values are 10, 100 and 1000, the logarithms (to base 10) will be 1, 2 and 3, whilst the square roots will be 3.15, 10 and 31.5

[10] An attempt was made to reproduce Table A.IV.7 with density in - i.e. retaining only child-related variables. The problem was that when the 'adults on income support variable' was omitted from the model shown in Table A.V.5, the ‘children in black ethnic groups’ variable dropped out. So that doesn't appear to work; the only model with child-only variables is A.V.7 *without* density.

**Table A.VI.3 - National Unit Cost Dependant with and without Density**

| | With Density | | Without Density | |
|---|---|---|---|---|
| | **Coeff.** | **Std. Error** | **Coeff.** | **Std. Error** |
| **(Constant)** | 178.7 | 326.2 | 371.9 | 325.2 |
| | | | | |
| **Children without good health** | 11370 | 4558 | 10440 | 4574 |
| **Income support households** | 22420 | 4565 | | |
| **Children in combined income support** | 5328 | 1894 | 13580 | 943.8 |
| **Children in black ethnic groups** | 4724 | 1366 | 4256 | 1225 |
| **Density** | 1.032 | 0.3737 | | |
| **Final Pseudo R squared** | 0.365 | | 0.363 | |
| **Reset Test Statistic** | 0.385 | | 0.385 | |

## ANNEX VI.(B) - Ordinary Least Squares Models

**Table A.VI.4 - Raw Cost Dependent: Starting and Ending Runs**
Final R Squared 62.9% Final Reset Test Statistic 9.19

| | **Unstandardised Coefficients** | | **St. Coef.** | **t** | **Sig.** | **Unstandardised Coefficients** | | **St. Coef.** | **t** | **Sig.** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Beta** | | | **B** | **Std. Error** | **Beta** | | |
| **Starting Constant** | 3363.6 | 294.21 | | 11.43 | .000 | 3363.6 | 294.2 | | 11.43 | .000 |
| **Ending Constant** | -1474.4 | 425.24 | | -3.47 | .001 | -1489.2 | 411.8 | | -3.62 | .000 |
| **Children in lone par HHs** | 5689.22 | 1901.4 | .166 | 2.99 | .003 | 14991.3 | 1397.0 | .438 | 10.73 | .000 |
| **INCSUP_F** | 30266.1 | 4772.9 | .427 | 6.34 | .000 | 16055.5 | 2983.4 | .226 | 5.38 | .000 |
| **Adult Asian ethnic groups** | -5782.7 | 881.79 | -.199 | -6.56 | .000 | | | | | |
| **Children without good health** | 24002.1 | 5239.2 | .163 | 4.58 | .000 | 10273.0 | 4289.3 | .070 | 2.40 | .017 |
| **HHs with 3 census dep measures** | - 19591.9 | 4557.3 | -.274 | -4.30 | .000 | | | | | |
| **Children Black ethnic groups** | 3603.28 | 1600.8 | .092 | 2.25 | .024 | 3613.8 | 1446.4 | .092 | 2.500 | .013 |
| **KROUTIN2** | 7115.57 | 1983.05 | .141 | 3.59 | .000 | | | | | |
| **Children mixed ethnic groups** | 10176.4 | 3882.18 | .095 | 2.62 | .009 | | | | | |
| **NEWDENS** | -.869 | .338 | -.066 | -2.57 | .010 | | | | | |
| **JSA_F** | 19306.4 | 8643.14 | .117 | 2.23 | .026 | | | | | |

a Dependent Variable: CSTDEPAJ

**Table A.VI.5 - Unit Cost Dependent: Starting and Ending Runs**
Final R Squared 61.2% Final Reset Test Statistic 8.92

| | Unstandardized Coefficients | | St. Coef. | t | Sig. | Unstandardized Coefficients | | St. Coef. | t | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | B | Std. Error | Beta | | |
| **Starting Constant** | 2344.3 | 266.7 | | 8.79 | .000 | 2344.3 | 266.7 | | 8.79 | .000 |
| **Ending Constant** | -1418.9 | 401.3 | | -3.54 | .000 | -1175.6 | 320.3 | | -3.67 | .000 |
| **Children Asian ethnic groups** | -8693.4 | 1198.7 | -.415 | -7.25 | .000 | | | | | |
| **ISJSA_FF** | 30682.4 | 3956.0 | .641 | 7.76 | .000 | 7739.5 | 3032.4 | .162 | 2.55 | .011 |
| **Children without good health** | 11336.7 | 4973.0 | .084 | 2.28 | .023 | | | | | |
| **KETHNW** | 5036.5 | 1037.2 | .361 | 4.86 | .000 | | | | | |
| **YPUNEMP2** | -21142.0 | 5908.4 | -.336 | -3.58 | .000 | | | | | |
| **KROUTIN2** | 19860.6 | 7052.5 | .429 | 2.82 | .005 | | | | | |
| **HHs with 3 census dep measures** | -13165.8 | 3952.5 | -.201 | -3.33 | .001 | | | | | |
| **Children with LLTI** | 21493.1 | 7737.4 | .077 | 2.78 | .006 | 28023 | 7058.8 | .100 | 3.97 | .000 |
| **NEWDENS** | -.760 | .291 | -.063 | -2.61 | .009 | | | | | |
| **KROUTIN1** | -16590.0 | 8097.4 | -.295 | -2.05 | .041 | | | | | |
| **Prop of econ act 16-24yr olds unemployed** | 17434.8 | 7732.4 | .163 | 2.26 | .024 | | | | | |
| **ISKIDS3A** | 3883.0 | 1825.5 | .170 | 2.13 | .034 | 11782 | 1564.5 | .515 | 7.53 | .000 |

a Dependent Variable:UNITCST2

**Table A.VI.6 - Client Numbers Dependent: Starting and Ending Runs**
Final R Squared 72.9% Final Reset Test Statistic 15.64

| | Unstandardized Coefficients | | St. Coef. | t | Sig. | Unstandardized Coefficients | | St. Coef. | t | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | | | | | |
| **Starting Constant** | 26.95 | 1.663 | | 16.21 | .000 | 26.95 | 1.663 | | 16.21 | .000 |
| **Ending Constant** | 13.78 | 6.147 | | 2.24 | .025 | -7.715 | 2.225 | | -3.47 | .001 |
| **Children in lone par HHs** | 31.78 | 9.076 | .149 | 3.50 | .000 | 67.85 | 7.149 | .318 | 9.49 | .000 |
| **Children without good health** | 87.75 | 26.87 | .096 | 3.27 | .001 | 56.02 | 26.02 | .061 | 2.15 | .031 |
| **NEWDENS** | -.00627 | .002 | -.077 | -3.72 | .000 | | | | | |
| **ISJSA_FF** | 178.26 | 23.21 | .546 | 7.68 | .000 | 84.85 | 11.11 | .260 | 7.63 | .000 |
| **YPUNEMP2** | -159.18 | 33.83 | -.371 | -4.71 | .000 | | | | | |
| **Children in HH where noone ever worked** | -73.26 | 24.26 | -.175 | -3.02 | .003 | | | | | |
| **Children Black ethnic groups** | 30.31 | 7.94 | .124 | 3.82 | .000 | 20.82 | 7.694 | .085 | 2.71 | .007 |
| **Children with LLTI** | 158.84 | 44.14 | .083 | 3.60 | .000 | 161.04 | 44.36 | .084 | 3.63 | .000 |
| **ISKIDS3A** | 40.81 | 13.04 | .262 | 3.13 | .002 | | | | | |
| **Prop of econ act 16-24yr olds unemployed** | 153.46 | 43.73 | .211 | 3.51 | .000 | | | | | |
| **HHs with 3 census dep measures** | -111.79 | 24.95 | -.251 | -4.48 | .000 | | | | | |
| **KROUTIN2** | 44.03 | 11.77 | .139 | 3.74 | .000 | 23.63 | 8.622 | .075 | 2.74 | .006 |
| **HHs with 1 census dep measures** | -45.63 | 15.57 | -.067 | -2.93 | .003 | | | | | |

a Dependent Variable: NDEP2

## ANNEX VI.(C) - Multi Level Results

**Table A.VI.7 - Linear Dependent CSTDEPAJ:**
Final Pseudo R Squared 0.316 Reset Statistic 0.274

| **Variance Estimates** | | | **Coefficients** | | | | |
|---|---|---|---|---|---|---|---|
| **Basic Model** | | | | **Unstand. Coeff.** | **Std. Error** | **t** | **Sig.** |
| **LA_ID** | 3665000 | 542000 | **(Constant)** | -942.2 | 382.3 | | |
| **PCDIST** | 9510000 | 295500 | | | | | |
| **Final Model** | | | **Children in Lone Parent** | 5581 | 1672 | | |
| **LA_ID** | 1684000 | 279200 | **Children without good health** | 19970 | 4881 | | |
| **PCDIST** | 7320000 | 227300 | **Combined income support households** | 17400 | 2634 | | |
| | | | **Density** | 1.197 | 0.4331 | | |
| | | | **Children in black ethnic groups** | 4143 | 1528 | | |

**Table A.VI.8 - National Unit Cost Dependent:**
Final Pseudo R Squared 0.365 Reset Statistic 0.4109

| **Variance Estimates** | | | **Coefficients** | | | | |
|---|---|---|---|---|---|---|---|
| **Basic Model** | | | | **Unstand. Coeff.** | **Std. Error** | **t** | **Sig.** |
| **LA_ID** | 3303000 | 476700 | **(Constant)** | 178.7 | 326.2 | | |
| **PCDIST** | 7428000 | 230900 | | | | | |
| **Final Model** | | | **Children without good health** | 11370 | 4558 | | |
| **LA_ID** | 1477000 | 2338000 | **Income support households** | 22420 | 4565 | | |
| **PCDIST** | 5335000 | 165700 | **Children in combined income support** | 5328 | 1894 | | |
| | | | **Children in black ethnic groups** | 4724 | 1366 | | |
| | | | **Density** | 1.032 | 0.3737 | | |

**Table A.VI.9 - Client Numbers Dependent**
Final Pseudo R Squared 0.387 Reset Statistic 1.565

| **Variance Estimates** | | | **Coefficients** | | | | |
|---|---|---|---|---|---|---|---|
| **Basic Model** | | | | **Unstand. Coeff.** | **Std. Error** | **t** | **Sig.** |
| **LA_ID** | 247.5 | 32.53 | **(Constant)** | -0.1603 | 2.022 | | |
| **PCDIST** | 261.5 | 8.13 | | | | | |
| **Final Model** | | | **Children without good health** | 96.12 | 25.53 | | |
| **LA_ID** | 154.5 | 20.27 | **Combined income support households** | 96.41 | 18.93 | | |
| **PCDIST** | 157.4 | 4.892 | **Children in combined income support** | 47.57 | 10.33 | | |
| | | | **Children in black ethnic groups** | 25.87 | 8.084 | | |
| | | | **Density** | .007251 | .00214 | | |

**Table A.VI.10 - National unit cost dependent**
Final Pseudo R Squared 0.363 Reset Statistic 0.385

| Variance Estimates | | | Coefficients | | | | |
|---|---|---|---|---|---|---|---|
| **Basic Model** | | | | **Unstand. Coeff.** | **Std. Error** | **t** | **Sig.** |
| **LA_ID** | 3303000 | 476700 | **(Constant)** | 371.9 | 325.2 | | |
| **PCDIST** | 7428000 | 230900 | | | | | |
| **Final Model** | | | **Children without good health** | 10440 | 4574 | | |
| **LA_ID** | 1423000 | 227000 | **Children in combined income support** | 13580 | 943.8 | | |
| **PCDIST** | 5408000 | 168000 | **Children in black ethnic groups** | 4256 | 1225 | | |

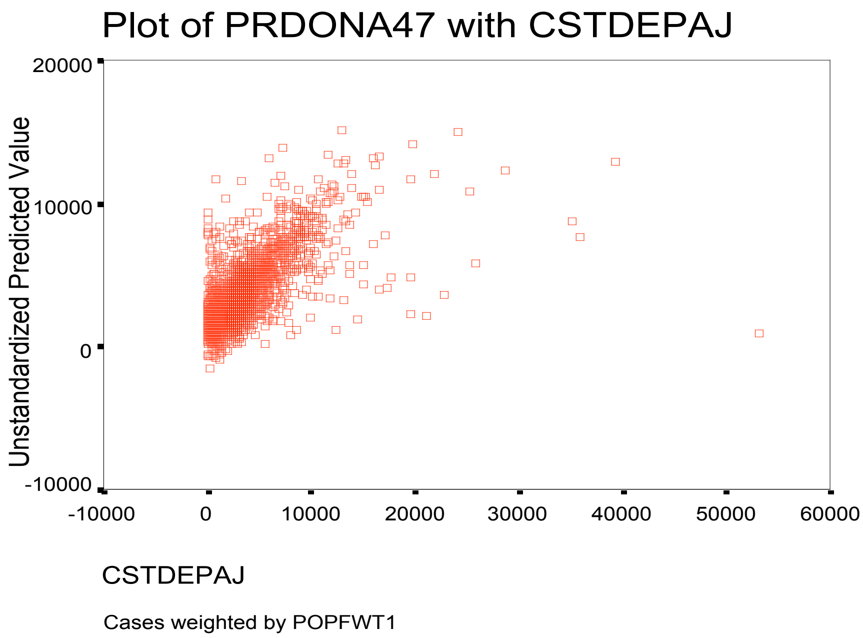
## Annex VII

### Table A.VII.1 - WARD LEVEL Descriptive Statistics

| | N | Range | Minimum | Maximum | Sum | Mean | | Std. Deviation | Variance | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LA_ID** | **Statistic** | **Statistic** | **Statistic** | **Statistic** | **Statistic** | **Statistic** | **Std. Error** | **Statistic** | **Statistic** | **Statistic** | **Std. Error** | **Statistic** | **Std. Error** |
| **108** | 20 | 11953.6 | 630.8 | 12584.4 | 98325.5 | 4916.3 | 672.4 | 3007.2 | 9043485.4 | 0.865 | 0.512 | 0.876 | 0.992 |
| **116** | 132 | 14019.4 | 89.3 | 14108.7 | 478674.1 | 3626.3 | 226.3 | 2599.6 | 6757954.1 | 1.186 | 0.211 | 1.94 | 0.419 |
| **210** | 18 | 8618.4 | 740.9 | 9359.3 | 64380.3 | 3576.7 | 491.4 | 2084.7 | 4345896.9 | 1.187 | 0.536 | 2.28 | 1.038 |
| **213** | 21 | 7457.3 | 2394.6 | 9851.9 | 124688.2 | 5937.5 | 559.5 | 2564.0 | 6574244.1 | 0.299 | 0.501 | -1.41 | 0.972 |
| **219** | 22 | 7715.8 | 397.5 | 8113.3 | 73335.1 | 3333.4 | 489.8 | 2297.6 | 5278961.9 | 0.671 | 0.491 | -0.851 | 0.953 |
| **307** | 20 | 12422.3 | 448.7 | 12871.0 | 90561.2 | 4528.1 | 767.8 | 3433.5 | 11788908.8 | 1.044 | 0.512 | 0.79 | 0.992 |
| **319** | 22 | 11112.5 | 306.5 | 11419.0 | 89428.9 | 4064.9 | 713.6 | 3346.9 | 11201715.3 | 0.812 | 0.491 | -0.169 | 0.953 |
| **324** | 23 | 12643.3 | 284.2 | 12927.5 | 116736.2 | 5075.5 | 730.7 | 3504.5 | 12281428.4 | 0.537 | 0.481 | -0.565 | 0.935 |
| **408** | 24 | 7536.8 | 798.8 | 8335.5 | 69911.7 | 2913.0 | 356.6 | 1746.9 | 3051797.3 | 1.372 | 0.472 | 2.706 | 0.918 |
| **413** | 168 | 9146.8 | 45.3 | 9192.1 | 360574.9 | 2146.3 | 151.5 | 1963.4 | 3854978.7 | 1.338 | 0.187 | 1.514 | 0.373 |
| **503** | 186 | 10001.9 | 117.8 | 10119.6 | 467863.4 | 2515.4 | 160.9 | 2194.9 | 4817620.0 | 1.384 | 0.178 | 1.276 | 0.355 |
| **506** | 177 | 14427.2 | 116.3 | 14543.5 | 571894.5 | 3231.0 | 193.7 | 2577.6 | 6644269.9 | 1.278 | 0.183 | 1.846 | 0.363 |
| **511** | 155 | 31944.2 | 107.4 | 32051.5 | 545978.6 | 3522.4 | 263.5 | 3281.1 | 10765877.2 | 4.554 | 0.195 | 36.417 | 0.387 |
| **606** | 193 | 12444.4 | 208.6 | 12653.0 | 636763.0 | 3299.3 | 178.3 | 2476.5 | 6133100.5 | 1.429 | 0.175 | 2.259 | 0.348 |
| **607** | 205 | 18739.6 | 135.2 | 18874.8 | 657946.8 | 3209.5 | 207.1 | 2964.9 | 8790494.5 | 2.031 | 0.17 | 6.098 | 0.338 |
| **615** | 30 | 11792.6 | 205.6 | 11998.2 | 90317.8 | 3010.6 | 536.9 | 2940.6 | 8647368.6 | 1.625 | 0.427 | 2.438 | 0.833 |
| **702** | 16 | 9774.8 | 32.1 | 9806.9 | 91318.5 | 5707.4 | 681.3 | 2725.3 | 7427511.4 | -0.433 | 0.564 | 0.236 | 1.091 |
| **722** | 23 | 9347.6 | 563.0 | 9910.7 | 108190.9 | 4704.0 | 428.5 | 2054.9 | 4222426.4 | 0.093 | 0.481 | 1.131 | 0.935 |
| **728** | 20 | 8470.2 | 1073.4 | 9543.7 | 98856.7 | 4942.8 | 511.4 | 2287.2 | 5231504.0 | 0.501 | 0.512 | -0.138 | 0.992 |
| **805** | 205 | 13818.1 | 92.7 | 13910.8 | 614172.1 | 2996.0 | 160.9 | 2303.6 | 5306736.3 | 1.531 | 0.17 | 3.241 | 0.338 |
| **811** | 16 | 5106.0 | 1555.8 | 6661.7 | 54658.8 | 3416.2 | 366.2 | 1464.8 | 2145754.7 | 0.927 | 0.564 | 0.241 | 1.091 |
| **820** | 283 | 20395.3 | 118.5 | 20513.7 | 620744.5 | 2193.4 | 116.4 | 1957.4 | 3831340.4 | 3.548 | 0.145 | 26.766 | 0.289 |
| **911** | 35 | 4309.9 | 192.0 | 4501.9 | 68974.0 | 1970.7 | 195.0 | 1153.7 | 1330981.2 | 0.477 | 0.398 | -0.828 | 0.778 |
| | | | | | | | | | | | | | |
| | 2014 | 32019.4 | 32.10 | 32051.5 | 6194295.5 | 3075.6 | 57.71 | 2589.96 | 6707903.2 | 2.086 | .055 | 10.675 | .109 |

## ANNEX VIII - Plots of Predicted Values against Dependents and Examination of Outliers

### Plot for Raw Local Cost Dependent




### Table A.VIII.1 - Lists of Districts for Raw Local Costs

| LA_ID | PCDIST | CSTDEPAJ | IMDTOTAL |
|---|---|---|---|
| 108.00 | NE23 | 16468.47 | 21.87 |
| 205.00 | DN1 | 16040.54 | 55.95 |
| 215.00 | HU2 | 16495.32 | 63.98 |
| 306.00 | M4 | 16477.71 | 67.88 |
| 306.00 | M7 | 19510.01 | 49.58 |
| 316.00 | L20 | 25942.43 | 51.79 |
| 407.00 | CV7 | 53252.00 | 16.43 |
| 412.00 | WV8 | 17710.56 | 18.05 |
| 414.00 | ST7 | 22835.87 | 16.20 |
| 509.00 | LE1 | 28638.55 | 58.61 |
| 512.00 | NG1 | 25200.43 | 53.88 |
| 607.00 | NR26 | 15004.00 | 15.24 |
| 607.00 | NR34 | 17253.59 | 16.30 |
| 613.00 | MK9 | 35895.63 | 27.41 |
| 624.00 | PE7 | 19549.67 | 13.70 |
| 704.00 | E9 | 35195.96 | 43.94 |
| 707.00 | W10 | 19850.49 | 43.05 |
| 709.00 | SE9 | 15012.77 | 24.80 |
| 713.00 | NW6 | 39319.30 | 30.53 |
| 713.00 | W10 | 24100.47 | 43.05 |
| 724.00 | N11 | 15421.30 | 21.45 |
| 724.00 | N22 | 16113.31 | 35.74 |
| 724.00 | N4 | 16009.35 | 38.42 |
| 724.00 | N8 | 15270.17 | 30.23 |
| 735.00 | E7 | 17134.17 | 36.29 |
| 820.00 | TN17 | 21193.19 | 11.14 |
| 909.00 | BS2 | 21942.31 | 50.09 |
| 913.00 | PL1 | 19607.44 | 47.28 |

Number of cases read: 28 Number of cases listed: 28

**Plots for Unit Cost Dependent**

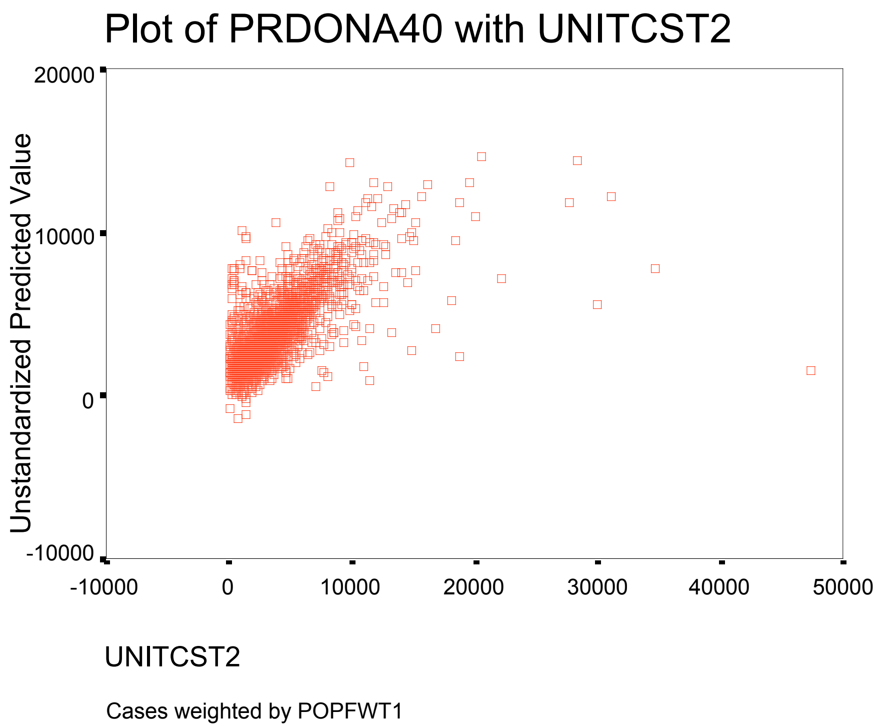



**Table A.VIII.2 - Lists of Districts for Unit Costs**

| LA_ID | PCDIST | UNITCST2 | IMDTOTAL |
|---|---|---|---|
| 205.00 | DN1 | 18472.92 | 55.95 |
| 214.00 | HU6 | 15137.99 | 43.60 |
| 215.00 | HU1 | 27733.07 | 62.60 |
| 215.00 | HU2 | 19563.43 | 63.98 |
| 215.00 | HU3 | 15254.45 | 57.17 |
| 306.00 | M11 | 15654.19 | 71.05 |
| 306.00 | M7 | 22115.90 | 49.58 |
| 316.00 | L20 | 29963.60 | 51.79 |
| 407.00 | CV7 | 47370.47 | 16.43 |
| 509.00 | LE1 | 28423.39 | 58.61 |
| 606.00 | LU2 | 16864.27 | 16.97 |
| 624.00 | PE7 | 18756.20 | 13.70 |
| 704.00 | E9 | 34702.49 | 43.94 |
| 705.00 | NW10 | 15015.43 | 32.73 |
| 707.00 | W10 | 16110.12 | 43.05 |
| 713.00 | NW6 | 31131.78 | 30.53 |
| 713.00 | W10 | 20607.94 | 43.05 |
| 720.00 | SE19 | 18054.90 | 26.01 |
| 909.00 | BS2 | 18791.94 | 50.09 |
| 913.00 | PL1 | 20033.41 | 47.28 |

Number of cases read: 20 Number of cases listed: 20

**Plot for Numbers Dependent**

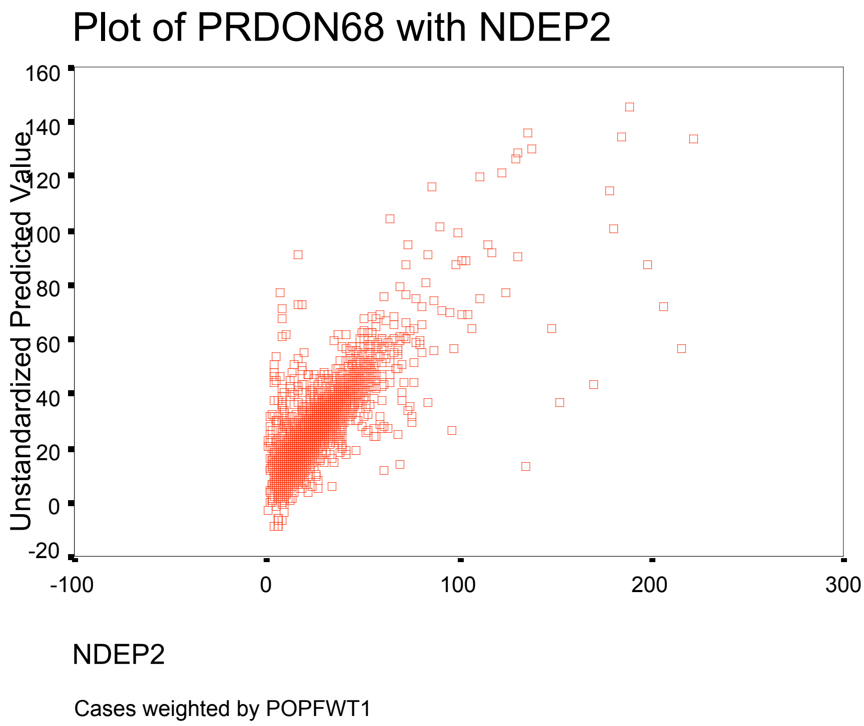



**Table A.VIII.3 - Lists of Districts for Numbers Dependent**

| LA_ID | PCDIST | NDEP2 | IMDTOTAL |
|---|---|---|---|
| 205.00 | DN1 | 106.90 | 55.95 |
| 215.00 | HU1 | 206.72 | 62.60 |
| 215.00 | HU2 | 130.32 | 63.98 |
| 306.00 | M11 | 105.13 | 71.05 |
| 316.00 | L20 | 152.34 | 51.79 |
| 404.00 | CV6 | 169.79 | 31.27 |
| 407.00 | CV7 | 135.09 | 16.43 |
| 509.00 | LE1 | 198.16 | 58.61 |
| 703.00 | SE10 | 129.96 | 30.68 |
| 703.00 | SE12 | 110.72 | 23.69 |
| 703.00 | SE13 | 222.46 | 28.78 |
| 703.00 | SE18 | 135.68 | 35.35 |
| 703.00 | SE2 | 137.74 | 32.82 |
| 703.00 | SE28 | 130.67 | 34.51 |
| 703.00 | SE3 | 122.22 | 25.45 |
| 703.00 | SE7 | 185.19 | 35.01 |
| 703.00 | SE8 | 188.56 | 36.41 |
| 704.00 | E9 | 215.68 | 43.94 |
| 705.00 | W11 | 148.09 | 27.59 |
| 707.00 | W10 | 116.65 | 43.05 |
| 712.00 | SW4 | 110.47 | 28.21 |
| 712.00 | SW8 | 103.88 | 33.44 |
| 713.00 | NW6 | 180.74 | 30.53 |
| 713.00 | W10 | 178.54 | 43.05 |
| 713.00 | W11 | 114.83 | 27.59 |
| 713.00 | W2 | 102.01 | 30.55 |
| 909.00 | BS2 | 124.89 | 50.09 |
| 913.00 | PL1 | 101.09 | 47.28 |

Number of cases read: 28 Number of cases listed: 28

## Annex IX

**Table A.IX.1 - Correlations between independent variables and Residuals from equations**

| | Child numbers | | Raw Local costs | | National unit Costs | |
|---|---|---|---|---|---|---|
| | *Corr.* | *Sig.* | *Corr.* | *Sig.* | *Corr.* | *Sig.* |
| **INCSUP_F** | .005 | .802 | .000 | 1.000 | .006 | .765 |
| **ISJSA_FF** | .000 | 1.000 | -.002 | .910 | .000 | 1.000 |
| **ISKIDS3A** | .005 | .819 | .001 | .955 | .000 | 1.000 |
| **LONPIS_F** | .000 | .987 | .001 | .962 | .014 | .515 |
| **KIS_F** | .006 | .782 | .002 | .915 | .006 | .771 |
| **JSA_F** | -.010 | .636 | -.005 | .803 | -.011 | .590 |
| **INCJSA_F** | -.014 | .517 | -.008 | .693 | -.016 | .440 |
| **KJSA_F** | -.011 | .593 | -.017 | .432 | -.056 | .009 |
| **Residents in pcdist** | -.011 | .612 | -.015 | .494 | -.017 | .417 |
| **16-24yr olds economically active** | .051 | .016 | .051 | .017 | .063 | .003 |
| **Prop of econ act 16-24yr olds unemployed** | -.013 | .554 | -.002 | .922 | -.014 | .512 |
| **YPUNEMP2** | -.031 | .147 | -.021 | .322 | -.043 | .043 |
| **YPSTUDNT** | .016 | .440 | -.006 | .773 | .019 | .361 |
| **STUDENTS** | -.056 | .008 | -.056 | .009 | -.045 | .033 |
| **UNEMPL1** | -.061 | .004 | -.054 | .011 | -.050 | .018 |
| **Children in multiple occupancy dwellings** | .006 | .785 | .010 | .639 | .029 | .175 |
| **Children living on 5th floor or above** | -.008 | .692 | -.004 | .856 | .020 | .357 |
| **Children in housing with no CH** | -.037 | .082 | -.030 | .162 | -.050 | .018 |
| **Children in no car HHs** | -.007 | .758 | -.005 | .824 | .017 | .419 |
| **Children in 2car HHs** | .011 | .595 | .019 | .365 | .002 | .913 |
| **KNOWNOCC** | .005 | .801 | .007 | .731 | .029 | .175 |
| **Children in social rental** | .020 | .338 | .022 | .300 | .046 | .031 |
| **Children in lone parent HHs** | .000 | 1.000 | .000 | 1.000 | .052 | .014 |
| **Children not in families** | -.003 | .877 | -.012 | .580 | .005 | .810 |
| **Children in poor health** | -.004 | .869 | .006 | .783 | .002 | .926 |
| **Children without good health** | .000 | 1.000 | .000 | 1.000 | -.005 | .826 |
| **Children providing informal care** | -.012 | .583 | .007 | .734 | -.020 | .351 |
| **Children with LLTI** | .000 | 1.000 | .018 | .407 | .000 | 1.000 |
| **Children in HH where noone employed** | -.014 | .506 | -.015 | .486 | -.009 | .658 |
| **Children in HH where noone ever worked** | -.025 | .246 | -.021 | .319 | -.030 | .164 |
| **HHs with one of census dep measures** | .003 | .876 | .020 | .353 | .038 | .074 |
| **HHs with 2 census dep measures** | -.014 | .525 | -.020 | .355 | -.020 | .343 |
| **HHs with 3 census dep measures** | -.022 | .304 | -.025 | .249 | -.029 | .171 |
| **HHs with 4 census dep measures** | -.025 | .233 | -.021 | .321 | -.031 | .142 |
| **16-19 yr olds with no educ quals** | .038 | .078 | .030 | .153 | .025 | .237 |
| **ETHNW** | -.041 | .052 | -.053 | .013 | -.074 | .000 |
| **Adult mixed ethnic groups** | .000 | .982 | .002 | .941 | .016 | .454 |
| **Adult Asian ethnic groups** | -.056 | .008 | -.073 | .001 | -.130 | .000 |
| **Adult Black ethnic groups** | -.005 | .819 | -.005 | .822 | .033 | .119 |
| **Adult Chinese & other non white ethnic groups** | -.013 | .550 | -.015 | .477 | .001 | .967 |
| **KETHNW** | -.034 | .113 | -.047 | .029 | -.065 | .002 |
| **Children mixed ethnic groups** | .013 | .551 | .010 | .634 | .028 | .195 |
| **Children Asian ethnic groups** | -.053 | .013 | -.071 | .001 | -.127 | .000 |
| **Children Black ethnic groups** | .000 | 1.000 | .000 | 1.000 | .038 | .076 |
| **Children Chinese & other non white ethnic groups** | -.008 | .724 | -.012 | .583 | .004 | .855 |
| **MINDIST** | -.079 | .000 | -.019 | .378 | -.056 | .009 |
| **NEWDENS** | -.042 | .046 | -.040 | .058 | -.030 | .163 |
| **KROUTIN1** | -.002 | .942 | .004 | .840 | .003 | .900 |
| **KROUTIN2** | .000 | 1.000 | .004 | .834 | .005 | .811 |

## ANNEX X (A): High Gradient Models Take 1

(Authorities chosen based on ratio of range of dependent to its minimum within each authority)

**Table A.X1 - UNIT COSTS: Based on only 276 Postcode Districts from Following LAs 106,107, 112 114, 312, 319, 406, 413, 418, 613, 815, 820, 911.**
**Final R Squared 62.3% Final Reset Test Statistic 1.65**

| | Unstandardized Coefficients | | St. Coef. | t | Sig. | Unstandardized Coefficients | | St. Coef. | t | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | *B* | *Std. Error* | *Beta* | | | | | | | |
| **Starting Constant** | 2344.3 | 215.9 | | 10.86 | .000 | 2344.3 | 215.9 | | 10.86 | .000 |
| **Ending Constant** | -1623.8 | 588.2 | | -2.76 | .006 | -624.7 | 310.8 | | -2.01 | .045 |
| **Children in lone parent HHs** | 9957.9 | 2651.4 | .409 | 3.76 | .000 | 11680 | 1995.2 | .480 | 5.85 | .000 |
| **LONPIS_F** | 25276.7 | 13191.3 | .296 | 1.92 | .056 | 22620 | 6980.1 | .265 | 3.24 | .001 |
| **Children in HH where noon employed** | -27749.8 | 4291.7 | -1.424 | -6.47 | .000 | | | | | |
| **KNOWNOCC** | 9432.1 | 2028.6 | .613 | 4.65 | .000 | | | | | |
| **ISJSA_FF** | 19103.3 | 6322.3 | .628 | 3.02 | .003 | | | | | |
| **Children without good health** | 15110.4 | 7609.9 | .168 | 1.99 | .048 | | | | | |

a Dependent Variable: UNITCST2

**Table A.X.2 - LOCAL RAW COST:** Based on only 523 Postcode Districts from Following LAs: 106,107, 114, 214, 218, 312, 315, 317, 319, 320, 321, 322, 323, 406, 413, 416,417, 503, 609, 612, 614, 622, 812, 911
**Final R squared 62.9% Final Reset Test Statistic 3.91**

| | Unstandardized Coefficients | | St. Coef. | t | Sig. | Unstandardized Coefficients | | St. Coef. | t | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | *B* | *Std. Error* | *Beta* | | | *B* | *Std. Error* | *Beta* | | |
| **Starting Constant** | 2024.5 | 219.9 | | 9.21 | .000 | 2024.5 | 219.86 | | 9.21 | .000 |
| **Ending Constant** | -2158.2 | 475.0 | | -4.54 | .000 | -1796.8 | 337.12 | | -5.33 | .000 |
| **Children in lone parent HHs** | 9106.0 | 2854.7 | .351 | 3.19 | .002 | 16690.5 | 1302.8 | .644 | 12.81 | .000 |
| **Children without good health** | 35656.9 | 5950.1 | .348 | 5.99 | .000 | 11571.8 | 4757.2 | .113 | 2.43 | .015 |
| **Adult Asian ethnic groups** | -4450.9 | 1079.8 | -.236 | -4.12 | .000 | | | | | |
| **LONPIS_F** | 66991.6 | 9922.0 | .706 | 6.75 | .000 | | | | | |
| **HHs with 3 census dep measures** | - 13167.2 | 4306.7 | -.282 | -3.06 | .002 | | | | | |
| **Children in HH where noone employed** | -8175.9 | 3560.2 | -.383 | -2.30 | .022 | | | | | |

a Dependent Variable: CSTDEPAJ

## ANNEX X (B) - High Gradient Models Take 2

(Authorities Chosen Based On Ratio Of Range Of Dependent To National Average Range)

**Table A.X.3 - NATIONAL UNIT COST MODEL;** But Based on only 352 Postcode Districts from Following LAs: 108, 205, 215, 217, 306, 316, 407, 412, 414, 510, 606, 621, 624, 703, 704, 705, 706, 713, 720, 723, 807, 817, 902, 912, 913
**Final R Squared; Final Reset Test Statistic 4.16**

| | Unstandardized Coefficients | | St. Coef. | T | Sig. | Unstandardized Coefficients | | St. Coef. | T | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | B | Std. Error | Beta | | |
| **Starting Constant** | 3394.43 | 494.70 | | 6.862 | .000 | 3394.43 | 494.7 | | 6.86 | .000 |
| **Ending Constant** | 388.6 | 946.05 | | .411 | .682 | -1031.3 | 889.3 | | -1.16 | .247 |
| **NEWDENS** | -4.143 | 1.053 | -.300 | -3.93 | .000 | | | | | |
| **Children Black ethnic groups** | 24707.9 | 4344.6 | .466 | 5.69 | .000 | 25760.2 | 4465.7 | .486 | 5.77 | .000 |
| **INCSUP_F** | 56866.4 | 9348.4 | .740 | 6.08 | .000 | 37141.9 | 6264.5 | .483 | 5.93 | .000 |
| **Children with LLTI** | 80309.5 | 26285 | .206 | 3.06 | .002 | 81546.1 | 26794 | .209 | 3.04 | .003 |
| **YPUNEMP2** | -26380.9 | 9391.6 | -.312 | -2.81 | .005 | | | | | |

a Dependent Variable: UNITCST2;

**Table A.X.4 - LOCAL RAW COST MODEL;** But Based on only 361 Postcode Districts from Following LAs: 108, 205, 217, 311, 404, 407, 412, 414, 509, 512, 606, 607, 613, 624, 704, 706, 713, 807, 820.
**Final R Squared; Final Reset Test Statistic = 1.93**

| | Unstandardized Coefficients | | St. Coef. | T | Sig. | Unstandardized Coefficients | | St. Coef. | T | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | B | Std. Error | Beta | | |
| **Starting Constant** | 3363.6 | 443.16 | | 7.59 | .000 | 3363.6 | 443.16 | | 7.59 | .000 |
| **Ending Constant** | 35.4 | 615.26 | | .058 | .954 | 565.27 | 562.03 | | 1.01 | .315 |
| **KIS_F** | 18651.0 | 2730.0 | .517 | 6.83 | .000 | 16780.0 | 2691.5 | .465 | 6.24 | .000 |
| **Children Black ethnic groups** | 51672.8 | 9485.4 | .788 | 5.45 | .000 | 52019.9 | 9605.7 | .793 | 5.42 | .000 |
| **Children Asian ethnic groups** | -6291.1 | 2828.2 | -.149 | -2.22 | .027 | | | | | |
| **NEWDENS** | -5.264 | 1.503 | -.374 | -3.50 | .001 | | | | | |
| **Residents in pcdist** | .04270 | .016 | .212 | 2.59 | .010 | | | | | |

a Dependent Variable: CSTDEPAJ;

**Table A.X.5 - NUMBERS MODEL;** But Based on only 324 Postcode Districts From Following LAs: 205, 206, 215, 404, 407, 509, 623, 704, 704, 705, 706, 711, 713, 723, 809, 812, 817, 902, 905, 914.

**Final R Squared Final Reset Test Statistic 5.14**

| | **Unstandardized Coefficients** | | **St. Coef.** | **T** | **Sig.** | **Unstandardized Coefficients** | | **St. Coef.** | **T** | **Sig.** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Beta** | | | **B** | **Std. Error** | **Beta** | | |
| **Starting Constant** | 36.47 | 2.720 | | 13.41 | .000 | 36.47 | 2.720 | | 13.41 | .000 |
| **Ending Constant** | -1.86 | 6.381 | | -.292 | .771 | -8.850 | 6.324 | | -1.40 | .163 |
| **LONPIS_F** | 951.91 | 134.26 | .757 | 7.09 | .000 | 853.57 | 113.96 | .679 | 7.49 | .000 |
| **Children with LLTI** | 598.88 | 175.64 | .209 | 3.41 | .001 | 573.20 | 178.86 | .200 | 3.21 | .001 |
| **Prop of econ act 16-24yr olds unemployed** | -236.21 | 78.53 | -.231 | -3.01 | .003 | | | | | |
| **Children in poor health** | 883.16 | 349.46 | .151 | 2.53 | .012 | 897.53 | 358.23 | .153 | 2.51 | .013 |
| **NEWDENS** | -.01636 | .006 | -.231 | -2.78 | .006 | | | | | |
| **KJSA_F** | 275.31 | 122.09 | .275 | 2.26 | .025 | | | | | |

a Dependent Variable: NDEP2;

## ANNEX XI - November

### Table A.X1.1 - Full Results of OLS Regression with new dependent (NUNIT2CR)

| | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| **Run with dummies only** | | | | | |
| (Constant) | 2578.3930 | 297.1136 | | 8.6781 | 0.0000 |
| LANUM001 | 3106.6732 | 708.1873 | 0.0829 | 4.3868 | 0.0000 |
| LANUM002 | -563.2833 | 857.3467 | -0.0120 | -0.6570 | 0.5112 |
| LANUM003 | 1731.1497 | 762.2950 | 0.0423 | 2.2710 | 0.0233 |
| LANUM004 | 2622.5446 | 861.0861 | 0.0558 | 3.0456 | 0.0024 |
| LANUM005 | 2517.5869 | 926.7899 | 0.0493 | 2.7165 | 0.0067 |
| LANUM006 | 3600.8241 | 715.5101 | 0.0950 | 5.0325 | 0.0000 |
| LANUM007 | 2206.1045 | 1151.3961 | 0.0341 | 1.9160 | 0.0555 |
| LANUM008 | 2733.3281 | 939.6057 | 0.0527 | 2.9090 | 0.0037 |
| LANUM009 | 1654.4717 | 959.1601 | 0.0312 | 1.7249 | 0.0847 |
| LANUM010 | 1640.1806 | 847.9180 | 0.0355 | 1.9344 | 0.0532 |
| LANUM011 | 1630.7257 | 585.0404 | 0.0554 | 2.7874 | 0.0054 |
| LANUM012 | 2121.6318 | 1143.1288 | 0.0331 | 1.8560 | 0.0636 |
| LANUM013 | 1491.7803 | 793.4444 | 0.0348 | 1.8801 | 0.0602 |
| LANUM014 | 3260.4471 | 698.9128 | 0.0885 | 4.6650 | 0.0000 |
| LANUM015 | 2222.3596 | 740.6317 | 0.0562 | 3.0006 | 0.0027 |
| LANUM016 | 3409.7685 | 578.6015 | 0.1176 | 5.8931 | 0.0000 |
| LANUM017 | 4818.3691 | 554.5484 | 0.1761 | 8.6888 | 0.0000 |
| LANUM018 | 1009.9509 | 822.7451 | 0.0226 | 1.2275 | 0.2198 |
| LANUM019 | 685.6315 | 612.2925 | 0.0220 | 1.1198 | 0.2629 |
| LANUM020 | 2627.9416 | 506.9481 | 0.1093 | 5.1838 | 0.0000 |
| LANUM021 | 3168.3894 | 677.5979 | 0.0893 | 4.6759 | 0.0000 |
| LANUM022 | 941.3250 | 702.1441 | 0.0254 | 1.3406 | 0.1802 |
| LANUM023 | 6614.3839 | 738.7430 | 0.1679 | 8.9536 | 0.0000 |
| LANUM024 | 1552.7856 | 880.8347 | 0.0322 | 1.7629 | 0.0781 |
| LANUM025 | 2588.2987 | 928.6352 | 0.0506 | 2.7872 | 0.0054 |
| LANUM026 | 14.8363 | 552.9489 | 0.0005 | 0.0268 | 0.9786 |
| LANUM027 | 1709.2054 | 916.2655 | 0.0339 | 1.8654 | 0.0623 |
| LANUM028 | 2093.5329 | 715.3404 | 0.0552 | 2.9266 | 0.0035 |
| LANUM029 | 1348.3811 | 840.7667 | 0.0295 | 1.6038 | 0.1089 |
| LANUM030 | 7275.7517 | 617.4444 | 0.2304 | 11.7837 | 0.0000 |
| LANUM031 | 2646.1935 | 754.8538 | 0.0655 | 3.5056 | 0.0005 |
| LANUM032 | 3078.7201 | 774.2029 | 0.0740 | 3.9766 | 0.0001 |
| LANUM033 | 4636.8773 | 794.8088 | 0.1080 | 5.8340 | 0.0000 |
| LANUM034 | 2415.2425 | 710.0774 | 0.0643 | 3.4014 | 0.0007 |
| LANUM035 | 813.1578 | 784.5950 | 0.0192 | 1.0364 | 0.3001 |
| LANUM036 | -806.1661 | 806.3206 | -0.0185 | -0.9998 | 0.3175 |
| LANUM037 | 1261.5197 | 689.8306 | 0.0348 | 1.8287 | 0.0676 |
| LANUM038 | 2084.0943 | 884.9424 | 0.0430 | 2.3551 | 0.0186 |
| LANUM039 | 2348.7206 | 596.7247 | 0.0778 | 3.9360 | 0.0001 |
| LANUM040 | 2832.5928 | 710.7809 | 0.0753 | 3.9852 | 0.0001 |
| LANUM041 | 2205.6945 | 861.5384 | 0.0469 | 2.5602 | 0.0105 |
| LANUM042 | 1911.1547 | 674.7705 | 0.0541 | 2.8323 | 0.0047 |
| LANUM043 | -115.9361 | 518.9003 | -0.0047 | -0.2234 | 0.8232 |
| LANUM044 | 3365.4422 | 1006.3653 | 0.0602 | 3.3442 | 0.0008 |
| LANUM045 | 338.0595 | 831.9114 | 0.0075 | 0.4064 | 0.6845 |

| | | | | | |
|---|---|---|---|---|---|
| LANUM046 | 1260.5285 | 437.4941 | 0.0667 | 2.8812 | 0.0040 |
| LANUM047 | 3192.8136 | 886.0098 | 0.0657 | 3.6036 | 0.0003 |
| LANUM048 | 3734.9934 | 992.7707 | 0.0678 | 3.7622 | 0.0002 |
| LANUM049 | 634.9668 | 576.9853 | 0.0220 | 1.1005 | 0.2712 |
| LANUM050 | 2858.5888 | 440.0435 | 0.1497 | 6.4962 | 0.0000 |
| LANUM051 | 1536.4762 | 681.9440 | 0.0430 | 2.2531 | 0.0244 |
| LANUM052 | 668.9102 | 695.6366 | 0.0183 | 0.9616 | 0.3364 |
| LANUM053 | 2750.6398 | 693.8646 | 0.0753 | 3.9642 | 0.0001 |
| LANUM054 | 1025.5793 | 817.0880 | 0.0231 | 1.2552 | 0.2096 |
| LANUM055 | 3144.9069 | 724.4776 | 0.0817 | 4.3409 | 0.0000 |
| LANUM056 | 2567.9315 | 756.3603 | 0.0634 | 3.3951 | 0.0007 |
| LANUM057 | -140.0381 | 488.7709 | -0.0062 | -0.2865 | 0.7745 |
| LANUM058 | 3413.8087 | 768.1323 | 0.0828 | 4.4443 | 0.0000 |
| LANUM059 | 780.9456 | 895.3686 | 0.0159 | 0.8722 | 0.3832 |
| LANUM060 | 654.1880 | 561.9923 | 0.0235 | 1.1641 | 0.2445 |
| LANUM061 | 61.5606 | 731.4741 | 0.0016 | 0.0842 | 0.9329 |
| LANUM062 | 1364.4981 | 877.9919 | 0.0284 | 1.5541 | 0.1203 |
| LANUM063 | 476.9357 | 531.0661 | 0.0185 | 0.8981 | 0.3693 |
| LANUM064 | 858.6186 | 518.4151 | 0.0345 | 1.6562 | 0.0978 |
| LANUM065 | 1030.7291 | 504.7486 | 0.0432 | 2.0421 | 0.0413 |
| LANUM066 | 3688.6120 | 776.9975 | 0.0882 | 4.7473 | 0.0000 |
| LANUM067 | -431.9345 | 538.6643 | -0.0164 | -0.8019 | 0.4227 |
| LANUM068 | 3975.8908 | 688.0396 | 0.1099 | 5.7786 | 0.0000 |
| LANUM069 | -1044.1223 | 1890.1307 | -0.0096 | -0.5524 | 0.5807 |
| LANUM070 | 1499.8308 | 501.1957 | 0.0635 | 2.9925 | 0.0028 |
| LANUM071 | 5144.1031 | 737.7548 | 0.1308 | 6.9726 | 0.0000 |
| LANUM072 | 1132.6861 | 448.1627 | 0.0574 | 2.5274 | 0.0116 |
| LANUM073 | 1546.5534 | 504.0700 | 0.0649 | 3.0681 | 0.0022 |
| LANUM074 | 193.3358 | 540.3098 | 0.0073 | 0.3578 | 0.7205 |
| LANUM075 | 579.1887 | 518.9401 | 0.0233 | 1.1161 | 0.2645 |
| LANUM076 | 2914.2365 | 802.3758 | 0.0672 | 3.6320 | 0.0003 |
| LANUM077 | -91.5347 | 574.9069 | -0.0032 | -0.1592 | 0.8735 |
| LANUM078 | 44.2186 | 772.2357 | 0.0011 | 0.0573 | 0.9543 |
| LANUM079 | -419.0021 | 1037.8162 | -0.0072 | -0.4037 | 0.6864 |
| LANUM080 | 72.3569 | 938.0690 | 0.0014 | 0.0771 | 0.9385 |
| LANUM081 | 3957.1160 | 984.6345 | 0.0725 | 4.0189 | 0.0001 |
| LANUM082 | 2284.0854 | 999.1718 | 0.0412 | 2.2860 | 0.0224 |
| LANUM083 | -176.8251 | 997.6481 | -0.0032 | -0.1772 | 0.8593 |
| LANUM084 | -491.3386 | 924.8426 | -0.0096 | -0.5313 | 0.5953 |
| LANUM085 | 3456.4758 | 915.8549 | 0.0686 | 3.7740 | 0.0002 |
| LANUM086 | 1742.9397 | 928.6467 | 0.0341 | 1.8769 | 0.0607 |
| LANUM087 | -588.1512 | 559.6449 | -0.0212 | -1.0509 | 0.2934 |
| LANUM088 | 2584.7193 | 889.0843 | 0.0530 | 2.9072 | 0.0037 |
| LANUM089 | 2552.9125 | 915.2117 | 0.0507 | 2.7894 | 0.0053 |
| LANUM090 | 6205.7786 | 779.3619 | 0.1479 | 7.9626 | 0.0000 |
| LANUM091 | 4406.5323 | 776.7482 | 0.1055 | 5.6731 | 0.0000 |
| LANUM092 | 6298.2518 | 992.7482 | 0.1143 | 6.3443 | 0.0000 |
| LANUM093 | 7009.3283 | 919.2339 | 0.1385 | 7.6252 | 0.0000 |
| LANUM094 | 6797.4771 | 1042.5616 | 0.1170 | 6.5200 | 0.0000 |
| LANUM095 | 5578.5135 | 752.0075 | 0.1387 | 7.4182 | 0.0000 |
| LANUM096 | 4592.9455 | 741.7114 | 0.1160 | 6.1924 | 0.0000 |
| LANUM097 | 5685.8970 | 763.4370 | 0.1388 | 7.4478 | 0.0000 |
| LANUM098 | 2844.4631 | 790.6484 | 0.0667 | 3.5976 | 0.0003 |
| LANUM099 | 6233.5656 | 816.0285 | 0.1409 | 7.6389 | 0.0000 |

| | | | | | |
|---|---|---|---|---|---|
| LANUM100 | 10560.5708 | 1055.7412 | 0.1793 | 10.0030 | 0.0000 |
| LANUM101 | 655.1976 | 847.8029 | 0.0142 | 0.7728 | 0.4397 |
| LANUM102 | 3431.5016 | 683.4390 | 0.0957 | 5.0209 | 0.0000 |
| LANUM103 | 934.1197 | 783.5938 | 0.0221 | 1.1921 | 0.2334 |
| LANUM104 | 1704.0120 | 738.2248 | 0.0433 | 2.3083 | 0.0211 |
| LANUM105 | 823.1283 | 707.5163 | 0.0220 | 1.1634 | 0.2448 |
| LANUM106 | 2563.3464 | 649.5576 | 0.0761 | 3.9463 | 0.0001 |
| LANUM107 | 2238.6166 | 700.1883 | 0.0606 | 3.1972 | 0.0014 |
| LANUM108 | 5753.5181 | 710.4523 | 0.1530 | 8.0984 | 0.0000 |
| LANUM109 | 9570.9611 | 794.5171 | 0.2231 | 12.0463 | 0.0000 |
| LANUM110 | 1023.1355 | 810.7746 | 0.0233 | 1.2619 | 0.2071 |
| LANUM111 | 52.6765 | 792.9821 | 0.0012 | 0.0664 | 0.9470 |
| LANUM112 | 1499.5730 | 747.9291 | 0.0375 | 2.0050 | 0.0451 |
| LANUM113 | 2959.6899 | 798.9727 | 0.0685 | 3.7044 | 0.0002 |
| LANUM114 | 2031.6795 | 979.1654 | 0.0374 | 2.0749 | 0.0381 |
| LANUM115 | 1880.9044 | 870.5155 | 0.0395 | 2.1607 | 0.0308 |
| LANUM116 | 2207.9568 | 680.9594 | 0.0618 | 3.2424 | 0.0012 |
| LANUM117 | -236.3546 | 923.3794 | -0.0046 | -0.2560 | 0.7980 |
| LANUM118 | 4407.7730 | 777.2384 | 0.1054 | 5.6711 | 0.0000 |
| LANUM119 | 1531.4811 | 1035.6807 | 0.0265 | 1.4787 | 0.1394 |
| LANUM120 | 837.9503 | 453.1798 | 0.0417 | 1.8490 | 0.0646 |
| LANUM121 | 388.5495 | 505.2440 | 0.0162 | 0.7690 | 0.4420 |
| LANUM122 | 1206.8560 | 655.7228 | 0.0354 | 1.8405 | 0.0658 |
| LANUM123 | 2076.8678 | 985.8207 | 0.0380 | 2.1067 | 0.0353 |
| LANUM124 | 1107.6214 | 1010.2460 | 0.0197 | 1.0964 | 0.2730 |
| LANUM125 | 1130.9975 | 429.3813 | 0.0620 | 2.6340 | 0.0085 |
| LANUM126 | 4029.6095 | 867.3760 | 0.0850 | 4.6457 | 0.0000 |
| LANUM127 | 2286.7381 | 831.7815 | 0.0506 | 2.7492 | 0.0060 |
| LANUM128 | 743.4256 | 589.1156 | 0.0250 | 1.2619 | 0.2071 |
| LANUM129 | 3989.2673 | 820.8759 | 0.0896 | 4.8598 | 0.0000 |
| LANUM130 | -501.8358 | 601.3571 | -0.0164 | -0.8345 | 0.4041 |
| LANUM132 | -150.9925 | 718.4053 | -0.0040 | -0.2102 | 0.8336 |
| LANUM133 | 3593.4918 | 588.7793 | 0.1211 | 6.1033 | 0.0000 |
| LANUM134 | 477.8260 | 552.7095 | 0.0175 | 0.8645 | 0.3874 |
| LANUM135 | 1154.1664 | 577.8237 | 0.0399 | 1.9974 | 0.0459 |
| LANUM136 | 1186.1076 | 929.6790 | 0.0231 | 1.2758 | 0.2022 |
| LANUM137 | 3760.3139 | 647.8210 | 0.1120 | 5.8046 | 0.0000 |
| LANUM138 | 1012.4598 | 874.7296 | 0.0211 | 1.1575 | 0.2472 |
| LANUM139 | -942.3907 | 750.5936 | -0.0235 | -1.2555 | 0.2094 |
| LANUM140 | 4936.0149 | 771.9887 | 0.1190 | 6.3939 | 0.0000 |
| LANUM141 | 2566.4836 | 1052.6947 | 0.0437 | 2.4380 | 0.0149 |
| Run with Variables | | | | | |
| (Constant) | -1220.3770 | 358.9517 | | -3.3998 | 0.0007 |
| LANUM001 | 3094.8782 | 546.0673 | 0.0826 | 5.6676 | 0.0000 |
| LANUM002 | -2169.4361 | 663.0079 | -0.0464 | -3.2721 | 0.0011 |
| LANUM003 | -1218.8575 | 592.0853 | -0.0298 | -2.0586 | 0.0397 |
| LANUM004 | 1651.6901 | 664.4626 | 0.0351 | 2.4858 | 0.0130 |
| LANUM005 | 162.5739 | 720.1495 | 0.0032 | 0.2258 | 0.8214 |
| LANUM006 | 1709.1648 | 555.2731 | 0.0451 | 3.0781 | 0.0021 |
| LANUM007 | -323.1967 | 892.8003 | -0.0050 | -0.3620 | 0.7174 |
| LANUM008 | -1010.2771 | 749.0528 | -0.0195 | -1.3487 | 0.1776 |
| LANUM009 | -322.8517 | 746.8543 | -0.0061 | -0.4323 | 0.6656 |
| LANUM010 | 120.7570 | 661.3387 | 0.0026 | 0.1826 | 0.8551 |
| LANUM011 | 428.7964 | 453.1614 | 0.0146 | 0.9462 | 0.3441 |

| | | | | | |
|---|---|---|---|---|---|
| LANUM012 | 1197.6596 | 881.3909 | 0.0187 | 1.3588 | 0.1743 |
| LANUM013 | 5.9741 | 612.1338 | 0.0001 | 0.0098 | 0.9922 |
| LANUM014 | 2008.2082 | 539.4032 | 0.0545 | 3.7230 | 0.0002 |
| LANUM015 | 854.7927 | 571.4560 | 0.0216 | 1.4958 | 0.1349 |
| LANUM016 | 2058.6525 | 448.6401 | 0.0710 | 4.5887 | 0.0000 |
| LANUM017 | 3013.2496 | 433.1445 | 0.1101 | 6.9567 | 0.0000 |
| LANUM018 | 303.1771 | 635.8253 | 0.0068 | 0.4768 | 0.6335 |
| LANUM019 | 63.4628 | 472.1224 | 0.0020 | 0.1344 | 0.8931 |
| LANUM020 | 1991.2252 | 392.1976 | 0.0828 | 5.0771 | 0.0000 |
| LANUM021 | 2344.1046 | 522.2974 | 0.0660 | 4.4881 | 0.0000 |
| LANUM022 | 1808.6820 | 542.0036 | 0.0488 | 3.3370 | 0.0009 |
| LANUM023 | 3798.8299 | 578.4285 | 0.0964 | 6.5675 | 0.0000 |
| LANUM024 | 264.2885 | 681.2252 | 0.0055 | 0.3880 | 0.6981 |
| LANUM025 | 2234.7153 | 715.4107 | 0.0437 | 3.1237 | 0.0018 |
| LANUM026 | 1152.7914 | 427.4092 | 0.0423 | 2.6972 | 0.0071 |
| LANUM027 | 2386.2161 | 705.6914 | 0.0473 | 3.3814 | 0.0007 |
| LANUM028 | 951.6960 | 552.2130 | 0.0251 | 1.7234 | 0.0850 |
| LANUM029 | 1209.8577 | 647.4816 | 0.0264 | 1.8686 | 0.0618 |
| LANUM030 | 1927.9116 | 506.6709 | 0.0611 | 3.8051 | 0.0001 |
| LANUM031 | 1274.0737 | 585.3145 | 0.0315 | 2.1767 | 0.0296 |
| LANUM032 | 1414.2046 | 599.2584 | 0.0340 | 2.3599 | 0.0184 |
| LANUM033 | 2160.7743 | 616.4412 | 0.0503 | 3.5052 | 0.0005 |
| LANUM034 | 2726.0246 | 546.8324 | 0.0726 | 4.9851 | 0.0000 |
| LANUM035 | -178.8382 | 604.9017 | -0.0042 | -0.2956 | 0.7675 |
| LANUM036 | -724.9132 | 623.5091 | -0.0166 | -1.1626 | 0.2451 |
| LANUM037 | 963.4085 | 531.5618 | 0.0266 | 1.8124 | 0.0701 |
| LANUM038 | -2187.7280 | 699.2191 | -0.0451 | -3.1288 | 0.0018 |
| LANUM039 | -2315.3332 | 487.1336 | -0.0767 | -4.7530 | 0.0000 |
| LANUM040 | 1731.1083 | 556.3784 | 0.0460 | 3.1114 | 0.0019 |
| LANUM041 | 407.6803 | 665.6620 | 0.0087 | 0.6124 | 0.5403 |
| LANUM042 | -232.8439 | 528.0022 | -0.0066 | -0.4410 | 0.6593 |
| LANUM043 | 668.6356 | 401.4167 | 0.0269 | 1.6657 | 0.0959 |
| LANUM044 | 816.2119 | 779.5695 | 0.0146 | 1.0470 | 0.2952 |
| LANUM045 | 860.4576 | 642.2009 | 0.0190 | 1.3399 | 0.1804 |
| LANUM046 | 952.8398 | 337.6432 | 0.0504 | 2.8220 | 0.0048 |
| LANUM047 | 1684.9747 | 684.7070 | 0.0347 | 2.4609 | 0.0139 |
| LANUM048 | 1919.3789 | 767.1731 | 0.0348 | 2.5019 | 0.0124 |
| LANUM049 | 1503.0853 | 445.0676 | 0.0520 | 3.3772 | 0.0007 |
| LANUM050 | -143.0958 | 356.8652 | -0.0075 | -0.4010 | 0.6885 |
| LANUM051 | 259.1019 | 526.9026 | 0.0072 | 0.4917 | 0.6230 |
| LANUM052 | 212.2542 | 535.9421 | 0.0058 | 0.3960 | 0.6921 |
| LANUM053 | 298.3219 | 538.5290 | 0.0082 | 0.5540 | 0.5797 |
| LANUM054 | 1498.9381 | 631.6334 | 0.0338 | 2.3731 | 0.0177 |
| LANUM055 | 1485.1960 | 559.3902 | 0.0386 | 2.6550 | 0.0080 |
| LANUM056 | 784.3505 | 585.7221 | 0.0194 | 1.3391 | 0.1807 |
| LANUM057 | 388.3398 | 376.4182 | 0.0171 | 1.0317 | 0.3023 |
| LANUM058 | 1277.0906 | 593.7999 | 0.0310 | 2.1507 | 0.0316 |
| LANUM059 | 1532.3877 | 689.7093 | 0.0312 | 2.2218 | 0.0264 |
| LANUM060 | 1180.4909 | 432.5557 | 0.0424 | 2.7291 | 0.0064 |
| LANUM061 | 1139.1170 | 564.0066 | 0.0293 | 2.0197 | 0.0435 |
| LANUM062 | 210.6750 | 676.1745 | 0.0044 | 0.3116 | 0.7554 |
| LANUM063 | 925.0129 | 409.0149 | 0.0359 | 2.2616 | 0.0238 |
| LANUM064 | 1359.5728 | 400.0562 | 0.0547 | 3.3985 | 0.0007 |
| LANUM065 | 1301.9186 | 389.5455 | 0.0545 | 3.3421 | 0.0008 |

| | | | | | |
|---|---|---|---|---|---|
| LANUM066 | 2454.7528 | 602.3616 | 0.0587 | 4.0752 | 0.0000 |
| LANUM067 | 482.3832 | 415.6364 | 0.0184 | 1.1606 | 0.2459 |
| LANUM068 | 2299.1880 | 531.7926 | 0.0636 | 4.3235 | 0.0000 |
| LANUM069 | 889.7847 | 1455.0630 | 0.0082 | 0.6115 | 0.5409 |
| LANUM070 | 1190.8334 | 386.1292 | 0.0504 | 3.0840 | 0.0021 |
| LANUM071 | 2175.4816 | 576.8664 | 0.0553 | 3.7712 | 0.0002 |
| LANUM072 | 2147.5063 | 349.1447 | 0.1089 | 6.1508 | 0.0000 |
| LANUM073 | 1687.0059 | 387.8292 | 0.0708 | 4.3499 | 0.0000 |
| LANUM074 | 1318.9804 | 417.6399 | 0.0500 | 3.1582 | 0.0016 |
| LANUM075 | 1141.4774 | 399.7307 | 0.0459 | 2.8556 | 0.0043 |
| LANUM076 | 1590.8983 | 619.8014 | 0.0367 | 2.5668 | 0.0103 |
| LANUM077 | 1188.1086 | 446.5849 | 0.0413 | 2.6604 | 0.0079 |
| LANUM078 | -20.3634 | 594.3303 | -0.0005 | -0.0343 | 0.9727 |
| LANUM079 | 1115.0285 | 800.5984 | 0.0193 | 1.3927 | 0.1638 |
| LANUM080 | 1592.9777 | 723.0699 | 0.0308 | 2.2031 | 0.0277 |
| LANUM081 | 3692.0363 | 760.3628 | 0.0676 | 4.8556 | 0.0000 |
| LANUM082 | 1790.2032 | 772.8456 | 0.0323 | 2.3164 | 0.0206 |
| LANUM083 | 1438.4830 | 771.7585 | 0.0260 | 1.8639 | 0.0625 |
| LANUM084 | 1543.6980 | 715.2640 | 0.0303 | 2.1582 | 0.0310 |
| LANUM085 | 2498.4695 | 705.5671 | 0.0496 | 3.5411 | 0.0004 |
| LANUM086 | 1249.8563 | 715.2630 | 0.0244 | 1.7474 | 0.0807 |
| LANUM087 | 524.7212 | 431.6439 | 0.0189 | 1.2156 | 0.2243 |
| LANUM088 | 1196.7493 | 685.9937 | 0.0245 | 1.7445 | 0.0812 |
| LANUM089 | -945.3921 | 721.5324 | -0.0188 | -1.3103 | 0.1903 |
| LANUM090 | 2834.2037 | 611.6432 | 0.0676 | 4.6338 | 0.0000 |
| LANUM091 | -753.5661 | 620.6747 | -0.0180 | -1.2141 | 0.2248 |
| LANUM092 | 3011.6459 | 789.1044 | 0.0547 | 3.8165 | 0.0001 |
| LANUM093 | 1379.0931 | 741.7304 | 0.0273 | 1.8593 | 0.0631 |
| LANUM094 | 5319.5282 | 809.9314 | 0.0915 | 6.5679 | 0.0000 |
| LANUM095 | 1768.1750 | 601.8392 | 0.0439 | 2.9380 | 0.0033 |
| LANUM096 | 1599.9307 | 581.2006 | 0.0404 | 2.7528 | 0.0060 |
| LANUM097 | 1358.4585 | 610.8523 | 0.0332 | 2.2239 | 0.0263 |
| LANUM098 | -3414.4731 | 665.1422 | -0.0800 | -5.1334 | 0.0000 |
| LANUM099 | 4609.4922 | 639.6453 | 0.1042 | 7.2063 | 0.0000 |
| LANUM100 | 7202.4770 | 842.0155 | 0.1223 | 8.5539 | 0.0000 |
| LANUM101 | -2523.5918 | 658.6126 | -0.0546 | -3.8317 | 0.0001 |
| LANUM102 | 3283.6180 | 530.1608 | 0.0915 | 6.1936 | 0.0000 |
| LANUM103 | 676.8129 | 605.9239 | 0.0160 | 1.1170 | 0.2641 |
| LANUM104 | -1105.7128 | 587.4266 | -0.0281 | -1.8823 | 0.0599 |
| LANUM105 | 883.2559 | 546.7331 | 0.0236 | 1.6155 | 0.1064 |
| LANUM106 | 1275.6251 | 506.7648 | 0.0379 | 2.5172 | 0.0119 |
| LANUM107 | 378.2974 | 551.2777 | 0.0102 | 0.6862 | 0.4927 |
| LANUM108 | 3809.8847 | 557.0361 | 0.1013 | 6.8396 | 0.0000 |
| LANUM109 | 4918.5692 | 640.6986 | 0.1147 | 7.6769 | 0.0000 |
| LANUM110 | 753.3054 | 629.4901 | 0.0172 | 1.1967 | 0.2316 |
| LANUM111 | 145.6965 | 611.9659 | 0.0034 | 0.2381 | 0.8118 |
| LANUM112 | 821.5370 | 580.9394 | 0.0206 | 1.4142 | 0.1575 |
| LANUM113 | 1362.6428 | 631.6235 | 0.0316 | 2.1574 | 0.0311 |
| LANUM114 | 2837.7329 | 756.9233 | 0.0523 | 3.7490 | 0.0002 |
| LANUM115 | 1318.1633 | 673.8839 | 0.0277 | 1.9561 | 0.0506 |
| LANUM116 | -2218.2678 | 548.6521 | -0.0621 | -4.0431 | 0.0001 |
| LANUM117 | 944.1021 | 714.9230 | 0.0186 | 1.3206 | 0.1868 |
| LANUM118 | 1834.6994 | 609.0852 | 0.0439 | 3.0122 | 0.0026 |
| LANUM119 | 825.9421 | 798.7086 | 0.0143 | 1.0341 | 0.3012 |

| | | | | | |
|---|---|---|---|---|---|
| LANUM120 | 2409.2741 | 352.8853 | 0.1199 | 6.8274 | 0.0000 |
| LANUM121 | 1302.5530 | 389.8665 | 0.0545 | 3.3410 | 0.0008 |
| LANUM122 | 2102.3326 | 505.0174 | 0.0617 | 4.1629 | 0.0000 |
| LANUM123 | 1802.5623 | 759.9064 | 0.0330 | 2.3721 | 0.0178 |
| LANUM124 | 1374.7081 | 777.7877 | 0.0245 | 1.7675 | 0.0773 |
| LANUM125 | 2244.0729 | 331.7823 | 0.1229 | 6.7637 | 0.0000 |
| LANUM126 | 3162.9124 | 668.2647 | 0.0667 | 4.7330 | 0.0000 |
| LANUM127 | 821.9585 | 644.6471 | 0.0182 | 1.2751 | 0.2024 |
| LANUM128 | 740.9268 | 453.5026 | 0.0250 | 1.6338 | 0.1025 |
| LANUM129 | 2764.7290 | 632.3448 | 0.0621 | 4.3722 | 0.0000 |
| LANUM130 | 767.5109 | 464.4001 | 0.0252 | 1.6527 | 0.0985 |
| LANUM132 | -496.1764 | 552.8693 | -0.0130 | -0.8975 | 0.3696 |
| LANUM133 | 3505.8369 | 454.1345 | 0.1182 | 7.7198 | 0.0000 |
| LANUM134 | 1403.0758 | 428.1813 | 0.0515 | 3.2768 | 0.0011 |
| LANUM135 | 1913.6761 | 445.5435 | 0.0661 | 4.2951 | 0.0000 |
| LANUM136 | 2129.9599 | 716.3035 | 0.0416 | 2.9735 | 0.0030 |
| LANUM137 | 2150.9496 | 500.2847 | 0.0641 | 4.2995 | 0.0000 |
| LANUM138 | 1922.5377 | 674.3738 | 0.0402 | 2.8508 | 0.0044 |
| LANUM139 | 31.4457 | 578.7265 | 0.0008 | 0.0543 | 0.9567 |
| LANUM140 | 3754.0054 | 597.2768 | 0.0905 | 6.2852 | 0.0000 |
| LANUM141 | 1558.9828 | 811.8164 | 0.0265 | 1.9204 | 0.0549 |
| ISJSA_FF | 872.8624 | 3508.8831 | 0.0162 | 0.2488 | 0.8036 |
| ISKIDS3A | 17347.1912 | 1813.2841 | 0.6737 | 9.5667 | 0.0000 |
| Children with LLTI | 25412.3412 | 7974.5229 | 0.0808 | 3.1867 | 0.0015 |
| Reset Test Run | | | | | |
| ISJSA_FF | -5062.9039 | 3489.7557 | -0.0942 | -1.4508 | 0.1470 |
| ISKIDS3A | 7289.7605 | 2062.1303 | 0.2831 | 3.5351 | 0.0004 |
| Children with LLTI | 29658.5562 | 7817.5635 | 0.0943 | 3.7938 | 0.0002 |
| RESETEX4 | 0.0001 | 0.0000 | 0.5739 | 9.5776 | 0.0000 |

Dependent Variable: NUNITC2R

REFERENCES


Aldgate, Jane and Stratham, June (2001) *The Children Act now: messages from research.* Stationery Office, London, UK

Beecham, J. (2000) *Unit Costs: Not Exactly Child's Play.* Joint publication from the Department of Health, Personal Social Services Research Unit and Dartington Social Care Research Unit.

Cleaver, H., Unell, I. and Aldgate, J. (1999) *Children's needs - parenting capacity: The impact of parental mental illness, problem alcohol and drug use, and domestic violence on children's development*, Stationary Office, London, UK

Jonathan Dickens, Darren Howell, June Thoburn and Gillian Schofield (2005) , *Children Starting to be Looked After by Local Authorities in England: An Analysis of Inter-authority Variation and Case-centred Decision Making*, British Journal of Social Work Volume 37, Number 4, Pp. 597-617

Hardiker, P., Exton K. And Barker M. (1991) *The Social Policy Contexts of Prevention in Child Care*, British Journal of Social Work Volume 21, Number 4, Pp. 341-359

Kirton, D.(1995). *`Race', identity and the politics of adoption*. Working Paper 2, Centre for. Adoption and Identity Studies, University of East London. ...

Kirton D., Beecham J. and Ogilvie K. (2003) *Remuneration and performance in foster care*, University of. Kent at Canterbury

Moss P., Stratham J. and Dilton J. (2000), *The 'child in need' and 'the rich child': discourses, constructions and practice*, Critical Social Policy, Vol 20, No.2, pp.233-254

Selwyn, J., Sturgess, W., Quinton, D. and Baxter, K. (2004) *Costs and Outcomes of NonED-Infant Adoptions*, Bristol: Bristol University

Stone & Galbraith (2005) *How not to fund hospital and community health services in England*, J.Roy.Statist.Soc.A, vol. 169, pp 143-164

Tunstill Jane (2000) *Services for children in need from policy to practice*
Studies in evaluating the Childrens Act 1989, 167

Ward, H., Holmes, L., Soper, J. and Olsen, R. (2004) *The Costs and Consequences of different types of Child Care. Report to the Department of Health*. Loughborough: CCfR Loughborough University;

Ref: DCSF-RW007



**www.dcsf.gov.uk/research**

Published by the Department for
Children, Schools and Families

department for
children, schools and families