Parental income and child outcomes: what can we learn from material deprivation?

Alissa Goodman and Michal Myck, Institute for Fiscal Studies[1]

Draft, 4th March 2005.

1. Introduction

Since the Government put reducing child poverty at the centre of its domestic policy agenda since 1999, it has introduced a programme of very big increases in benefits and tax credits for families with children. Although such increases almost by definition help the Government to meet its proximate policy aims, namely to reduce income-based measures of child poverty, by a quarter relative to a 1998-99 baseline by 2004-05, and by one half by 2010-11, it remains an open question whether, and how much these financial transfers will have affected other, possibly more meaningful, measures of well-being, besides income.

One measure of well-being, much favoured in social-policy circles, and recently introduced as part of the DWP's new official measure of child poverty is *material deprivation*. This note sets out what we learn about the relationship between family income and material deprivation from a panel of lone parents constructed from 5 waves of the Family and Children Survey (FACS). In addition we consider how material deprivation and family income are related to another aspect of well-being, again within lone-parent families, namely, parent and child health.

Analysis of poverty in the UK has been recently enriched by material deprivation information in several surveys including the Poverty and Social Exclusion Survey (PSE), the British Household Panel Survey (BHPS), the Families and Children Survey (FACS), and most recently, the Families' Resources Survey (FRS). This paper examines the relationship between income, material deprivation and self-reported health using FACS data, since this gives us both a 5 year panel, and relatively large samples of families with children. The FACS data (collected annually since 1999), includes a section on 'hardship' with a list of questions asking respondents whether they own specific items identified by a majority of the population as 'necessities' (for the rest of this paper we shall refer to these as 'hardship questions').

Information on material deprivation such as this is often collected as an alternative basis for measuring poverty, and poverty measures based on this type of information are often referred to as "consensual" poverty measures. The principal idea of

[1] This project has been funded by Her Majesty's Treasury Evidence Based Policy Fund in conjunction with the Inland Revenue, Department for Education and Skills, the Department of Work and Pensions, and the Department of Media, Culture and Sport, and is very gratefully acknowledged. We would also like to thank Laura Blow, Mike Brewer, Ian Walker and Frank Windmeijer for very useful discussions.The usual disclaimer applies.

Townsend's original work (1979) on this way of measuring poverty was that there is a set of consumption items which are considered essential, or in Townsend's words "customary, or at least widely encouraged and approved". Absence of these items from the consumption basket was to be a reflection of deprivation. The greater was the number of items which an individual or family did not consume the greater was their degree of deprivation.

Although the approach can be criticised on the grounds that ownership of specific items may be as much a product of preference as of choice (see McKay, 2004), deprivation indices have the advantage of giving us some idea of what the material *consequences* of given income levels, or changes in incomes might be, for example, whether or not a child is adequately fed our housed. In this sense, they give us a measure of child outcomes that could be affected by government policies to increase the incomes of families with children.

Another particular advantage of deprivation indices is that they are likely to provide a better indication of the longer-run resources available to a family than most measures of current income. While for some people current income may correctly reflect their long-run financial situation, for many it will fail to account for financial uncertainties, as well as past income variation and expectations of income levels in the future[2].

In this paper we do not use the hardship questions to identify which families are in poverty, or not. Instead we construct an index of hardship, based on the number of items a family lacks, weighted according to the general prevalence of ownership of that item across the population as a whole. We then examine how changes in income affect material deprivation, and how material deprivation and income, in turn, affect parent and child health.

One strength of our analysis lies in our use of panel data. Since family income may be correlated with many unobserved factors, which are also associated with higher (or lower) deprivation, any estimates of the relationship between income and deprivation which do not take this into account are likely to be biased. We exploit the fact that we can use multiple observations on the same families, by using data from five waves of the Families' and Children's Survey (1999-2003), in order to control for time-invariant family fixed effects which might affect both family income and material deprivation. Our focus is on lone parent families as only for this type of families FACS is a representative survey over the five waves and because for lone parents incomes information is more reliable than for couples. However, lone parents are also of particular policy interest, since they make up a disproportionate number of the child and family poverty count, relative to their incidence in the population.

We show that deprivation, as summarised in our measure, is negatively correlated with income, i.e. as income goes up, deprivation goes down. In addition, deprivation is lower for the working population over and above the contribution of income which results from employment, and for home-owners relative to those who live in rented accommodation. This result is not very surprising and it confirms the results of Berthoud, et al. (2004) who used a different measure of material deprivation. Our analysis goes further than Berthoud in that having confirmed these relationships we then go to argue that we can use material deprivation as a proxy for long-term financial status and use it to analyse how long-term/permanent income affects other

[2] Consumption data may also be valuable in approximating long-run financial circumstances, but complete consumption information is often not available to the researcher, especially in panel data.

dimension of quality of life. Analysis of the consequences of deprivation shows a very strong relationship between health status and deprivation. Our material deprivation measure contributes substantially to the explanation of variation in health status of both parents and children. The explanatory power of our estimations improves significantly when the measure is included in health status regressions alongside current disposable income.

Section 2 provides some views on how hardship information should be used in the analysis of deprivation, defines a summary measure of deprivation which we use in the rest of the paper and briefly describes the data used for the estimations. Results from estimating the relationship between determinants of deprivation and its consequences are presented in section 3. Section 4 concludes.

2. Hardship questions and material deprivation in FACS

As stated in our introductory section, we do not use material deprivation scores to separate the population out into poor or non-poor (for an example of work which does this, see Gordon et al, 2000). Instead we follow Desai and Shah (1988) by constructing an index of deprivation, which we then use to investigate how changes in parental income affect this particular measure and how deprivation, as summarised in the measure relates to parental and child health.

In most recent surveys, including FACS and FRS, respondents are asked to state if they do not have or consume an item because they do not 'need' it or because they 'cannot afford' it. It is therefore possible to distinguish between 'unenforced hardship' and 'enforced hardship' (respectively). This type of distinction can help us distinguish between those who are financially constrained and those who just have different preferences than people who have a specific item. This is a crucial distinction, though as we demonstrate elsewhere, and other authors have also commented on, it is not obvious if measures constructed on the basis of 'enforced hardship' definition are as meaningful as one might desire (see Myck, 2005, and McKay, 2004).

In analysing hardship information the principal issues for the researcher are the choice of items to be included on the list of 'necessities' and the method of aggregating them into a measure of deprivation. The first step in this procedure was carried out as part of the design of the FACS questionnaire, so we do not have any scope for altering these (although we are able to focus on subsets of the necessities if we choose to). However we are able to devise a methodology to combine the responses to the 34 hardship questions contained in the FACS questionnaire (see table A2 in the Appendix for a full list of these) in order to construct a continuous deprivation scale.

2.1. Constructing a material deprivation measure from hardship questions

Formula (1) is a general representation of how hardship information can be aggregated into a deprivation index Π:

$$\Pi_{it} = \frac{\sum_{h=1}^{H} hard_{it}^{h} * (1 - \pi_{ht})}{H} \tag{1}$$

where the dummy *hard* for *H* hardship questions selected for inclusion in the index is weighted by weight $(1-\pi_{ht})$; *hard* takes value 1 if a family is in hardship with respect to good *'h'*, indicator *'i'* identifies the family, and *'t'* the time when information is collected. Dividing the weighted sum of hardship items for each family by the number of hardship questions normalises the measure so that it takes values from 0 to 1, where 0 means 'not in hardship' and 1 means 'extreme hardship'.[3] Such representation is very flexible and leaves a lot to be specified. First of all there is the choice of items *H* to be included in the index, secondly there is the issue of whether we want to analyse enforced or unenforced hardship, and then there is the question of weights to be applied in the aggregation.

From the point of view of formula (1) Townsend's (1979) original index was constructed by using hardship questions identifying unenforced hardship, and the weight applied to each of them was 1. Since enforced hardship can be identified from FACS questions we shall assign value 1 to *hard* if family *'i'* does not have a given item, would like to have it and cannot afford it. To minimise the degree of arbitrariness in the construction of our deprivation measure we use all 34 hardship questions from the FACS hardship list. Applying weights in the aggregation procedure is to allow for different contributions to the index by different hardship items. It seems most natural that the weights should relate either to:

- deprivation nature of item *'h'* (it seems natural to think that the more people are in hardship with respect to a given item, the less deprived a family is without it)
- value of item *'h'* (i.e. if a family is in hardship with respect to a cheap item they are more deprived than if they are in hardship with respect to an expensive item)

In our analysis we apply the first of the above options and use the proportion of single parents who do not have item *'h'* as (π_{ht}). Note therefore that we use the proportion which is 'observable' by a given family. For the purpose of weighting the index this in our view is preferred to using the proportion of single parents who are in enforced hardship with respect to a given item. People's preferences are not directly observed and we think that the deprivation nature of hardship items relates to how well off people are relative to what they can judge about the reference group they compare themselves to. This weighting process implicitly assumes that '*people feel more deprived if they see many more haves than have nots for any event, when they are among the have nots themselves*' (Desai and Shah, 1988).

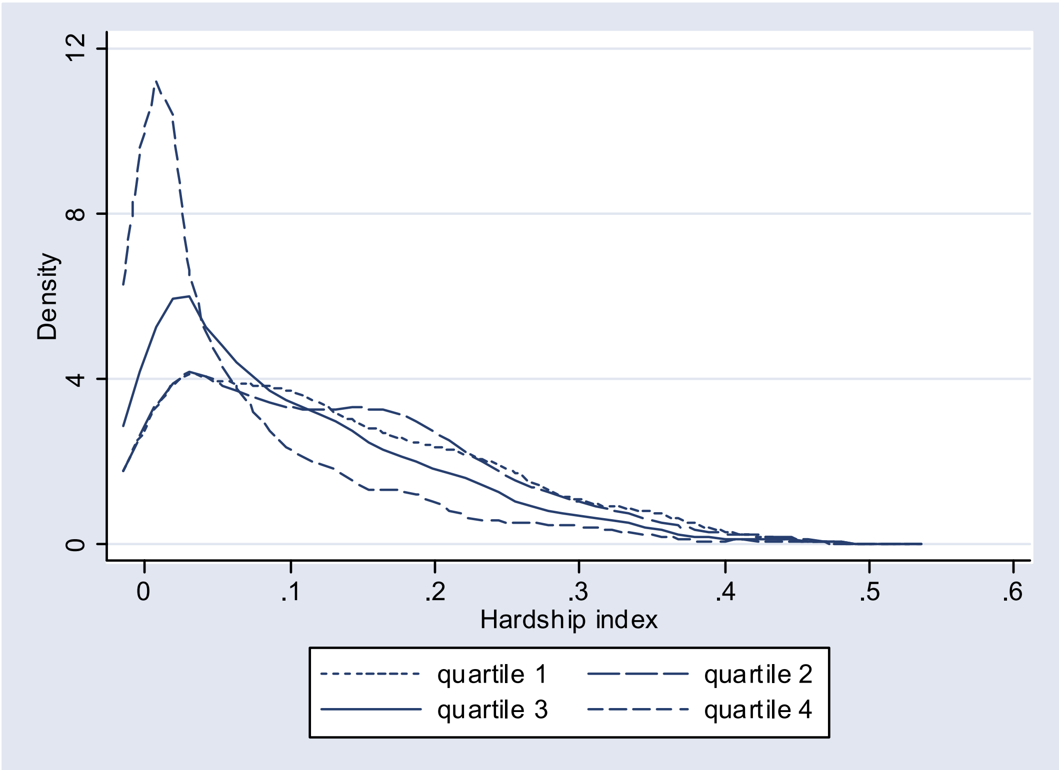
The way we construct our deprivation index (sometimes referred to as the 'relative measure of hardship status') a family can become more or less deprived from one wave of FACS to another, even though the number of items they cannot afford does not change between the surveys. For this to happen it is enough that the items this family cannot afford become more or less common in the population. It is important to stress that our aim here is not to construct a measure which will help us 'identify' who is deprived and who is not. Instead we want to generate a sensible method to capture the degree of deprivation, to be able to analyse how deprivation changes in time, to determine the driving forces of these changes and examine some consequences of deprivation.

Our measure of hardship has thus the following features:

[3] Precise interpretation of the measure will depend on the weights we use in construction of the index.

- It is based purely on hardship questions in which people are asked if they can afford a consumption item on the list or not.
- It does not include other 'dimensions' of deprivation, such as 'worrying about money' or debts, though if availability of 'necessities' reflects deprivation then it should also effectively 'contain' information about financial problems and constraints.
- It takes account of the deprivation nature of each item, in that the weight assigned to each item relates to the proportion of people who have it – the higher is the proportion of people who have the good, the more inability to afford it contributes to the measure.
- It is a continuous measure which, given the availability of panel hardship data, will facilitate the use of panel data techniques to analyse the problem.

Figure 1. Income and deprivation index – index density by income quartiles.



In figure 1 we show the distribution of our deprivation index for each of four income quartiles in the data. As we would expect the distribution of the index is most skewed towards zero for the 4th quartile and slightly less for the 3rd quartile. However there seems to be very little difference in the distribution of the deprivation index between families in the bottom two quartiles.

2.2. FACS structure and information on hardship

The FACS data set has been collected since 1999 and was originally intended to provide information on lower and moderate-income families. In the first wave of the survey (initially called SOLIF – Survey of Low-Income Families) a screening procedure was implemented as a result of which the first two waves of the survey are not representative for couples.[4] However, all lone parents were included in the

[4] For details of the screening procedure see for example Marsh et al. (2001).

survey, and so the lone parents sample has been representative from the start. This is the principal though not the only reason why we shall focus our analysis on lone parents. In addition to the survey screening procedures information on financial resources of the families seems much more reliable for lone parents, and this information is crucial from the point of view of our analysis. [5]

Table 1. FACS lone parents sample, summary statistics.

	Full sample	Wave 1	Wave 5
Number of observations	8338	1704	1378
Proportion of men	3.7%	3.8%	3.3%
Proportion receiving in-work support (FC/WFTC/NTC)	28.1%	20.6%	35.5%
Proportion employed	46.3%	41.1%	50.5%
Proportion declaring health status as 'good'	56.3%	54.3%	59.7%
Average (standard deviation in parenthesis):			
Age	34.7 (8.4)	34.1 (8.0)	35.3 (8.4)
Number of dependent children	1.7 (0.9)	1.8 (0.9)	1.7 (0.8)
Weekly equivalised family disposable income*	£233.90 (£161.90)	£198.70 (£91.30)	£263.30 (£162.00)
Weekly unequivalised family disposable income*	£228.70 (£185.20)	£195.80 (£116.80)	£256.00 (£195.70)
Deprivation index	0.110 (0.101)	0.131 (0.099)	0.088 (0.096)

Source: FACS data. Selected sample.
Notes: * - September 2000 prices.

Our sample includes lone parents from all five waves of FACS. We exclude those aged over 55, the lone parents after they find a partner (and become couples) and those for whom we have missing incomes or hardship information. To allow for application of the fixed effects panel estimator we include only those lone parents who are observed at least twice over the period of five years. We thus create a panel dataset in which we have 8,338 observations on 2,399 lone parents. Table A1 in the Appendix shows the breakdown of these lone parents by the waves they are observed in. Over 850 lone parents are observed throughout the FACS panel. In table 1 we present some summary statistics for our sample. Only about 4% of the sample are male, and the average age of parents in the sample is 34.7. In wave 1 the average equivalised weekly disposable income is just below £200, and it is about 30% higher in real terms in wave 5. The average proportion of single parents receiving FC/WFTC/NTC[6] is around 28% but it grows from 21% to 36% between waves 1 and 5.[7] Growth in employment among single parents between waves 1 and 5 is also high. The proportion of single parents in work rises from 41% to 51% between the 1999 sample and the 2003 sample. At the same time our deprivation measure falls by a third from 0.13 to 0.09.

[5] The principal reason why the quality of incomes data for couples is worse than for lone parents is due to proxy answers by one partner about the income of the other.
[6] These are the main sources of in work support to lone parents in operation over the period, namely Family Credit, Working Families Tax Credit and what we refer to as the New Tax Credits (see footnote below).
[7] New Tax Credits were already in place when Wave 5 information was collected. The figure for wave 5 is therefore based on NTC receipts. Individuals receiving the Working Tax Credit and the Child Tax Credit as well as those who receive only the Child Tax Credit and are working more than 16 hours per week are considered as being in receipt of in-work support.

In Section 3 we present analysis of the relationship between our deprivation index and current income and then look at how current income and the deprivation index contribute to the explanation of another reflection of people's wellbeing – their self reported health status.

3. Income, deprivation and health

In this section we present results of analysis of determinants and consequences of material deprivation as measured in our deprivation index. The FACS sample of single parents is used to demonstrate how income correlates with material deprivation and how important the latter is in explaining the health status of parents and children. In the analysis of both the determinants and the consequences of hardship we use the random and fixed effects estimators, facilitated by the panel structure of FACS. Random effects estimators improve the estimation (relative to the simple OLS analysis) by taking account of unobserved within family correlation. Fixed effect estimators use differences from within-family mean values to identify effects of regressors. This allows to account for the bias in the random effects specifications resulting from omitted variables which are time-invariant.

3.1. Current income and material deprivation

The first relationship we estimate is that between the deprivation index and income and we analyse if and how material deprivation varies with current family income. Apart from income the regressors include: FACS wave indicator to control for time effects, age of respondent, education dummy variables, a dummy variable for being employed, a dummy for home ownership, dummies for having two children and for having more than two, a dummy indicating if the youngest child is below school age (below 5) and a dummy for being male. The first two specifications in table 2 show the difference between including income represented by a series of dummies indicating what quartile of the distribution the family falls in, and income in levels and income squared in the regression. The specification in the latter case is more appropriate for fixed effects estimation, and we therefore include income in this form in the other specifications. Specification 3 is a random effects estimation with the full set of coefficients, and we run the corresponding fixed effects regression as specification 4. In fixed effects estimations (i.e. estimations in differences from means) the coefficient on the male dummy and on education dummies cannot be estimated since they do not change over the period of the panel, and we cannot estimate the effect of age since in differences from means age and time effects are perfectly collinear.

Specification 1 and 2 are random effect estimations and confirm that material deprivation falls with time (wave) and is negatively correlated with current family income. Non-linearity of the effect of income (specification 2) should not be surprising as we would expect income to have greater effect on deprivation at the lower end of the income distribution (this relationship is confirmed in other studies on income and deprivation, see for example Berthoud, et al. (2004)). In addition to that, both specifications confirm that having more than one child and having a child aged below 5 increases the degree of deprivation[8]. Specification 3 includes other regressors and

[8] Alternative specifications we have considered include using equivalised income to take into account the effect of family size and composition on the call for resources; alternatively we also plan to interact income with the family size and child age variables.

suggests that education above the minimum school leaving age reduces and that employment has a further reducing effect on the level of deprivation, over and above income, which is of course correlated with both education and employment status. Conditional on other factors lone fathers have lower values of the deprivation index than lone mothers. Higher age seems to increase the level of deprivation. When we control for all the additional characteristics the effect of income is still significant though only about half the magnitude when compared to specification 2.

In order to move beyond discussing the statistical associations between these variables, and towards an understanding of whether changes in income (and other variables) are likely to *cause* changes in deprivation, we need to use more sophisticated estimation techniques.

Ideally, we would like to be able to exploit some form of exogenous variation in income in order to identify the effects of changes in income on material deprivation (see Blow, et. al, 2004); However, although some of the large increases in benefits to families with children could be argued to be exogenous (i.e. accrue to lone parents independently of any choices that they make, particularly with regard to the deprivation score of the family), it remains to future work to explore how we might exploit the exogenous nature of these changes in the form of a natural experiment in order to identify unbiased income effects.

An alternative estimation strategy is to *difference out* the effects of unobserved factors that determine both income and deprivation in order to obtain unbiased estimates of the income effects. In an ideal situation, we could use differences in outcomes between siblings in the same families, who may - due to parental income changes over time - experience different family income at the same age. However the structure of the FACS survey does not allow us to do this, since unfortunately we cannot distinguish separate outcomes for different siblings within the same family (on the other hand, the assumptions underlying the validity of this approach may well be questionable, see Blow et al op. cit).

However we are able to exploit the panel nature of the data in FACS to improve our estimates of the effects of income on material deprivation, by using fixed effects estimation (specification 4). The advantage of using fixed effects is that the estimation corrects for any bias resulting from the presence of time-invariant family fixed effects which might determine both family income and material deprivation; These fixed effects might include characteristics such as responsibility and foresightedness, and might also include parental preferences for work, leisure, and the consumption items contained in the hardship index. There is no reason to suppose that people's preferences would enter this equation linearly, but if we were prepared to make such an assumption, then, provided that preferences are fixed in time, the fixed effects estimation would also help us in reducing the bias of the estimated effect of income on deprivation. For example if we represent preferences in the equation by 'the degree of satisfaction from material possessions', Ω, then it is likely that this omitted variable would be correlated both with current income and with the deprivation index. In this situation the coefficient on income in the random effects estimation would be negatively biased (given positive correlation of Ω with income and its negative correlation with the deprivation index).

Such correlation seems to be confirmed in specification 4. The estimated effect of income on the deprivation index is smaller than in specification 2, suggesting that the omitted variables were leading us to overstate the negative effect of income on deprivation, or in other words creating a negative bias on our income coefficient in the random effects estimation. Comparing specification 2 and 3 there is also a reduction in the effect of being employed and having a house on deprivation, which once again is consistent with the omission of Ω creating a negative bias on our income estimate.

3.2. Material deprivation and health

In the section above we considered the relationship between current income and material deprivation, effectively considering material deprivation as an outcome for families with children. In this section we focus on a different outcome, namely parent and child health.

There is a wide literature which shows that there are strong associations between low income and poor health; much recent work, particularly from the US and Canada, but now also from the UK, shows that this link originates early in childhood (see Case et al 2003, Propper et. al 2004, Currie and Stabile, 2002, Shields et al, 2004); within this literature there is also a very lively debate on whether this relationship exists primarily because low income generates poor health, whether poor health leads to low income, or whether instead there is instead some unobserved 'third factor' which primarily explains the association between the two (of course it is perfectly plausible that it is some combination of these three that explains the association).

Children are an interesting case in this regard, since the possible causal connection between a child's health and his or her subsequent household income is much less clear cut than for adults: a child cannot, for example, except under very unusual circumstances, reduce his or her labour supply in response to poor health, and thereby directly reduce his or her income. This could suggest that any estimated relationship between low income and poor health amongst children would not be primarily due to the effects of poor health on low income, but instead originate from the other two channels spelled out above. However it is important to remember that there may also be indirect effects child health on household income, for example through the parents' labour supply– since a parent may need to spend more time caring for a sick child, and hence leading to lower household income.

In this section we contribute to this debate by presenting estimates of the effect of income and deprivation on health. Our measure of deprivation is very helpful in this context since we may think of it as a proxy for long-run, or permanent income, allowing us to distinguish between permanent and transitory income effects on child and adult health. We use simple linear probability models run on health dummy variables which take value 1 if people self report 'good' health status and run models for parental health and health status of the eldest child. [9]

As in the case of estimations presented in section 3.1 we use both random and fixed effects estimators. [10] There may be important unobserved fixed effects which are correlated with income, deprivation and health (the 'third factors' referred to above), so the fixed effects estimation seems especially important in this context. However this estimation approach does not deal with the endogeneity of income and deprivation with respect to health due to the other two channels referred to above. In future work we hope to further exploit the exogenous nature of some of the income

[9] Concerning their own and their children's health status respondents choose between: 'good', 'fairly good' and 'not good'. Children's health status is assessed by their parents.
[10] Literature using self-reported health status often uses ordered probit estimation to differentiate between the different types of response. Here we only present linear probit estimates which can be applied to the panel structure of the data.

changes experienced by lone parents over this time to deal with this issue more completely.

Results of estimating the effect of income and deprivation index on parental health are presented in table 3. The first specification regresses a dummy variable indicating reported 'good' health on income, income squared, the wave indicator, the dummy for being male and on age. Income seems to be significantly, positively correlated with health status, health seems to improve with time, although health worsens with age. Lone fathers seem to be healthier than lone mothers (or at least are more likely to report 'good' health). The effect from specification 1 basically carry through to specification 2 which controls for such characteristics as number of children, age of the youngest child, education and house ownership.[11] It suggests that better education is positively correlated with 'good' health over and above the effect of income it might imply. Specification 4 is also a random effects estimation but we now include the deprivation index among the regressors. Two findings are most striking. First of all when we control for material deprivation current income no longer comes out as a significant correlate of health status. The estimated effects of current income on health are still positive but no longer statistically significant. Most other coefficients are to a large degree unaffected by adding the deprivation index to specification 3. Another thing to note is that the R2 almost doubles (!) when we add material deprivation suggesting that deprivation has a very high explanatory power over health status.

Specifications 3 and 5 are fixed effect estimations corresponding to specifications 2 and 4. Once again we cannot identify the effect of gender and education, and cannot separate out the effect of age from the effect of time. The fixed effects estimation without the deprivation index (specification 3) has extremely low explanatory power and in fact we cannot reject the hypothesis that the regressors are jointly statistically insignificant. Adding material deprivation index, once again has a strong effect on the explanatory power of the estimated equation, and deprivation index comes out as a significant determinant of health status (with the expected negative sign). It is interesting to note that in both fixed effects specifications current income has a negative effect on health (though it is not statistically significant). One of the possible interpretations of these findings is that, conditional on long-term income (which we believe to be reflected in the deprivation measure), current income is an insignificant determinant of health.

In table 4 we present results of estimating the effect of income and deprivation on health status of the eldest child in the family. The estimation of the effect on children's health can only be conducted on data from waves 3-5. The sample is further reduced by the fact that information on some children cannot be identified across waves which leaves us with 3826 observations (1467 families) for the child regressions. One problem with identifying determinants of children's health is the fact that almost 80% of parents in the sample assess their children's health as 'good'. there is therefore very little variation in the sample which would allow to identify the coefficients precisely. For this reason we only present regressions based on a specification which includes just income and wave indicator, to which we then add the deprivation index in specifications 3 and 4. In specification 1 and 3 (random effects) we find that current income has a positive effect on child's health status, though in both specifications this effect is not statistically significant. In specification 3, in which we include the deprivation index, we once again find that it is a much stronger determinant of health than current income, the coefficient on the deprivation

[11] We exclude employment status from the equations as this is very likely to be endogenous to health.

index is negative and is statistically significant at 1%. Once again the R2 increases substantially after adding the deprivation index to the regression.

Fixed effect estimations produce surprising results concerning the effect of current income on child's health. In both specification, 2 and 4, income comes through as a significant determinant of children's health, but income is *negatively* correlated with health. In specification 4 the effect of material deprivation is not statistically significant, but it's sign is negative (as we would expect). We must note here that only in specification 3 could the hypothesis of joint insignificance of the regressors be rejected. This is due to the high correlation of the deprivation index with child's health status in the random effects specification. It is interesting that in the random effects specification material deprivation, as summarised in our deprivation index, contributes much more to explaining the variation in health levels than current income. It should perhaps not be surprising, though, since material deprivation will correlate with health both indirectly (i.e. like income) by being a proxy for the long-term budget constraint, and directly by being a summary measure containing information on living conditions and diet.

The finding that current income affects health negatively may require further analysis though it seems that there may be some satisfactory explanations of it. For example higher current income (compared to the long-run norm) which resulted from working more may lead to less time spent with children, and the worsening in their health; or alternatively given that the child health variables are parent—reported, greater parental concern that they might be neglecting their child's health.

4. Conclusion

The level of material deprivation, as measured by a deprivation index we proposed, among single parents in the FACS survey has been falling. This fall has been determined by increases in income and increased employment levels among single parents have contributed to the fall in deprivation over and above the current income changes related to higher proportion of lone parents in work. The last finding is consistent with the idea that the consumption level (which has its reflection in our material deprivation measure) reacts not only to changes in current disposable income but also to changed perception of income levels in the future (or indeed past accumulated wealth). Thus material deprivation seems to contain some additional information about a family's financial well-being, over and above the information summarised in the level of current disposable income.

Similar conclusions follow from our analysis of the relationship between material deprivation and health. Health level most certainly depends on the long-run financial situation and thus it should come as no surprise that material deprivation information contributes substantially to the explanation of variation in health. It is interesting that when we control for long-run income through our material deprivation measure, current income is no longer a significant explanatory factor in adult or child health status. Our results also suggest that unobserved family effects also account for much of the observed relationship between income and health.

It seems that there is still a lot to do in terms of developing a methodology for analysis of material deprivation which would be consistent with economic theory and guided by stricter 'scientific' rules. It seems clear however that if used properly material deprivation information could usefully assist the analysis of poverty based solely on family incomes.

References:

Berthoud R., M. Bryan and E. Bardasi (2004) The dynamics of deprivation: the relationship between income and material deprivation over time, *DWP Research Report* 219, CDS: Leeds.

Blow, L., Goodman, A., Kaplan, G, Walker, I, and Windmeijer, F. (2004), How Important is Income in Determining Children's Outcomes? – A Review of Econometric Approaches, Report to HM-Treasury's Evidence Based Policy Fund.

Burgess S., Propper, C. and Rigg, J. (2004) The Impact of Low Income on Child Health: Evidence from a Birth Cohort Study, *CASE Paper 85*, May 2004.

Case, A., Lubotsky, D. and Paxson, C. (2002), Economic Status and Health in Childhood: The Origins of the Gradient, *American Economic Review*, volume 92, issue 5, pp 1308-1334

Currie, A, Shields, M. and Wheatley Price, S (2004), Is the child health/family income gradient universal? Evidence from England, *IZA Discussion Paper 1328*, October 2004.

Currie, J. and Stablie, M. (2002), Socioeconomic status and health: why is the relationship stronger for older children?, *NBER Working Paper* 9098, August 2002

Desai M. and A. Shah (1988) "An econometric approach to the measurement of poverty" *Oxford Economic Papers*, Vol. 40, No 3, pp. 505-522.

Gordon, D. et al. (2000), *Poverty and Social Inclusion in Britain*, York: York Publishing Services for Joseph Rowntree Foundation.

Marsh, A. et al. (2001) Low –income Families in Britain: Work, welfare and social security in 1999. *DWP Research Report No. 138*. CDS: Leeds.

McKay Stephen (2004) Poverty or Preference: What Do 'Consensual Deprivation Indicators' Really Measure?, *Fiscal Studies*, vol. 25, No.2, pp. 201-224.

Myck M. (2005) "How does material deprivation analysis fit into the theory of consumer choice?" IFS mimeo, London.

Townsend, P. (1979) *Poverty in the UK,* London, Penguin Books.

Table 2. Material deprivation and income – estimation results.

Dependent variable: Deprivation index	**Specification 1**			**Specification 2**			**Specification 3**			**Specification 4**		
	Random effects est.			**Random effects est.**			**Random effects est.**			**Fixed effects est.**		
	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.
income quartile 2	-0.0049	(0.0024)	***									
income quartile 3	-0.0224	(0.0026)	***									
income quartile 4	-0.0395	(0.0030)	***									
income/100				-0.0112	(0.0010)	***	-0.0049	(0.0010)	***	-0.0029	(0.0011)	***
$income^2/10000$				0.0002	(0.0000)	***	0.0001	(0.0000)	***	0.0001	(0.0000)	***
wave	-0.0081	(0.0006)	***	-0.0089	(0.0006)	***	-0.0094	(0.0006)	***	-0.0099	(0.0006)	***
dummy – 2 children	0.0090	(0.0026)	***	0.0128	(0.0027)	***	0.0048	(0.0026)	*	0.0008	(0.0035)	
dummy – 3+ children	0.0312	(0.0038)	***	0.0388	(0.0040)	***	0.0202	(0.0040)	***	0.0080	(0.0055)	
dummy – youngest child <5	0.0063	(0.0023)	**	0.0055	(0.0024)	**	0.0007	(0.0025)		0.0016	(0.0029)	
dummy – male							-0.0391	(0.0079)	***	n.a.		
age							0.0006	(0.0002)	***	n.a.		
dummy – left school aged 17, 18							-0.0163	(0.0039)	***	n.a.		
dummy – left school aged 19+							-0.0207	(0.0049)	***	n.a.		
dummy – employed							-0.0393	(0.0024)	***	-0.0244	(0.0029)	***
dummy – owns house							-0.0329	(0.0029)	***	-0.0158	(0.0041)	***
constant	0.1390	(0.0030)	***	0.1465	(0.0031)	***	0.1565	(0.0076)	***	0.1588	(0.0035)	***
Number of obs.		8338			8338			8338			8338	
Number of groups		2339			2339			2339			2339	
R-squared:												
- within		0.0643			0.0658			0.0795			0.0851	
- between		0.0945			0.1090			0.2527			0.2222	
- overall		0.0728			0.0834			0.1954			0.1646	

Notes: income – net family unequivalised weekly income in September 2000 prices
wave – FACS wave indicator
male dummy – takes value 1 if male, 0 if female
age – age of respondent
employed dummy – takes value 1 if respondent works

In fixed effects estimations the effect of the male dummy can not be identified (as it is the same for all observations for a given individual). Similarly the effect of age cannot be identified separately from the effect of time (wave) as deviations from the mean for ‘wave’ and ‘age’ for a given individual are perfectly collinear.

Table 3. Income, material deprivation and parental health – estimation results.

Dependent variable: Good health dummy	**Specification 1**			**Specification 2**			**Specification 3**			**Specification 4**			**Specification 5**		
	Random effects est.			**Random effects est.**			**Fixed effects est.**			**Random effects est.**			**Fixed effects est.**		
	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.
income/100	0.0128	(0.0050)	**	0.0128	(0.0057)	**	-0.0030	(0.0069)		0.0052	(0.0056)		-0.0044	(0.0069)	
$income^2/10000$	-0.0003	(0.0001)	**	-0.0003	(0.0001)	**	0.0000	(0.0001)		-0.0001	(0.0001)		0.0000	(0.0001)	
deprivation index										-0.7444	(0.0613)	***	-0.2713	(0.0814)	***
wave	0.0123	(0.0034)	***	0.0138	(0.0034)	***	0.0083	(0.0038)	**	0.0067	(0.0035)	*	0.0055	(0.0039)	
dummy – male	0.0920	(0.0401)	**	0.0834	(0.0392)	**	n.a.			0.0586	(0.0380)		n.a.		
age	-0.0065	(0.0010)	***	-0.0089	(0.0011)	***	n.a.			-0.0084	(0.0011)	***	n.a.		
dummy – 2 children				-0.0123	(0.0146)		-0.0163	(0.0219)		-0.0035	(0.0143)		-0.0155	(0.0219)	
dummy – 3+ children				-0.0453	(0.0217)	**	0.0014	(0.0348)		-0.0193	(0.0214)		0.0049	(0.0348)	
dummy – youngest child <5				0.0152	(0.0147)		0.0010	(0.0183)		0.0198	(0.0145)		0.0020	(0.0183)	
dummy – left school aged 17, 18				0.0594	(0.0194)	***	n.a.			0.0455	(0.0188)	**	n.a.		
dummy – left school aged 19+				0.0975	(0.0242)	***	n.a.			0.0812	(0.0234)	***	n.a.		
dummy – owns house				0.1287	(0.0158)	***	0.0435	(0.0259)	*	0.0962	(0.0158)	***	0.0388	(0.0259)	
constant	0.7266	(0.0322)	***	0.7443	(0.0401)	***	0.5380	(0.0217)	***	0.8537	(0.0402)	***	0.5792	(0.0249)	***
Number of obs.		8338			8338			8338			8338			8338	
Number of groups		2339			2339			2339			2339			2339	
R-squared:															
- within		0.0004			0.0007			0.0016			0.0027			0.0035	
- between		0.0245			0.0736			0.0183			0.1361			0.0872	
- overall		0.0133			0.0432			0.0112			0.0802			0.0506	
Joint significance of regressors:		***			***			-			***			***	

Notes: income – net family unequivalised weekly income in September 2000 prices
wave – FACS wave indicator
male dummy – takes value 1 if male, 0 if female

age – age of respondent
In fixed effects estimations the effect of the male dummy can not be identified (as it is the same for all observations for a given individual). Similarly the effect of age cannot be identified separately from the effect of time (wave) as deviations from the mean for 'wave' and 'age' for a given individual are perfectly collinear.

Table 4. Income, material deprivation and children's health – estimation results.

Dependent variable: Eldest child's good health dummy	Specification 1			Specification 2			Specification 3			Specification 4		
	Random effects est.			Fixed effects est.			Random effects est.			Fixed effects est.		
	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.	Coeff.	s.e.	sign.
income/100	0.0080	(0.0065)		-0.0231	(0.0110)	**	0.0017	(0.0065)		-0.0237	(0.0110)	**
$income^2/10000$	-0.0003	(0.0002)		0.0005	(0.0003)	*	-0.0002	(0.0002)		0.0005	(0.0003)	*
deprivation index							-0.4558	(0.0753)	***	-0.1917	(0.1227)	
wave	-0.0015	(0.0069)		0.0029	(0.0072)		-0.0055	(0.0069)		0.0009	(0.0073)	
constant	0.7812	(0.0304)	***	0.8303	(0.0335)	***	0.8546	(0.0327)	***	0.8578	(0.0378)	***
Number of obs.	3826			3826			3826			3826		
Number of groups	1467			1467			1467			1467		
R-squared:												
- within	0.0005			0.0019			0.0008			0.0029		
- between	0.0099			0.0056			0.0330			0.0015		
- overall	0.0024			0.0015			0.0159			0.0017		
Joint significance of regressors:	-			-			***			-		

Notes: income – net family unequivalised weekly income in September 2000 prices
wave – FACS wave indicator

Appendix

Table A1. FACS lone parents sample, waves 1-5.

Observed in:	Number of families	Percent of families	Number of observations	Percent o observations
wave:12345	853	35.6%	3,906	46.9%
wave:1234	177	7.4%	657	7.9%
wave: 2345	177	7.4%	655	7.9%
wave:1 345	60	2.5%	229	2.8%
wave:12 45	62	2.6%	225	2.7%
wave:123 5	46	1.9%	164	2.0%
wave:123	170	7.1%	501	6.0%
wave: 234	26	1.1%	76	0.9%
wave: 345	199	8.3%	583	7.0%
wave:12 4	19	0.8%	55	0.7%
wave:12 5	13	0.5%	36	0.4%
wave: 23 5	14	0.6%	38	0.5%
wave:1 34	19	0.8%	56	0.7%
wave:1 3 5	9	0.4%	26	0.3%
wave:1 45	11	0.5%	33	0.4%
wave: 2 45	11	0.5%	32	0.4%
wave:12	240	10.0%	480	5.8%
wave: 23	35	1.5%	70	0.8%
wave: 34	48	2.0%	96	1.2%
wave: 45	168	7.0%	336	4.0%
wave:1 3	17	0.7%	34	0.4%
wave: 2 4	4	0.2%	8	0.1%
wave: 3 5	13	0.5%	26	0.3%
wave:1 4	7	0.3%	14	0.2%
wave:1 5	1	0.0%	2	0.0%
Total	2,399		8,338	

Table A2. Enforced hardship with respect to all 34 FACS items. Waves 1-5.

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Number of observations:	1704	1847	1761	1648	1378
Proportion of the sample who would like an item but cannot afford:					
A cooked main meal every day?	7.1%	5.7%	4.4%	2.9%	2.6%
Meat or fish every other day?	19.2%	16.1%	12.1%	9.8%	8.2%
A roast meat joint (or similar) at least once a week?	20.8%	19.5%	14.3%	11.6%	9.8%
Fresh vegetables on most days?	17.5%	13.6%	11.2%	9.4%	7.8%
Fresh fruit on most days?	16.7%	14.6%	11.3%	8.8%	8.3%
Cakes and biscuits on most days?	20.1%	16.9%	13.3%	9.7%	7.8%
Good quality food for family meals on most days?	41.1%	37.1%	30.1%	25.8%	21.3%
A weatherproof coat for each adult?	24.4%	20.0%	17.6%	14.7%	11.5%
A weatherproof coat for each child?	8.7%	7.1%	6.3%	5.2%	4.9%
Two pairs of all-weather shoes for each adult?	34.2%	28.6%	23.6%	21.7%	17.7%
Two pairs of all-weather shoes for each child?	25.6%	19.2%	16.0%	13.9%	10.3%
New, not second hand clothes when you all need them?	42.7%	35.6%	29.1%	25.2%	22.2%
A best outfit for the children?	19.9%	19.5%	15.6%	13.4%	11.9%
Good quality new clothes or shoes for children?	46.6%	40.1%	33.2%	31.3%	27.4%
A celebration with presents, for friends and family?	27.1%	22.7%	17.5%	13.7%	11.2%
Toys and sports gear for the children?	24.8%	21.1%	15.3%	11.8%	9.8%
Money for trips, holidays or outings, or going to parties?	59.4%	52.7%	46.8%	41.2%	37.2%
A one-week holiday away from home?	76.1%	68.6%	62.5%	59.5%	55.2%
A night out once a month?	47.2%	44.5%	35.9%	30.1%	28.6%
Able to have friends or relatives for a meal, once/month?	35.4%	29.4%	22.7%	20.6%	17.7%
A colour TV set?	1.4%	0.9%	0.3%	0.5%	0.2%
Cable, satellite, or digital TV?	38.8%	35.1%	29.6%	28.0%	24.5%
A refrigerator	1.6%	1.1%	0.6%	0.5%	0.4%
A separate deep freeze?	18.3%	15.9%	11.6%	8.9%	10.0%
A washing machine?	4.1%	3.5%	1.9%	2.0%	1.7%
A tumble drier?	29.8%	27.0%	24.5%	21.8%	21.0%
A telephone (including mobile)?	8.9%	6.8%	5.4%	4.2%	2.4%
A dishwasher?	36.1%	35.1%	31.1%	29.8%	27.6%
A video recorder?	10.4%	8.5%	6.6%	6.2%	4.9%
Central heating?	8.3%	7.4%	6.3%	5.1%	4.2%
A microwave oven?	11.9%	8.7%	6.5%	4.3%	3.6%
A car/van?	34.5%	30.9%	26.9%	24.3%	21.9%
A music system (tape or CD)?	11.5%	8.7%	6.5%	5.0%	4.9%
A home computer (not Gameboy, Nintendo, Playstation)?	50.4%	46.9%	38.6%	33.1%	25.7%