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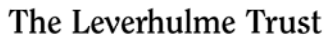

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# Intergenerational Persistence in Income and Social Class: The Impact of Within-Group Inequality

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## Abstract
Family income is found to be more closely related to sons' earnings for a cohort born in 1970 compared to one born in 1958. This result is in stark contrast to the finding on the basis of social class; intergenerational mobility for this outcome is found to be unchanged. We set up a formal framework which relates mobility in measured family income/earnings to mobility in social class. Building on this framework we then test a number of hypotheses to explain the difference between the trends. We reject Erikson and Goldthorpe's (2009) assertion that the divergent results are driven by the poorer measure of permanent family income in the 1958 cohort. Instead we find evidence of an increase in the intergenerational persistence of the permanent component of income that is unrelated to social class.

**Keywords:** Intergenerational mobility, Earnings, social class

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## 1. Introduction

Intergenerational persistence is the link between parents' socio-economic status and their children's socio-economic position in adulthood. Both economists and sociologists measure intergenerational links, with the first group of researchers tending to use income or earnings as the main measure of status (Solon, 1999) while the second use social class (Erikson and Goldthorpe, 1992) or an index of occupational status (Blau and Duncan, 1967). Both literatures face a problem of interpretation; it is implicit that the intergenerational association should not be too strong, but how strong is too strong? To cast light on this problem researchers make comparisons and ask the following questions: i) how does mobility compare across nations; ii) whether mobility is increasing or decreasing with time?

For both of these comparisons the findings of economists and sociologists are sharply contrasting for the UK. International comparisons of income mobility place the UK as country with low mobility (Blanden, 2009a, Corak, 2006) but sociologists tend to rank it closer to the middle (Erikson and Goldthorpe 1992, Breen, 2004). Cross-country rankings across the two approaches are barely correlated with each other (Blanden, 2009a). Likewise on trends, Blanden, Goodman, Gregg and Machin (2004) find that intergenerational mobility decreases for a cohort born in 1970 compared to a cohort born in 1958 while Goldthorpe and Jackson (2007) find no change in social class mobility for the same datasets.[1]

Of course the divergent results may simply reflect underlying conceptual differences. Economists are aiming to measure economic resources whereas class reflects workplace autonomy and broader social capital. An alternative explanation is that the differences are driven by measurement problems in parental status. Information on parental income in the cohorts is taken on a one-shot basis, and reliable measures of permanent income are not available. Fathers' social class has only seven categories, this will fail to capture much of the variation in permanent income between families. In addition, the importance of fathers' social class in determining the outcomes of the next generation is inherently connected to the male breadwinner model of the family, a paradigm which is becoming less and less appropriate as

[1]Nicoletti and Ermisch (2007) use data from the British Household Panel Survey to consider trends in intergenerational earnings mobility. Their results point to no substantial trend in mobility for cohorts born from 1950 to 1960. From 1961 to 1972 there is a decline in mobility as measured by the elasticity of earnings across generations, but no change in the partial correlation (our preferred measure). It should be noted that due to the use of fathers' earnings predicted from social class and education Ermisch and Nicoletti's methodology lies somewhere between the pure income and pure social class approaches**.**

women contribute more to family income, both in couples and by heading single-parent families.

One motivation for the reconciliation of these results is the wide acceptance of the findings on trends in income mobility (Blanden et al 2004 and subsequent papers) among politicians and commentators. The picture of falling mobility presented has contributed to the sense that Britain has a 'mobility problem' (Goldthorpe and Jackson, 2007, and Blanden, 2009b). It is therefore crucial to examine the robustness of this result. Furthermore, by drawing out the conceptual links between mobility as measured by economists and sociologists we hope to be able to offer a fresh perspective on both literatures, outlining clearly what is measured in each case and the advantages and disadvantages of each approach.

Our paper offers an alternative argument from the one presented in Erikson and Goldthorpe (2009) who propose that the differing results are explicable by the poor measurement of permanent family income in the 1958 cohort. If measurement error is more substantial in the first cohort this could lead to a downward bias on the estimate of persistence and the misleading implication that mobility has declined. The aim in our paper is to expand on the measurement error story by considering in detail all the possible mechanisms that could generate different trends in measured income and social class mobility. We then formulate a number of hypotheses and test them using the British cohort data. Our starting point is the assumption that the objective is to measure the intergenerational link between the *permanent* income of parents and their children. Therefore both current income and social class are incomplete proxies for permanent income. The question is: why do they differ, and further, which is preferable?

Our conceptual framework owes much to Björklund and Jäntti (2000) who attempt to reconcile results on economic and social mobility across countries. Björklund and Jäntti (2000) divide permanent income in each generation into the part that is associated with social class (of fathers and sons, respectively) and the part that is orthogonal to this (the residual). Intergenerational persistence can then be decomposed by studying the intergenerational correlations and cross-correlations of these components.

We show that residual income can be further decomposed into three parts. First, permanent income that is uncorrelated with social class, this can be thought of as within-class permanent income differences, second, transitory error (the difference between current and permanent income) and finally any pure measurement error. As noted above, larger errors of either type (transitory variation or measurement error) in the first cohort could be responsible

for the increase in measured persistence. In order to differentiate within-class differences in permanent income from error we add another component to our framework; the part of income in each generation which is uncorrelated with social class but is correlated with other characteristics (education, housing tenure, etc). This provides an estimate of the within-class component of permanent income.

An examination of data from the British Household Panel Survey (BHPS) reveals that current income is a good predictor of permanent income (as measured by a long-run average); whereas father's social class performs relatively poorly. We find that there is a substantial component of permanent income which is unrelated to social class. Conceptually, this can account for the divergent results.

We can then decompose the change in persistence across the cohorts by the different components of income. We find that a substantial part of the increased persistence is due to an increased impact of parental within-class permanent income (uncorrelated with social class but correlated with family characteristics) on the earnings of the next generation. We conclude our analysis by bringing together some additional evidence which casts doubt on Erikson and Goldthorpe's concerns over measurement error. Our findings suggest that there is little evidence of differential measurement error and that evidence for changes in transitory income cannot overturn the main result of rising income persistence.

In the next section we build up a framework which relates social class mobility to our measure of mobility based on family income and sons' earnings. This enables us to demonstrate clearly the reasons why results based on the two approaches might differ. In Section 3 we outline the data and in Section 4 we test each hypothesis in turn. Section 5 concludes by discussing the implications of our results for the study of mobility.

## 2. Framework

### *2.1 The Components of Income*

Here we set out a framework which demonstrates the relationships between permanent income, income at a point in time and fathers' social class. This provides clear foundations for our examination of the reasons behind the divergent results for income and social class.

For economists, the intergenerational relationship of interest is the relationship between parents' *permanent* income and the child's *permanent* income. As is common we shall denote permanent variables by * and logs by lower case variables.
Intergenerational mobility can be summarised by $\beta$ from the following regression:

$$y^*_{si} = \alpha + \beta y^*_{pi} + \varepsilon_i \quad (1)$$

The intergenerational correlation, *r*, is also of interest in cross-cohort studies as this adjusts $\beta$ for any changes in variance that occur across cohorts.[2]

$$r = \frac{Cov(y^*_{pi}, y^*_{si})}{\sqrt{(Var(y^*_{pi})\sqrt{Var(y^*_{si})}}} \text{ or } r = \beta \frac{(\sigma^{y^*_p})}{(\sigma^{y^*_s})} \quad (2)$$

Following Björklund and Jäntti (2000), permanent parental income can be decomposed into the part that is associated with father's social class (in our exposition social class is denoted by a continuous variable, but categorical variables are used in our analysis) and $v_p$, this is permanent income which is uncorrelated to fathers' social class. At this stage we assume no measurement error.

$$y^*_{pi} = \delta_p SC_{fi} + v_{pi} \quad (3)$$

The $\delta_p$ will reflect the relationship with social class of all the different components which make up total income. This is a point we shall return to in later analysis. The child's permanent earnings can also be split into similar components, the part that is related to the child's own class and the part that is independent of this. In our application the child's income measure is son's earnings, so we use the subscript *s*[3].

$$y^*_{si} = \delta_s SC_{si} + v_{si} \quad (4)$$

Unfortunately permanent income is generally not available to researchers (see Solon, 1992 for the first discussion of the biases that result) and the British cohort studies suffer from this limitation. Measured current parental income is permanent income plus two additional components, the transitory element of income ($u_p$) and the pure 'error' component ($e_p$) which means that measured income deviates from true income even at a point in time.

$$y_{pi} = \delta_p SC_{fi} + v_{pi} + u_{pi} + e_{pi} \quad (5)$$

$$y_{si} = \delta_s SC_{si} + v_{si} + u_{si} + e_{si} \quad (6)$$

[2] Björklund and Jäntti (2009) urge the more widespread use of this statistic when making international comparisons of mobility and the same arguments apply when considering trends over time.

[3] We follow Blanden, Gregg and Macmillan (2007) in focusing on sons. This is done to simplify the analysis so that we are focusing on male social class in both generations and to reduce the issues resulting from endogenous labour market participation. In general, it is surprising how little focus there is on the consequences of gender for the social class analysis, this is an area where further research is clearly needed.

Under classical measurement error assumptions[4] it is straightforward to show that the error in measuring parental permanent income will lead to a downward bias in the estimate of $\beta$ and that this bias will be contingent on the amount of variance in the transitory and error components.

$$p\lim \hat{\beta} = \beta \frac{\sigma^2_{y^*_p}}{\sigma^2_{y^*_p} + \sigma^2_{u_p+e_p}} \tag{7}$$

Notice that the partial correlation, $r$, is affected by measurement error in a different way (see equation 2), because $r$ is $\beta$ multiplied by the ratio of the standard deviations of parents' to sons' income. As classical measurement error will tend to increase the estimated variance, this means that any error in sons' earnings will downward bias $\hat{r}$ (it has no effect on $\hat{\beta}$) while the error in parental income will have less of an impact on this measure relative to $\beta$. We shall take up these points again in section 4.4.

### *2.2 Applying the framework to the BHPS*

The cohort data has information on father's social class and current parental income at age 16, meaning that we cannot directly measure permanent parental income in this data. He can however, estimate permanent income in the BHPS, and we can use this to understand more about how the components of current income in the cohorts might be related to permanent income as described in equations (3) and (5).

Solon (1992) points out that time averaging over many years of income observations allows us to get closer to a permanent income measure. The British Household Panel Study (BHPS) began in 1991 and now provides a long enough series of income data to allow us to approximate permanent income in childhood for the youngest sample members. We select 1206 two-parent families with children under 16 who have more than 7 income reports available. 17% of these have reported income in the full 15 years of the study while 65% have income reports for 10 years or more; these are averaged to create a 'permanent' childhood income measure. This can be compared with current income measured when the child is aged 16 or in the latest sweep.

[4] These assumptions are that the level of $y_i$ is uncorrelated with the size of the total error, and that errors are uncorrelated across generations. Under these assumptions, errors in the dependent variable will have no impact on estimates of $\beta$.

Alongside income, the BHPS includes information on father's social class, and by regressing average income on social class we are able to predict $\hat{\delta}_p SC_f$.[5] We also have information on other household characteristics that will be related to permanent income and using these we can split $v_p$ into the part that can be predicted ($\hat{\gamma}_p X_p$), with the remainder forming a permanent unmeasured residual capturing any variance in permanent income not captured by social class and our observable household characteristics, we denote this element as $\hat{\varepsilon}_{pi}$.

$$y^*_{pi} = \hat{\delta}_p SC_{fi} + \hat{\gamma}_p X_{pi} + \hat{\varepsilon}_{pi} \quad (8)$$

Note that this two step approach means that fathers' class is not competing in the regression with other family characteristics but is given its maximum explanatory power. The characteristics $X_p$ in the BHPS are parental education, employment status, age, housing tenure and self-reported financial difficulties.

The same approach can also be used to decompose current income.

$$y_{pi} = (\hat{\lambda}_p SC_{fi} + \hat{\pi}_{pi}) + (\hat{\phi}_p X_{pi} + \hat{\tau}_{pi}) + \hat{\varepsilon}_{pi} + \hat{u}_{pi} + \hat{e}_{pi} \quad (9)$$

[6]

Current income and permanent income can then be analysed separately to assess the size the components and measure their correlation with permanent income. If useful, we can apply this approach in the cohorts because although we do not have access to permanent income we do have information on characteristics that will be correlated with it. This will enable us to separate out measurement error from permanent income which is uncorrelated from social class, to the extent that this is correlated with other variables.

The first column of Table 1 decomposes the variances of permanent and current income into the components described in the equations above. The first aspect to notice is that the social class component is a fairly small minority (16%) of the variance of average childhood income whereas rather more (23%) is accounted for by the alternative income proxies.[7] The majority of the variance in average (permanent) childhood income is, however, unexplained; $\varepsilon_{pi}$ is substantial. The second part of the table considers the decomposition of

[5] Here social class is represented as a continuous variable, but in our analysis it is always estimated as a set of categorical dummies.

[6] Note that $\hat{\lambda}_p SC_{fi} + \hat{\pi}_{pi} = \hat{\delta}_p SC_f$ and $\hat{\phi}_p X_{pi} + \hat{\tau}_{pi} = \hat{\gamma}_p X_p$. $\hat{\pi}_{pi}$ therefore, measures the discrepancy between the predicted social class components of current and permanent income while $\hat{\tau}_{pi}$ fulfils the same function for that part of income predicted by the other permanent family characteristics.

[7] This is particularly surprising in the context of the two-step approach we adopt, which means that the proxies are only picking up variation in income within social class groups.

current income as represented in equation (12). What we find is that a very small part of the variance is related to social class (7.5%) but more than half (60%) of the variation in current income is actually due to the permanent components, with the residual permanent component forming the largest element of this. The lesson here is that the majority of permanent income cannot be predicted by social class, and that current income will have a substantial permanent component, even after the parts correlated with observed characteristics are accounted for. The second column shows the correlation between these components and permanent income, this once again emphasises the importance of residual permanent income ($\varepsilon_{pi}$) as this has the strongest correlation with our measure of permanent income. What is also apparent is that the correlation between current income and permanent income is very strong, at 0.74; this is much stronger than the association between permanent income and income as predicted by fathers' social class (0.4).

Our results suggest that the relationship between current income and permanent income is strong, and that current income is a better proxy for permanent income than fathers' social class is. It is also important to note that the residual permanent component of income forms a large part of residual current income (that is, income that is orthogonal to social class and our other explanatory variables). The implication of this is that it is not correct to assume that all current income which is unrelated to social class is simply error of one type or another.

### *2.3 Explaining differences in mobility trends*

Returning to our relationship of interest, the link between permanent incomes across generations, we can rewrite *r* in terms of variances and covariances.

$$r = \frac{Cov(y^*_{pi}, y^*_{si})}{\sqrt{Var(y^*_{pi})}.\sqrt{Var(y^*_{si})}} \qquad (10)$$

The numerator can be decomposed into the elements described above in equations (3) and (4).

$$Cov(y^*_{pi}, y^*_{si}) = Cov(\delta_p SC_{pi}, \delta_s SC_{si}) + Cov(v_{pi}, \delta_s SC_{si}) + Cov(v_{si}, \delta_p SC_{pi}) \qquad (11)$$
$$+Cov(v_{pi}, v_{si})$$

The first reason why results based on social class and income might vary is because the covariance between those parts of income explained by social class differs from the direct

association in social class across generations. One of the reasons why this might occur is due to the changing role of mothers' earnings.

To see this, think of permanent parental income as having three components, the permanent elements of each of fathers' earnings, mothers' earnings and other income.

$$y^*_{pi} = y^*_{fi} + y^*_{mi} + y^*_{oi} \quad (12)$$

Each of these three elements can be decomposed into the part which is associated with father's social class and the permanent component which is uncorrelated with this. The overall $\delta_p SC_{pi}$ will be a weighted average of these components with the weights dependent on the component's share in total income.

$$\delta_p SC_{pi} = S_f \delta_f SC_{pi} + S_m \delta_m SC_{pi} + (1 - S_f - S_m)\delta_o SC_{pi} \quad (13)$$

where $S_f$ ($S_m$) is the share of fathers' (mothers') permanent earnings in permanent parental income.

The overall $Cov(\delta_p SC_{pi}, \delta_s SC_{si})$ will be influenced by changes in any of the following aspects; the shares, the $\delta$ s on the components and the intergenerational relationship between the parts associated with social class. In the NCDS parental income is recorded by component, and in this cohort the correlation between sons' earnings as predicted by his social class and the part of father's earnings predicted by fathers' social class is .288, for mothers' earnings it is .253 and for other income it is -.265. The association with father's social class is weaker for mothers' earnings than for father's own earnings (the r-squared for the mothers' earnings regression is just 0.01 compared with 0.16 for fathers).

Taking one example if everything else is constant, a shift in the share of family income contributed by mothers rather than fathers will lead to decline in $Cov(\delta_p SC_{pi}, \delta_s SC_{si})$ across the cohorts.[8] However, if changing patterns of women's participation mean that either the link between mother's earnings and sons' earnings or the association between mother's earnings and father's social class increase then this could imply a increase in $Cov(\delta_p SC_{pi}, \delta_s SC_{si})$ that is not present for $Cov(SC_{pi}, SC_{si})$

As with the BHPS data, we can regress current income on social class in each birth cohort and for each generation *j* to identify $\hat{\lambda}_j SC_{ji}$. The residual from the regression of income on social class is the sum of the estimated $v_{pi}$ $u_{pi}$ and $e_{pi}$. By expanding the co-

[8] The share of mothers' earnings in total income in the GHS for 1974/5 and 1986/7 rises slightly from 21 percent to 24 percent in the couple-headed households with children.

variances as suggested in equation (11) and scaling them by the denominator of equation (10) we can formulate a 2x2 matrix for each cohort of the components of $\hat{r}$.

| | $\hat{\lambda}_s SC_{si}$ | $\hat{v}_{si} + \hat{u}_{si} + \hat{e}_{si}$ |
|---|---|---|
| $\hat{\lambda}_p SC_{fi}$ | $\frac{Cov(\hat{\lambda}_p SC_{pi}, \hat{\lambda}_s SC_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{\lambda}_p SC_{pi}, \hat{v}_{si} + \hat{u}_{si} + \hat{e}_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ |
| $\hat{v}_{pi} + \hat{u}_{pi} + \hat{e}_{pi}$ | $\frac{Cov(\hat{v}_{pi} + \hat{u}_{pi} + \hat{e}_{pi}, \hat{\lambda}_s SC_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{v}_{pi} + \hat{u}_{pi} + \hat{e}_{pi}, \hat{v}_{si} + \hat{u}_{si} + \hat{e}_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ |

(14)

We start by exploring the element in the top-left hand corner of matrix (14). If this part shows a different pattern across cohorts from the trend in social class mobility then the social class predictions of income have changed their role across the cohorts, perhaps owing to changes in mothers' earnings as just described. The upper right quadrant shows the contribution of the relationship between fathers' social class variation in income and within-class variation in sons' earnings. The lower half shows the relationships between within-class family income and sons' outcomes.

In order to begin to distinguish the role of unexplained permanent variation from the other residual elements we again follow the BHPS analysis and estimate $\hat{\phi}_j X_{ji}$ by regressing the residual from the previous regression on a set of $Xs$.

$$\upsilon_{ji} = \hat{\phi}_j X_{ji} + \varepsilon_{ji} + u_{ji} + e_{ji} \quad (15)$$

Expanding the covariance matrix gives

| | $\hat{\lambda}_s SC_{si}$ | $\hat{\phi}_s X_s$ | $\varepsilon_s + u_s + e_s$ |
|---|---|---|---|
| $\hat{\lambda}_p SC_{fi}$ | $\frac{Cov(\hat{\lambda}_p SC_{pi}, \hat{\lambda}_s SC_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{\lambda}_p SC_{pi}, \hat{\phi}_s X_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{\lambda}_p SC_{pi}, \hat{\varepsilon}_{si} + \hat{u}_{si} + \hat{e}_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ |
| $\hat{\phi}_p X_p$ | $\frac{Cov(\hat{\phi}_p X_{pi}, \hat{\lambda}_s SC_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{\phi}_p X_{pi}, \hat{\phi}_s X_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{\phi}_p X_{pi}, \hat{\varepsilon}_{si} + \hat{u}_{si} + \hat{e}_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ |
| $\varepsilon_p + u_p + e_p$ | $\frac{Cov(\hat{\varepsilon}_{pi} + \hat{u}_{pi} + \hat{e}_{pi}, \hat{\lambda}_s SC_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{\varepsilon}_{pi} + \hat{u}_{pi} + \hat{e}_{pi}, \hat{\phi}_s X_{si})}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ | $\frac{Cov(\hat{\varepsilon}_{pi} + \hat{u}_{pi} + \hat{e}_{pi}, \hat{\varepsilon}_{si} + \hat{u}_{si} + \hat{e}_{si}}{\sqrt{Var(y_{pi})}\sqrt{Var(y_{si})}}$ |

(16)

The intergenerational persistence of income can therefore be decomposed into the relationships between the $\hat{\lambda}_j SC_{ji}$, the $\hat{\phi}_j X_{ji}$ and the residual component $\varepsilon_{ji} + u_{ji} + e_{ji}$. This gets us close to analysing the components of the covariance as described in equation (11)

above and enables us to begin to differentiate the persistence in the permanent element of income which is not related to social class from the impact of transitory variation in income and measurement error.

Decomposing the partial correlation will enable us to get a good indication as to whether differences in results across disciplines are driven by the within-class predicted permanent income factors, $\hat{\phi}_j X_{ji}$. If the terms of the middle row of equation (19) are higher in the BCS this suggests that within class permanent income is becoming more persistent across the cohorts and contributing to the divergent results. However we must remember that $\hat{\phi}_j X_{ji}$ is not equivalent to $v_{ji}$, a substantial element of which will remain in the estimated residual.

As shown above in equation (7) transitory income and measurement error will lead to attenuation in our parameters of interest. The degree of attenuation will be dependent upon the share of the variance of $y_p$ which is comprised of variation in $u_p$ and $e_p$. So, if Erikson and Goldthorpe (2009) are correct and the share of non-permanent variance in parental income is larger in the first cohort than the second, this too could explain the differences in the results obtained by income and social class. The measurement error will inflate the variance of parental income relative to the covariance between income and earnings. In this case the results obtained by Blanden et al (2004) would not be a correct reflection of the changing influence of parental income on later earnings. It is necessary for us to confront the possibility that our results are driven by measurement error and we do this in Section 4.4. To summarise; the differences in the reported results for trends in income and social class mobility could be generated in the following ways:

1. The mapping from social class to income/earnings changed between the cohorts. This might occur if the share of fathers' earnings in total income was changing as a result of increased employment among mothers or increased worklessness among fathers.
2. The permanent income of parents that is unrelated to social class but predicted by other characteristics ($\hat{\phi}_p X_p$) has a larger influence on sons' income in the second cohort (the BCS) compared with the first (the NCDS).
3. Parental residual permanent income ($\varepsilon_p$) has a larger influence on sons' income in the second cohort compared with the first.
4. Results are based on measured current income rather than permanent income. If transitory income and/or measurement error in parental income are larger in the first

cohort than the second cohort this leads to greater attenuation bias in measuring $\beta$ and $r$ in the first cohort and the misleading impression of a rise in intergenerational persistence.

Our aim in the remainder of this paper is to distinguish between these hypotheses and then draw out the implications of our findings for the study of intergenerational persistence.

**3. Data**

Both sociologists and economists have utilised the two publicly accessible mature British cohort studies, the British Cohort Study of those born in 1970 and the National Child Development Study of those born in 1958. Both cohorts began with around 9000 baby boys included, although as we shall see the samples used are considerably smaller than this.

The NCDS contains all children born in the UK in a week in 1958 and obtains data at birth and ages 7, 11, 16, 23, 33, 42 and most recently 46. The BCS included all those born in Great Britain in a week in 1970. Information was obtained about the sample members and their families at birth and at age 5, 10, 16, 30 and 34. In the childhood surveys of both cohorts, information was obtained from parents on many topics including information on the child's birth weight and height, the child's behaviour and personality and the material circumstances of the family. The adult surveys have continued to be very detailed and have gathered information on (amongst other things) relationships, children and jobs.

Fathers' social class is measured at various ages in childhood but for consistency with the sociologists we will use measures at age 11 in the NCDS and 10 in the BCS. The social class measure is created from coding the father's Socio-Economic Group (SEG), into a seven-point Goldthorpe social class scheme (see Heath and McDonald, 1987). Details are provided in Goldthorpe and Jackson's Table 1.

The parental income information is taken from the age 16 survey for both cohorts. In the NCDS parents were asked to place father's earnings, mother's earnings and other income into a category. Family income is obtained by taking the midpoints of the three measures within their category and summing. In the BCS parents are only asked about their total family income, and are asked to give one of eleven categories. We generate a continuous income variable for the BCS by fitting a Singh-Maddala distribution to the data using maximum

likelihood estimation[9]. We also adjust the BCS to a net of tax variable and impute child benefit. This must be done to overcome differences in the way income is measured across the cohorts (see Blanden, Chapter 4 for full details).

Adult earnings and destination social class information is obtained at age 33 (NCDS) and 30 (BCS), where individuals are asked to provide information on their usual pay. A limitation of the data is that information on self-employment income is poor. Consequently, self-employed cohort members are dropped from our analysis. Destination social class in the NCDS is measured at 33 and is already available as a Goldthorpe schema. In the BCS there is no measure of the Goldthorpe schema at aged 30 so the individuals' SOC90 occupational codes and employment status are recoded to the same schema used in the NCDS, we follow Goldthorpe and Jackson (2007) in the way we do this.

Additional parental background variables are obtained at various points during the cohort member's childhood; this enables us to generate a matrix of $X_p$ variables. These are parental age, parental education reported at age 16 in both cohorts, mother's and father's employment at 16 and mother's employment at birth and 7 (5 in the BCS), lone parenthood at age 7 (5 in the BCS) and 16, housing tenure at age 16, whether the child received free school meals at age 11 (10 in the BCS) and parent-reported financial difficulties at 16[10]. Similarly the surveys in the cohort members' early 30s are used to derive comparable $X_s$ variables for sons, we use detailed education measures, a measure of early labour market attachment, and information on housing tenure, car ownership and pension contribution.

## 4. Results

### *4.1 Intergenerational mobility in income and social class*

Table 2 provides the 'headline results' from the examination of intergenerational income mobility using the regression approach.[11] The first panel provides results for the full sample, while the second includes only those cohort members living with their fathers at age 11(NCDS) or 10 (BCS). Through the rest of our analysis we concentrate on this 'no lone-parent' sample. Because fathers' social class is so crucial to what follows it makes little sense

[9] Singh and Madalla (1976). Many thanks to Christopher Crowe for providing his stata program smint.ado which fits Singh-Maddala distributions to interval data.

[10] The characteristics we observe are likely to do a better job at predicting low income as opposed to high income.

[11] These differ very slightly from those reported in Blanden, Gregg and Macmillan (2007) as age controls are not included. This is because age is more appropriately included as one of the Xs used to predict parental income.

to include those without co-resident fathers in our analysis. It is clear from Table 2 that this restriction has little impact on measured intergenerational income mobility; however, it does raise questions about the legitimacy of measures of mobility based on fathers' social class which exclude this population by design, an issue which becomes increasingly pertinent as more children are brought up in non-nuclear families.

For both income based measures of persistence, $\beta$ and $r$, the association of parental income at age 16 and sons' earnings in his early 30s has increased substantially and statistically significantly. The strengthened intergenerational association can also be demonstrated by using the transition matrix approach. We group incomes in each generation into equal-sized categories (in this case quintiles) and document the proportion of the total sample of families who make each possible move. In a world of perfect mobility each cell would contain 4% of the sample. Table 3 reveals the change in the extent of income persistence across generations using this approach. A larger proportion of cases are clustered near to the diagonal and there is less evidence of long-range movement.

The results for absolute social class mobility can also be easily summarised by transition matrices, and these are reported for the two cohorts in Table 4. The scales have been reversed from the usual reading of social class; one is now the bottom social class and seven the top social class. This is for ease of comparison with income and earnings measures. As with Goldthorpe and Jackson's (2007) results, there is no evidence of a change in absolute mobility across the cohorts.

The unadjusted proportions provide information on absolute mobility, but in contrast to income groupings, social classes are not a constant fraction of the population; they can, and do, change size across the cohorts. This structural change means that a full consideration of trends in mobility also needs to look at 'relative fluidity' which measures the extent of mobility abstracting from overall shifts in the proportions in each social class. It is easy to consider this in a very simple way; Table 5 shows that for both cohorts just over 30% of children born into the two lowest social classes migrate to the top two as adults and likewise a constant 65% of those born with fathers in the top two social classes remain in these classes as adults. A near constant 2:1 ratio of chances of entering the top two classes is revealed.

Notice that the results presented here do not allow for a direct comparison of the strength of the association in social class and income. We concentrate on trends only. In Erikson and Goldthorpe (2009) much is made of the stronger association across generations in social class compared to income. However this result compares the association in 7

category social class with the association in 5 category income quintile. The use of income quintile disregards the majority of the variation in family income; we do not regard this as a legitimate comparison.

This preliminary exploration of income and class mobility suggests that simple cross-tabulations reveal a growth in the association of income across the two cohorts while the strength of links in social class between generations remain quantitatively similar. This confirms the findings of Blanden, Goodman, Gregg and Machin (2004) and Goldthorpe and Jackson (2007).

### *4.2 Samples*

Before beginning our analysis of the role of the different income components we must first check if differences in samples can explain the divergent results. The cross-tabulations for income and social class we have seen so far are not based on the same sample, and this alone could generate differences in the estimated trends. Table 5 reports simple summary statistics for relative mobility. When the social class results are recomputed for the income sample there is evidence of relatively more long-range mobility from the bottom two into the top two social classes and relatively less mobility from the top into the bottom. There is no evidence, however, that restricting the sample has affected the trend in intergenerational mobility by social class.

### *4.3 Decomposing persistence by the components of income*

Recalling the framework in Section 2 the first substantive reason for the differences in results for trends in social class and income mobility is because the relationship between $\delta_p SC_p$ and $\delta_s SC_s$ increases across cohorts even though the relationship between social classes is constant. To test for this we use our decomposition approach to assess the relationships between $\hat{\lambda}_p SC_p$ and $\hat{\lambda}_s SC_s$ in each cohort. In our conceptual discussion we pointed to the role of mothers' earnings as a possible source of any discrepancy.

Table 6 estimates matrix (14) for the two cohorts and decomposes *r* into four parts, the correlation across individuals of permanent income/earnings predicted by social class, the correlation of residual income (residual permanent and transitory income/earnings and measurement error) and the cross-correlations. The cells sum to the total partial correlation. There is very little change in the correlation of incomes/earnings associated with social class as shown in the top left-hand corner of the matrix for each cohort. Indeed this element of

persistence has reduced slightly. This suggests that changes in mothers' employment patterns are not behind the differences.

Table 6 also allows us to explore the relationship between fathers' income associated with social class and sons' residual earnings. This element of persistence has increased from 0.01 to 0.04. In total the elements associated with father's social class account for 13% (1.5) of the 11.4 percentage point change across the cohorts. Hence there is a contribution to the difference in mobility from an increased relationship between income associated with fathers' social class and the sons' earnings, but it does not come through sons' social class. This shows that the larger part of the difference in the results between income and social class must be generated by the relationship between sons' earnings and the other elements of income, either through $\hat{\phi}_p X_p$, $\hat{\varepsilon}_p$, $\hat{u}_p$ or $\hat{e}_p$.

Following equation (16) we can further decompose measured income/earnings, picking out the part of income that is associated with permanent characteristics other than social class in each generation. The $X$s used have been discussed in the Data section and the full regression results are reported in Appendix Table A1. The fitted R-squared including class is around 0.4 in both the NCDS and the BCS. Table 7 reports the full three by three matrix. This allows us to explore how much of the rise in the partial correlation is associated with predicted permanent income. The results show that all of the elements of sons' income are more strongly correlated with $\hat{\phi}_p X_p$ in the second cohort compared with the first. Overall the increase in the partial correlation associated with this predicted part of permanent income provides 0.04 points or 30 percent of the total rise.

In total, 0.055 points or 45 percent of the change in income persistence can be accounted for as due to income associated with father's social class or other parental characteristics. We can think of this as a lower bound on the true change in beta, it is obtained by assuming that the change persistence associated with the residual permanent income $\hat{\varepsilon}_p$ is zero. This assumption implies that the relationship between permanent income which is uncorrelated with social class and our observed Xs (which we know to be a large part) and sons' earnings has quite a different persistence trend than the other components of permanent income.

An alternative approach is to apply some of our knowledge gained about residual permanent income in the BHPS to the cohorts. Table 8 compares the shares of the variance in current parental income that are attributable to social class, other characteristics and the residual. Broadly, the cohorts seem quite similar to the BHPS. Based on these results we can

make the alternative assumption that in the cohorts, as in the BHPS, the variance of the permanent residual component is twice the magnitude of the $\hat{\phi}_p X_p$ part. [12]

Using an Oaxaca-style decomposition, where $S_{\varepsilon c}$ is the share of permanent income accounted for by $\varepsilon$ in cohort *c* and $R_c$ is the ratio which transforms the beta into the partial correlation (see Table 2) we can show that:

$$\frac{Cov(\varepsilon_{pi}, y_{si})_{70}}{Var(\varepsilon_{pi})_{70}} S_{\varepsilon 70} R_{70} - \frac{Cov(\varepsilon_{pi}, y_{si})_{58}}{Var(\varepsilon_{pi})_{58}} S_{\varepsilon 58} R_{58} = \tag{17}$$

$$\left(\frac{Cov(\varepsilon_{pi}, y_{si})_{70}}{Var(\varepsilon_{pi})_{70}} - \frac{Cov(\varepsilon_{pi}, y_{si})_{58}}{Var(\varepsilon_{pi})_{58}}\right) S_{\varepsilon 58} R_{58} + \frac{Cov(\varepsilon_{pi}, y_{si})_{70}}{Var(\varepsilon_{pi})_{70}} (S_{\varepsilon 70} R_{70} - S_{\varepsilon 58} R_{58})$$

We assume that the shares of permanent income from $\varepsilon_{pi}$ ($S_{\varepsilon 70}$ and $S_{\varepsilon 58}$) do not change and are set to the level in the BHPS, and that the multiplying ratios are constant across the cohorts so the second term drops out. Setting the change in the persistence of $\varepsilon_{pi}$ across the cohorts equal to that of $\hat{\phi}_p X_p$ means that the 0.04 change is doubled to make 0.08[13] (because the share of permanent income associated with $\varepsilon_{pi}$ is twice that associated with $\hat{\phi}_p X_p$). If this is added to our lower band of 0.055 the expected change is 0.135. This is actually larger than the real change and suggests that in reality either the share of residual permanent income in the 1958 cohort is lower than in the BHPS, and/or persistence in this component has risen less strongly than persistence in predicted permanent income. However, this thought experiment shows that it would be easy to explain the changes we do find using this approach.

These upper and lower bound estimates based on assessments of permanent income straddle the observed rise in intergenerational persistence and clearly show that the rise is non-zero (even father's social class makes a contribution). Next we must address the evidence on measurement error. If this is greater in the 1958 cohort then we might speculate that the true change in intergenerational persistence is towards the lower bound.

### *4.4 Measurement Error and Transitory Income*

[12] Table 8 is based on banded income data for the cohorts but continuous income information in the BHPS. We have explored converting the BHPS into comparable bands and find that this does not influence the broad conclusion that the BHPS and cohort data are similar on the explored dimensions.

[13] In fact $R_{70} > R_{58}$ so the second term will also add a (likely) small amount to the estimate of 0.08.

Erikson and Goldthorpe (2009) assert that much, if not all, of the .114 rise in the intergenerational partial correlation is a consequence of greater error in the parental income measure in the NCDS. Our decomposition approach allows us to state that at the minimum .055 of the .114 is not due to measurement error, while our upper bound indicates that (under plausible assumptions) all the change in persistence is genuine. Our aim in this section is to collect together a number of pieces of evidence to enable us to assess directly the extent of measurement error in the 1958 cohort compared with measurement error in the 1970 cohort.

If we return to equation (7), the effect of measurement error on the intergenerational elasticity, we see that in the presence of classical measurement error the parental income variable will have increased variance. Table 8 indicates that the pattern in the cohorts is the reverse of what we would anticipate in the present of differential measurement error in the first cohort. The total variance of log income in the NCDS is .138 compared with .225 in the BCS. This pattern is replicated for residual income, where measurement error would be concentrated.

Another feature of measurement error is its impact on the two measures of intergenerational persistence $\beta$ and *r*. With classical measurement error in the explanatory variable $\beta$ will be downward biased, however as *r* is $\beta$ scaled by the relative variance of parental to sons' income larger variance in parental income will lead to a larger estimate of *r* relative to $\hat{\beta}$. In this case differential measurement error would manifest itself in a smaller rise in $\hat{r}$ across the cohorts compared to the rise in $\hat{\beta}$. Our results in Table 2 show a clear rise in both measures, with the partial correlation increasing slightly more than the elasticity.

The parental income question in the NCDS was asked, in part, during the period of the three-day working week which occurred at the start of 1974 as a result of industrial action in the coal industry. It is possible that the reported income is that of the three-day week rather than usual weekly income, if this was the case it could lead to unusually high measurement error in the first cohort and bias results towards finding a fall in mobility. We check this particular issue by estimating the intergenerational coefficient and partial correlation for those families interviewed in January and February 1974 (definitely within the three-day-week period). We find that if anything intergenerational persistence is stronger for these families. This is in line with Grawe's (2004) study who finds no evidence of income misreporting in the NCDS due to the reduced working week.

As noted in the Data Section the structure of the parental income questions is different between the cohorts; this could be another source of differential error. The parents of the

NCDS cohort members provide banded information on three sources of income, fathers' earnings, mothers' earnings and other income; the mid points are then added. In the BCS just one total band is provided. We might think that this would lead to more accurate income information in the NCDS and certainly a single banded total income will reduce the measured variance of income by more than one derived from three component sources of income. We have modelled the implications of both banding approaches in the continuous BHPS data and find that neither has an appreciable impact on total variance or the decomposition of current income into the different permanent income components. Overall, it seems that there is nothing in the data construction that will lead to greater measurement error in the NCDS.

We confirm this by comparing the income reports from the cohorts with incomes given in a nationally representative survey over the same period. Figure 1 maps the cumulative distribution functions of log parental income in the cohorts alongside those for families with similar-aged children in the Family Expenditure Survey (FES) in the same years. It appears that in both datasets cohort parents tend to report lower incomes than parents in the FES. This is not surprising as questioning in the FES is a good deal more thorough so is likely to uncover more income sources. The categorical nature of the income data in the cohorts tends to lead to a more lumpy distribution (particularly in the BCS) and a truncated upper tail. For our purposes the most notable feature is that these aspects are certainly no more pronounced in the NCDS than in the BCS.

Erikson and Goldthorpe (2009) express concern about the parental income data in the NCDS because of the weaker link between social class and parental income in the NCDS compared with the BCS. Social class can explain 9% of the variance of parental income in the NCDS and 23% in the BCS. Erikson and Goldthorpe infer from this that the income variable in the NCDS is a poorer measure of parental income than for the BCS. This could be due to more transitory income or more measurement error.[14] They, however, present no supporting evidence for this assertion. We can examine this finding by comparing the predictive power of father's social class in the cohorts with the same periods in the GHS data. Table 9 shows that fathers' social class explains more of the variance in family earnings in the second period in the GHS, mirroring the pattern found in the cohorts. This finding is not sensitive to selecting the sample based on the employment status of parents.

[14] Erikson and Goldthorpe (2009) note in particular that the association between parental income in the NCDS is lower than the corresponding association in the BCS *and* the association between the offspring's own earnings and own social class in both cohorts. However, the comparison across generations is invalid because the income measures are different, we would expect the correlation between own earnings and own social class to differ from the association between parental income and father's class.

So far our discussion of measurement error has been more concerned with pure reporting error than error in permanent income due to transitory variation. In Blanden et al (2004) the New Earnings Survey (NES) is used to calculate the proportion of variance in earnings over a five year period that could be regarded as 'permanent' for men in the years around the age 16 income measures. We find that in the years around 1986 men's transitory fluctuations account for 21 percent of the variance in any year, around 1974 this was 32 percent. It appears that there is some evidence to point towards greater transitory error in the first cohort. Erikson and Goldthorpe (2009) note that if allowance were made for this problem, the fall in mobility would 'no longer appear as dramatic as it does when the data are taken at face value'. Applying the same figures to parental income, transitory error of this magnitude would imply a true $\beta$ of .321 in the NCDS and .366 in the BCS, reducing the change in beta to .045, compared to the 0.07 found in Table 2.

There are three points that need to be made about this evidence. First, that this reduced figure is still a statistically significant rise and, at about 60% of the observed figure, is broadly in line with the lower bound estimate given before. Secondly, the NES calculations are for individual earnings, whereas we need to know about transitory error in family income, including the impact of mothers' earnings and other income. Furthermore using social class as the measure of economic status will not resolve this problem. As we have seen previously, social class predicts a minority of the variance of permanent income. Further investigation using the NES reveals that current earnings uncorrelated to social class (residual income, in our terms) also has an increasing permanent component. The average residual of income from a social class regression predicts 62 percent of income variation in 1974 and 73 percent of income variation in 1986. This aspect of permanent income will not be included in the social class analysis.

## 5. Discussion and Conclusion

The paper extends a framework first set out by Björklund and Jäntti (2000) to model the link between social class and income measures of intergenerational mobility. We take as our baseline model the relationship between the permanent income of parents and the permanent income of sons. Using a framework which relates permanent income to social class and current income we are able to offer four possible explanations for the divergence between trends in intergenerational mobility in income and social class in the UK. Here we will

briefly review the evidence for each hypothesis in turn, drawing out the broader implications of our results for the study of mobility.

First, changes in the components of income, such as the importance of mothers' earnings could lead to a divergence between the intergenerational correlations in social class and intergenerational persistence in income associated with social class. This turns out not to be important over this period as our data predates the large rise in mothers employment and lone parenthood which occurred from the mid-1980s to the late 1990s. However, our framework has drawn attention to the importance of this issue. As studies use more recent cohorts of children to trace the time path of mobility father's social class is likely to be an increasingly poor measure of parental socio-economic status.

The second hypothesis which would explain the divergence is that the trend in the persistence in permanent income within father's social class groups differs from the trend in persistence in income that is predicted by father's social class. This is plausible given that analysis of BHPS data reveals social class is a rather poor predictor of permanent childhood income relative to current income. This hypothesis can be explored by looking at permanent income predicted by other income proxies, such as parental education, housing tenure, and parental age. Our investigations find that around half of the headline rise in intergenerational income mobility is accounted for by predicted permanent income. It appears that this component of permanent income has an increasing impact on the outcomes of the next generation. However, in the BHPS these predictors account for only about 40% of the variation permanent family income differences. If the rest of permanent family income variation behaved in the same way then the headline rise in persistence across generations is highly plausible.

The final explanation for the divergence is the one concentrated on by Erikson and Goldthorpe (2009). They assert that either measurement error or transitory income variations are relatively larger in the first cohort. We produce a number of pieces of evidence which counter this claim. Erikson and Goldthorpe's discussion of transitory variations in income carries the implication that social class is a more stable measure. This ignores the impact of changes in occupation on class. We do not explore this in detail in this study but we note that of the fathers observed for between seven and fourteen years in the BHPS only 11% remain in the same class for the whole period.

Income inequality rose strongly through the 1980s (see Brewer et al. 2008, for a recent summary), and in a companion paper Blanden (2009a) finds a strong association between intergenerational income persistence and cross-sectional income inequality based on

international comparisons. It seems plausible that the divergence in trends in intergenerational mobility for income and social class in the UK is related to the growth in income inequality over the same period.[15]

Intergenerational income and social class mobility capture different things. Social class reflects job autonomy and wider social capital while income and earnings reflect economic opportunities. In this study we find limited common ground between the two approaches. We show that social class is a poor proxy for permanent income, and that there are good reasons why the trends for economic and social mobility differ for those growing up in 1970s and 80s Britain.

[15] Weeden et al (2007) and Kim and Sakamoto (2008) investigate whether between or within social class inequalities are the primary source of the rise in earnings inequality in the US.The two papers find conflicting results leaving the question open at present. There is no comparable study for the UK.

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**Table 1: Components of Permanent Childhood and Current Income in the BHPS**

| | Percentage share of variance | Correlation with permanent childhood income |
|---|---|---|
| **Permanent childhood income, components associated with:** | | |
| Fathers' social class ($\hat{\delta}_p SC_p$) | 15.67 | 0.431 |
| Other income predictors ($\hat{\gamma}_p X_p$) | 22.26 | 0.615 |
| Residual permanent income ($\hat{\varepsilon}_p$) | 62.07 | 0.716 |
| **Current income, components associated with:** | | |
| Fathers' social class ($\hat{\lambda}_p SC_p$) | 7.54 | 0.398 |
| Other income predictors ($\hat{\phi}_p X_p$) | 17.41 | 0.514 |
| Transitory and measurement error ($\hat{u}_p + \hat{e}_p$) | 40.55 | -0.041 |
| Residual permanent income ($\hat{\pi}_p + \hat{\tau}_p + \hat{\varepsilon}_p$) | 34.52 | 0.706 |
| Error and residual unmeasured income, ($\hat{\pi}_p + \hat{\tau}_p + \hat{\varepsilon}_p + \hat{u}_p + \hat{e}_p$) | 75.06 | 0.487 |
| Current income ($y_p$) $(\hat{\lambda}_p SC_p + \pi_p) + (\hat{\phi}_p X_p + \tau_p) + \varepsilon_p + u_p + e_p$ | | 0.735 |
| Current income without error = permanent childhood income $(\hat{\lambda}_p SC_p + \pi_p) + (\hat{\phi}_p X_p + \tau_p) + \varepsilon_p$ | | 1.000 |

Notes:

1. N=1206
2. Other income characteristics; parental education, parental age, parental employment, housing tenure and self reported financial difficulties all from the last observed period
3. Fathers' Social class is from last recorded period
4. Permanent income measured as an average of all income observations across time; min obs=7 max obs=16, 30% 14 obs or more, 65% 10 obs or more.
5. Current income is from the last data point available for the family.

**Table 2: Changes in Intergenerational Mobility using Family Income at age 16 and Sons' Earnings (at age 33 NCDS and 30 BCS): Elasticities and Partial Correlations**

| | **NCDS** | **BCS** |
|---|---|---|
| β | 0.211 (.026) | 0.278 (.021) |
| **Partial correlation (r)** | 0.172 (.021) | 0.280 (.022) |
| **N** | 2163 | 1976 |
| **Couples only** | **NCDS** | **BCS** |
| β | 0.219 (.027) | 0.289 (.022) |
| **Partial correlation (r)** | 0.176 (.021) | 0.290 (.022) |
| **N** | 2109 | 1932 |

Notes:

1. These figures differ very slightly from those Blanden, Gregg and Macmillan (2007) table 4 because parental age controls are not included.
2. Standard errors are in parentheses.

**Table 3: Changes in Income Mobility: Transition Matrices of Quintiles of Family Income and Sons' Earnings**

| **NCDS** | | | | | | **BCS** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Destination (earnings at 33)** | | | | | | **Destination (earnings at 30)** | | | | |
| **Origin (inc at 16)** | **1** | **2** | **3** | **4** | **5** | **Origin (inc at 16)** | **1** | **2** | **3** | **4** | **5** |
| **1** | 5.5 | 4.8 | 3.4 | 3.9 | 2.5 | **1** | 7.1 | 4.9 | 3.2 | 3.6 | 2.4 |
| **2** | 4.7 | 4.4 | 4.2 | 3.5 | 3.2 | **2** | 5.0 | 4.5 | 3.9 | 3.1 | 2.9 |
| **3** | 4.3 | 4.2 | 4.7 | 3.8 | 3.8 | **3** | 3.9 | 4.6 | 4.5 | 4.8 | 3.1 |
| **4** | 3.2 | 3.6 | 3.8 | 4.4 | 4.5 | **4** | 2.5 | 3.4 | 4.1 | 4.6 | 4.4 |
| **5** | 2.3 | 3.1 | 3.9 | 4.6 | 5.9 | **5** | 1.7 | 2.7 | 4.1 | 3.9 | 7.2 |

Notes:

1. Sample sizes 2109 in the NCDS and N=1932 in the BCS
2. Cells indicate the proportions of each origin quintile in each destination earning quintile
3. If society was perfectly mobile, every cell would contain 4%

**Table 4: Changes in Fathers' and Sons Social Class Mobility: Distribution of Origin and Destination Social Classes**

| **NCDS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Destination** | | | | | | | |
| **Origin** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **Σ** |
| **1** | 6.1 | 4.9 | 1.7 | 0.9 | 0.9 | 2.0 | 2.6 | **19.1** |
| **2** | 6.9 | 7.3 | 2.0 | 1.8 | 2.1 | 4.4 | 6.2 | **30.7** |
| **3** | 1.4 | 1.4 | 0.4 | 0.5 | 0.3 | 1.0 | 1.2 | **6.2** |
| **4** | 1.3 | 1.0 | 0.3 | 1.5 | 0.2 | 0.6 | 1.1 | **6.0** |
| **5** | 1.4 | 1.5 | 0.6 | 0.6 | 1.1 | 2.1 | 2.7 | **10.1** |
| **6** | 1.5 | 2.4 | 1.0 | 0.8 | 1.5 | 3.7 | 6.0 | **16.9** |
| **7** | 1.0 | 1.0 | 0.4 | 0.4 | 0.8 | 2.4 | 5.5 | **11.5** |
| **Σ** | **19.6** | **19.5** | **6.4** | **6.5** | **6.9** | **16.3** | **25.3** | **100** |

| **BCS** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Destination** | | | | | | | |
| **Origin** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **Σ** |
| **1** | 3.6 | 1.5 | 2.0 | 1.1 | 0.8 | 2.5 | 1.2 | **12.7** |
| **2** | 5.6 | 3.8 | 4.3 | 1.6 | 1.6 | 5.0 | 3.6 | **25.5** |
| **3** | 1.9 | 1.4 | 1.7 | 0.9 | 0.7 | 2.3 | 1.6 | **10.5** |
| **4** | 1.9 | 1.3 | 1.2 | 1.6 | 0.5 | 2.7 | 1.8 | **11.0** |
| **5** | 0.7 | 0.6 | 0.7 | 0.2 | 0.7 | 1.8 | 1.5 | **6.2** |
| **6** | 1.6 | 1.5 | 1.8 | 1.1 | 1.3 | 5.9 | 5.5 | **18.7** |
| **7** | 0.9 | 0.7 | 1.1 | 0.6 | 1.3 | 4.4 | 6.6 | **15.6** |
| **Σ** | **16.2** | **10.8** | **12.8** | **7.1** | **6.9** | **24.6** | **21.8** | **100** |

Notes:

1. Sample sizes 3,940 in the NCDS and 3,813 in the BCS
2. Cells indicate the proportions of each origin social class in each destination social class
3. Social class 1, Non-skilled manual; Social class 2, Skilled manual; Social class 3, Lower grade technicians; Social class 4, Self employed; Social class 5, Routine non-manual; Social class 6, Lower grade managers; Social class 7, Professionals.
4. The last column and bottom row give the sum of all other columns and rows.

**Table 5: Summary statistics of changes in relative class mobility across cohorts and samples**

| | Social class sample | |
|---|---|---|
| | **NCDS** | **BCS** |
| Proportion of those in top two origin social classes remaining there | 65% | 64% |
| Proportion of those in bottom two origin social classes moving to the top two | 31% | 32% |
| Relative odds | 2.10 | 1.98 |
| Proportion of those in bottom two origin social classes remaining there | 49% | 38% |
| Proportion of those in top two origin social classes moving to the bottom two | 18% | 14% |
| Relative odds | 2.67 | 2.76 |
| | **Income Sample (with no lone parents)** | |
| | **NCDS** | **BCS** |
| Proportion of those in top two origin social classes remaining there | 68% | 68% |
| Proportion of those in bottom two origin social classes moving to the top two | 35% | 35% |
| Relative odds | 1.94 | 1.94 |
| Proportion of those in bottom two origin social classes remaining there | 48% | 40% |
| Proportion of those in top two origin social classes moving to the bottom two | 16% | 13% |
| Relative odds | 3.00 | 3.07 |

Notes:

1. Sample sizes 3,940 in the NCDS and 3,813 in the BCS for the social class sample.
2. Sample sizes 1,729 in the NCDS and 1,646 in the BCS for income sample with no lone parents.
3. Note that the income samples differ from those used in Tables 2 & 3 as fathers' social class is missing for some families where income is reported.
4. The restriction to no lone parents makes almost no difference to these statistics as only very few of those we define as lone parents have information on social class.

**Table 6: Decomposition of Income Mobility Changes – Social class only**

| **NCDS** | $\hat{\lambda}_s SC_{si}$ | $v_s + u_s + e_s$ | **Total** |
|---|---|---|---|
| $\hat{\lambda}_p SC_{pi}$ | 0.068 | 0.010 | **0.078** |
| $v_p + u_p + e_p$ | -0.006 | 0.103 | **0.097** |
| **Total** | **0.062** | **0.114** | **0.176** |
| **BCS** | $\hat{\lambda}_s SC_{si}$ | $v_s + u_s + e_s$ | **Total** |
| $\hat{\lambda}_p SC_{pi}$ | 0.054 | 0.039 | **0.093** |
| $v_p + u_p + e_p$ | 0.066 | 0.130 | **0.197** |
| **Total** | **0.120** | **0.170** | **0.290** |

Notes:

1. Sample sizes 2,109 and 1,932
2. Notation refers to notation in text
3. Each cell represents a covariance scaled by the total variance

**Table 7: Decomposition of Income Mobility Changes – Social class and other permanent income predictors**

| **NCDS** | $\hat{\lambda}_s SC_{si}$ | $\hat{\phi}_s X_{si}$ | $\varepsilon_s + u_s + e_s$ | **Total** |
|---|---|---|---|---|
| $\hat{\lambda}_p SC_{pi}$ | 0.068 | 0.027 | -0.016 | **0.078** |
| $\hat{\phi}_p X_{pi}$ | 0.028 | 0.029 | 0.010 | **0.067** |
| $\varepsilon_p + u_p + e_p$ | -0.034 | -0.001 | 0.066 | **0.031** |
| **Total** | **0.062** | **0.054** | **0.059** | **0.176** |
| **BCS** | $\hat{\lambda}_s SC_{si}$ | $\hat{\phi}_s X_{si}$ | $\varepsilon_s + u_s + e_s$ | **Total** |
| $\hat{\lambda}_p SC_{pi}$ | 0.054 | 0.032 | 0.007 | **0.093** |
| $\hat{\phi}_p X_{pi}$ | 0.050 | 0.037 | 0.021 | **0.107** |
| $\varepsilon_p + u_p + e_p$ | 0.016 | 0.018 | 0.055 | **0.089** |
| **Total** | **0.120** | **0.087** | **0.083** | **0.290** |

Notes:

1. Sample sizes 2,109 and 1,932
2. Notation refers to notation in text
3. Each cell represents a covariance scaled by the total variance
4. Other income characteristics; parental education, maternal employment at birth, 7/5 and 16, fathers' employment at 16, housing tenure at 16, lone parent at 7/5 and 16 and self reported financial difficulties at 16
5. Other earnings characteristics; total GCSEs A*-C, total A-levels, staying on decisions at 16 and 18, degree attainment, proportion of time spent as a NEET 16-24, housing tenure at 33/30, car ownership at 33/30, pension contributor at 33/30

**Table 8: Decomposition of Parental Income Variance: NCDS, BCS and BHPS cohorts**

| **NCDS current income** | | $\hat{\lambda}_p FSC_p$ | $\hat{\phi}_p X_{pi}$ | $\varepsilon_p + u_p + e_p$ | |
|---|---|---|---|---|---|
| Variance | 0.1381 | 0.0115 | 0.0371 | 0.0895 | |
| Percentage of total variance | | 8.36 | 26.86 | 64.78 | |
| **BCS current income** | $y_p$ | $\hat{\lambda}_p FSC_p$ | $\hat{\phi}_p X_{pi}$ | $\varepsilon_p + u_p + e_p$ | |
| Variance | 0.2248 | 0.0463 | 0.0452 | 0.1332 | |
| Percentage of total variance | | 20.60 | 20.13 | 59.27 | |
| **BHPS current income** | $y_p$ | $\hat{\lambda}_p FSC_p$ | $\hat{\phi}_p X_{pi}$ | $\varepsilon_p + u_p + e_p$ | |
| Variance | 0.2716 | 0.0205 | 0.0473 | 0.2038 | |
| Percentage of total variance | | 7.54 | 17.41 | 75.06 | |
| **BHPS permanent income** | $y_p$ | $\hat{\lambda}_p FSC_p$ | $\hat{\phi}_p X_{pi}$ | $\pi_p + \tau_p + \varepsilon_p$ | $u_p + e_p$ |
| Variance | 0.2716 | 0.0205 | 0.0473 | 0.0937 | 0.1101 |
| Percentage of total variance | | 7.54 | 17.41 | 34.52 | 40.56 |

Notes: See text for explanation
Samples: NCDS, 2109, BCS, 1932, BHPS 1206.

**Table 9: R-Squared for Father's Social Class Predicting Income or Earnings on Alternative Samples**

| | **GHS 74/75** | **NCDS** | **GHS 86/87** | **BCS** |
|---|---|---|---|---|
| Income – full sample | 0.143 [4271] | 0.079 [2109] | 0.238 [2623] | 0.196 [1932] |
| Combined income – dad employed | 0.144 [3944] | 0.092 [1917] | 0.279 [2238] | 0.200 [1163] |
| Combined income – either employed | 0.147 [4091] | 0.079 [2020] | 0.251 [2378] | 0.196 [1237] |
| Proportion of dad's employed | 92.2 | 90.9 | 85.9 | 86.2 |

Notes:
1. *These specifications have other income included in the dependent variable as it is not separable in BCS.
2. Sample sizes are given in square brackets.

**Figure 1: Cumulative Distribution Functions of Parental Income in the Cohorts and the Family Expenditure Survey**

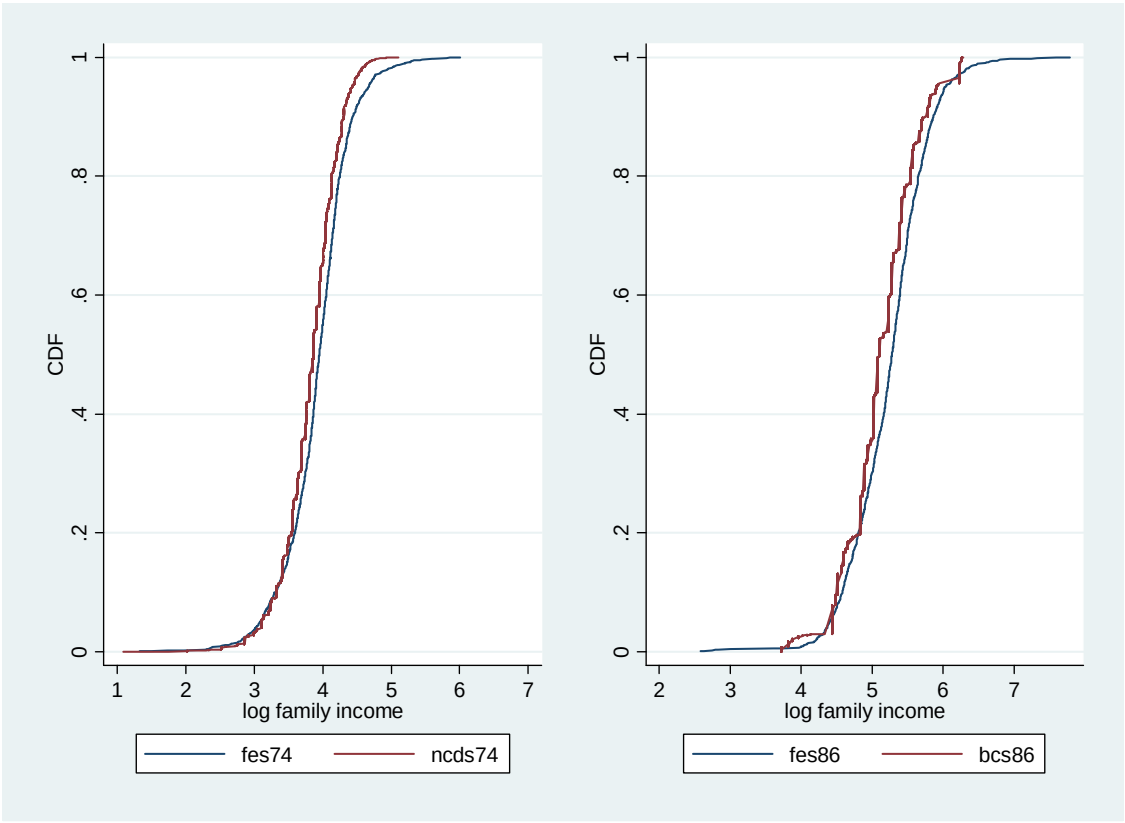

**Table A1: Background regressions for fathers' social class and Xs**

| | NCDS | BCS |
|---|---|---|
| $y_p = \hat{\lambda}_p SC_f + \hat{\upsilon}_p$ | | |
| Social class 2 – Skilled manual | 0.112 (0.024) | 0.098 (0.036) |
| Social class 3 – Lower grade technicians | 0.130 (0.038) | 0.173 (0.044) |
| Social class 4 – Self employed | 0.054 (0.053) | 0.223 (0.047) |
| Social class 5 – Routine non-manual | 0.150 (0.033) | 0.251 (0.047) |
| Social class 6 – Lower grade managers | 0.289 (0.029) | 0.450 (0.038) |
| Social class 7 – Professionals | 0.351 (0.032) | 0.666 (0.040) |
| Social class missing | 0.096 (0.027) | 0.128 (0.039) |
| Constant | 7.045 (.019) | 6.947 (0.029) |
| R-squared | 0.079 | 0.196 |
| $\hat{\upsilon}_p = \hat{\phi}_p X_p + \varepsilon_p + u_p + e_p$ | | |
| Dad left education at school leaving age | 0.044 (0.055) | -0.026 (0.043) |
| Dad left education 16-18 | 0.074 (0.056) | -0.011 (0.045) |
| Dad higher education | 0.143 (0.060) | -0.009 (0.053) |
| Mum left education at school leaving age | -0.109 (0.062) | 0.129 (0.054) |
| Mum left education 16-18 | -0.088 (0.062) | 0.219 (0.055) |
| Mum higher education | -0.026 (0.069) | 0.358 (0.066) |
| Mum employed at birth of son | -0.054 (0.0145) | -0.002 (0.045) |
| Dad employed at 16 | 0.0294 (0.030) | 0.205 (0.038) |
| Mum employed at 16 | 0.209 (0.015) | 0.106 (0.026) |
| Mum employed at 5 | 0.030 (0.016) | 0.017 (0.019) |
| Social housing at 16 | -0.020 (0.015) | -0.186 (0.024) |
| Renting at 16 | -0.070 (0.031) | -0.199 (0.066) |
| Lone parent at 16 | -0.358 (0.044) | -0.246 (0.051) |
| Lone parent at 5 | 0.050 (0.085) | 0.069 (0.062) |
| Free school meals at 11/10 | 0.0538 (0.031) | -0.051 (0.038) |
| Financial difficulties at 11/10 | -0.094 (0.027) | -0.210 (0.028) |
| Mum education missing | -0.005 (0.088) | 0.246 (0.083) |
| Dad education missing | 0.019 (0.074) | -0.068 (0.070) |
| Mum employed at birth missing | -0.026 (0.037) | 0.021 (0.018) |
| Dad employed at 16 Missing | 0.272 (0.305) | 0.115 (0.056) |
| Mum employed at 16 Missing | -0.104 (0.070) | 0.098 (0.049) |
| Mum employed at 5 missing | -0.006 (0.034) | -0.135 (0.098) |
| Lone parent at 5 missing | 0.053 (0.040) | 0.0136 (0.122) |
| Lone parent at 16 missing | - | -0.210 (0.086) |
| Financial difficulties missing | -0.078 (0.046) | -0.165 (0.055) |
| Parental average age | 0.017 (0.014) | 0.0124 (0.018) |
| Parental average age squared | -0.0002 (0.002) | -0.0003 (0.0002) |
| Parental age missing | 0.486 (0.300) | 0.096 (0.376) |
| Constant | -0.637 (0.300) | -0.391 (0.356) |
| R-squared | 0.3044 | 0.274 |

Omitted class in social class regressions is 'unskilled manual'.

**Table A2: Background regressions for sons' social class and Xs**

| | NCDS | BCS |
|---|---|---|
| $y_s = \hat{\lambda}_s SC_s + \hat{\upsilon}_s$ | .221 (.032) | .169 (.190) |
| Social class 2 – Skilled manual | .120 (.034) | .218 (.038) |
| Social class 3 – Lower grade technicians | .185 (.045) | .277 (.034) |
| Social class 4 – Self employed | .074 (.110) | .358 (.190) |
| Social class 5 – Routine non-manual | .180 (.042) | .170 (.042) |
| Social class 6 – Lower grade managers | .316 (.034) | .392 (.031) |
| Social class 7 – Professionals | .553 (.031) | .645 (.031) |
| Social class missing | .221 (.032) | .169 (.190) |
| Constant | 7.165 (.024) | 7.103 (.024) |
| R-squared | .160 | .206 |
| $\hat{\upsilon}_p = \hat{\phi}_p X_p + \varepsilon_p + u_p + e_p$ | | |
| O level/GCSE | .0051 (.0042) | .0105 (.004) |
| Stay on at 16 | .0344 (.0258) | -.0180 (.0248) |
| A levels | .0440 (.0132) | .0210 (.0103) |
| Stay on at 18 | -.0167 (.0339) | .0210 (.0103) |
| Degree | .0935 (.0340) | .0237 (.0299) |
| Proportion of time NEET | -.4951 (.0756) | -.4212 (.0621) |
| Pension contributer at 33/30 | -.0122 (.0224) | .0620 (.020) |
| Owns home at 33/30 | .3346 (.0850) | .1782 (.0306) |
| Rents home at 33/30 | .1662 (.0886) | .0964 (.0342) |
| No car | -.0501 (.0274) | -.0097 (.0314) |
| GCSE missing | .0151 (.0288) | -.0009 (.0324) |
| Stay on at 16 missing | -.0351 (.0295) | - |
| A level missing | - | -.0513 (.0254) |
| Stay on at 18 missing | - | - |
| Degree missing | -.1614 (.2875) | - |
| NEET missing | -.1438 (.0371) | -.4982 (.4050) |
| Pension contributor missing | .0614 (.0221) | - |
| Own home missing | .0901 (.0897) | .0314 (.1118) |
| Rents home missing | - | - |
| Car missing | .0912 (.1087) | -.0536 (.0322) |
| Constant | -.2766 (.0858) | -.1880 (.0330) |
| R-squared | .134 | .0892 |

Omitted class in social class regressions is 'skilled manual'.
NCDS Sample size: 2109, BCS Sample size: 1932.