

ESRC Research Centre for Analysis of Social Exclusion

TRACKING INCOME: HOW WORKING FAMILIES' INCOMES VARY THROUGH THE YEAR

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CASereport 32
ISSN 1465-3001

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Acknowledgements



The fieldwork for the study was carried out by the National Centre for Social Research (NatCen) and funded by the Evidence-Based Policy Fund of HM Treasury and by the Inland Revenue (now part of HM Revenue and Customs, HMRC), who also supported parts of the analysis reported here. Other parts of the analysis were supported by the Economic and Social Research Council as part of its general support for the Centre for Analysis of Social Exclusion (CASE) at the London School of Economics and Political Science and by the Suntory and Toyota International Centres for Economics and Related Disciplines. The authors are very grateful for this support, to Matt Barnes and Jon Hales

and their colleagues at NatCen for all the work they put into organising the fieldwork and data collection, to Sarah Guy, formerly at HMRC, Lindsey Jarvis and their colleagues for all their support with the project, including the supply of linked administrative records, and to Bryan Darragh, Jane Dickson, Laura Lane and Lucinda Himeur for assistance in analysing the data and preparing the report. An advisory group including Charlotte Clark (DWP), Stephen Jenkins (Essex University), Stephen McKay (Bristol University), Duncan McKinnon (HM Treasury) and Jane Millar (Bath University) gave very helpful advice as the project proceeded.



The authors are very grateful for helpful comments on earlier drafts of this report from members of the Advisory Group and from NatCen, HMRC and HM Treasury. However, the views and opinions contained in this report are the responsibility of the authors and do not necessarily reflect those of any of those who have supported the project or have commented on earlier drafts.

Summary

Aims of the study

- This report presents the first results of a study financed by HM Treasury through its Evidence-Based Policy Fund and by the Inland Revenue (now part of HM Revenue and Customs). Data were collected by the National Centre for Social Research, and were analysed by the Centre for Analysis of Social Exclusion at the London School of Economics and Political Science.
- The study aimed to reveal the range of income patterns across a whole year for a group of particular policy interest, low- to middle-income working families with children.
- Such information has not been collected in the UK before. It sheds light on three key issues: how the distribution of incomes across a whole year compares with those measured over a short period; patterns of income mobility at a finer level than observed before; and the extent to which state transfers (benefits and tax credits) smooth incomes over the year. Such information may have implications both for measurement of income distribution and mobility, and for the design of state transfers.
- The study was more successful in obtaining information week-by-week across the whole year than anticipated, and the results in this report are based on data for a total of 4,800 weeks of income from 93 families. The families were all receiving the Working Families Tax Credit (WFTC) in the winter of 2002 to 2003, and data were collected for the financial year 2003-04.
- This was the first year of the 'new tax credit' system. Two features of this would affect income flows differently from later years. On the one hand there were some initial delays in payments of the tax credits. On the other, there were no adjustments made in 2003-04 to correct for under- or over-payments of tax credits in previous years, which will affect income flows from 2004-05 onwards.
- Given the sample size, it was not anticipated that the results would necessarily be representative of families of this type, but potential respondents were selected to include a mix of family types and a range of incomes and circumstances amongst the target group. Findings are therefore suggestive of the situation of such families, rather than giving a definitive indication of the exact proportions falling into any particular pattern of income variability.
- Nearly all of the families agreed to allow matching of the information supplied with that from HMRC's administrative records. This comparison is very reassuring in terms of the validity of the data collected on total market incomes and on tax credits and their variation across the year.
- One hundred and ninety-two respondents originally agreed to take part in the study, 180 of whom started the process of reporting income. Modest vouchers were given as incentives to those continuing with the survey each month. By the end of six months, 129 were still participating, and by the end of the year 110 respondents were still in the study, 93 of whom produced information from which we could construct income records for the whole year. This was a lower rate of attrition than we initially expected for such an intensive survey and meant that the sample analysed is more than 50 per cent greater than the original target.
- The original sample was selected to give a mixture of lone parents and couples, owners and tenants, one and two-earner couples, and those entitled to larger or smaller amounts of WFTC (and hence higher or lower incomes within the range entitled to it).
- There was no evidence of particular bias in the pattern of attrition over the year either by family characteristics or by the variability of their income in the first part of the year, although it does appear to have been harder to maintain records for the whole year for those experiencing change in partnership status.
- One hundred and fourteen participants took part in a face-to-face interview in December 2003, and 83 in a final follow-up interview in June 2004. These asked both about attitudes to income variability and about particular parts of the respondents' records where there were apparent anomalies or gaps in the fortnightly reports.
- The 93 cases analysed in the rest of the report have a composition broadly matching that of WFTC recipients in November 2002, but with somewhat higher proportions than nationally of couples, particularly with two earners, and of those with lower WFTC entitlements.

The study

- The aim of the project was to collect detailed information on the incomes received week-by-week over a complete year by a sample of families.
- So far as we know, a study of this kind had not been carried out before. In preparation for the main stage of the study, a pilot survey was started in November 2002. The main stage of the study, analysed in this report, started in April 2003.
- In an initial interview in March 2003 details of income and circumstances were collected. Each family nominated a main respondent, who was trained in completing income diaries (each covering two weeks). The respondents were then telephoned fortnightly throughout the 2003-04 financial year to collect details of income in each of the previous two weeks (generally referring to these income diaries, which were later returned to the survey organisation).

The data obtained

- The cases in the study showed considerable differences in the income patterns they followed. While a few had regular and fairly constant income items across the year, many had substantial variations during the course of it.
- While we have data on incomes week-by-week, patterns of payment mean that it makes sense to analyse these aggregated into thirteen four-week periods.
- For those with monthly income items, analysis on this basis requires apportionment of these into (up to) thirteen four-weekly periods, to avoid artificially large variations between periods.
- The analysis in this report excludes income from Housing Benefit and Council Tax Benefit. Income including them may be either more or less variable than that of income excluding them.
- As intended, the cases cover a range of different types of family both in terms of characteristics and income level.
- Average total net family income for the cases was £17,000 (excluding Housing and Council Tax Benefits). Most of the families had total net incomes in the range between £12,000 and £22,000. This corresponds roughly to the second to the sixth tenths of the income distribution for all *households* (some of whom contain more than one family unit) in 2003-04, or from the second to the fourth lowest tenths of the distribution of non-retired households with children.
- Their net pay averaged £10,000. It made up two-thirds of total net income for the couples in the study, but about half for lone parents.
- Their other market income was significant – averaging £1,200 over the year for lone parents, mainly from child support payments.
- Their income from social security benefits averaged £1,900 over the year. It was most important for the small number of families that started the year without an earner.
- Tax credits made up a substantial part of these families' incomes: 24 per cent of total income for couples in the study, and 30 per cent for lone parents. The total amount received averaged £4,600, very close to the average national entitlement for families with children who were entitled to more than just the family element of Child Tax Credit in 2003-04.
- For the sample as a whole there was no pronounced seasonality in income receipts over the year. There was somewhat higher net pay in the period just before Christmas. Tax credits receipts were lower in the first period, and higher in the fourth and fifth periods than in the rest of the year.
- A third of cases had income we describe as 'stable with blips', that is, with income in at least ten periods within 15 per cent of their mean, but varying by 25 per cent or more from it in some periods.
- A quarter of the cases had 'erratic' or 'highly erratic' reported incomes, with at least four of the thirteen periods outside the range from 85 to 115 per cent of their annual average.
- Bearing in mind that sub-groups of our sample contain only small numbers, smaller proportions of lone parents, of those without an earner at the start of the year, and of tenants had more stable income patterns than of other groups.
- Those with the most stable incomes did not have what we identified as changes in demographic composition (mostly changes in numbers of children under 16), in labour market position, or significant changes in benefits or tax credit payment patterns during the year.
- A higher proportion of those whose labour market position clearly changed during the year had 'erratic' or 'highly erratic' incomes.

The trajectories followed by total family incomes over the year

- We defined eight different types of trajectory that the families' reported incomes could follow over the thirteen four-week periods, ranging from what we describe as 'highly stable' to 'highly erratic'.
- Only seven of the 93 families had incomes fitting our 'highly stable' pattern, that is, varying less than 10 per cent either way from their annual average. Only a third had income in at least eleven periods within 15 per cent of their mean, and within 25 per cent of it in any other periods.

The extent of income variability within the year

- As a summary index of the extent to which incomes vary across the year for our sample cases, we measured the 'coefficients of variation' (CVs) in the incomes over thirteen four-week periods.
- The average coefficient of variation for the 93 cases was 16.5 per cent. One third of the sample had CVs in their total net incomes over 13 four-week periods of over 20 per cent.

- This measured variation did not result simply from outlying unusual periods. We also measured variation over twelve periods, excluding the observations furthest from each case's mean income. This reduced the average coefficient of variation to 11.8 per cent, but for half of the cases it remained above 10 per cent.
- Higher proportions of sample cases with incomes below £15,000, of lone parents, and of the small number of cases starting the year without an earner experienced high income variability than of others.
- Those experiencing what we identified as labour market change or changes in payment patterns of benefits or tax credits had higher variability than others. Those experiencing demographic change (mostly in their number of children) did not. More of those with no identified change in circumstances had low variability (but some of these cases also had high variability).
- Looking at the sample of four-week income observations as a whole, only 40 per cent of the 1,200 observations were within plus or minus 5 per cent of the case's average for the whole year. Eighteen per cent of them were outside a range of plus or minus 20 per cent of the case's average.
- Widening the 'window' within which incomes are observed to eight weeks reduces the variation between observations and the case's annual average, but 14 per cent of observations remain outside a range of plus or minus 20 per cent of the case's average.
- This degree of variation has potentially important implications for understanding the meaning of income distribution derived from cross-sectional surveys: income measured over a short period may vary significantly from income over the whole year (although the use of 'normal' or 'usual' pay in some surveys may remove some of the variation that we observe).
- The amount of income inequality measured *between* the 93 cases, is reduced as the window of observation is widened from four to twelve weeks. However, the inequality between the incomes for the whole year of the cases is no lower than that between incomes they received in the last twelve weeks of the year.
- The variability observed may also have implications for measuring income mobility: part of the change observed when comparing observations a year apart may reflect short-term 'wobble', rather than an underlying longer-term change (although again part of this problem may be removed where surveys look at 'usual' pay).
- As an indication of the scale of such effects, within our sample there are large differences for many cases depending on whether income changes between the first and second halves of the year are measured using incomes measured over 8 or 26 week windows.
- Even larger differences in income changes are seen when neighbouring eight week windows are used as the starting point for measuring income change over the following 24 weeks.
- Tax credit receipts are also more variable than pay on average, and have a mix of stable and more variable payment patterns.
- The greater variability of these items than pay does not necessarily mean, however, that they have a destabilising effect on total incomes, as their variations can offset those in net pay. Adding in other market income does increase variability compared to net pay, but adding in either social security benefits or tax credits reduces variability.
- It is for the more disadvantaged groups – lone parents and tenants – that adding in benefits and tax credits has the greatest stabilising effect.
- For those without an identified change in circumstances in the year, adding in benefits and tax credits has only a limited effect in reducing income variability. By contrast, for those cases with an identified labour market change, benefits have a large stabilising effect, as do tax credits to a somewhat smaller extent.
- Tax credits reduce inequality *between* the incomes of the 93 cases by as much as benefits do. However, although their value for the cases in the sample is twice as large as that of benefits, adding in tax credits has a smaller effect on reducing variability of their incomes *across the year*.
- Part of the reason for this is the less sharp means-testing of tax credits than some benefits. Another part of it reflects the way tax credits are designed, with their calculation based on income across the year as a whole and adjustments during the year to try to ensure the correct total is paid by the end of it, rather than reflecting income in a particular week.

Income variability by component

- Net pay is more variable than total net income, especially for lone parents and tenants, and, of course, for those stopping and starting jobs.
- Other market income is highly variable, both because of small amounts of one-off income items, but also because of irregularity in larger receipts, for instance, of child support payments.
- Benefit incomes are on average more variable than net pay, but have a mixed pattern: some cases have stable receipts, for instance of Child Benefit, but others have highly variable receipts of other kinds (such as from Jobseeker's Allowance).

- Part of the variability of tax credits might have resulted from problems associated with the introduction of the new tax credit system in the first few weeks of 2003-04. However, considerable variability in tax credit receipts remained even after the first 12 weeks. It is only after the first 20 weeks of the year that tax credit receipts became somewhat more stable. They had no greater a stabilising effect on income as a whole in the last eight or ten periods of the year than in the first part of the year.

Comparisons with administrative records

- We were able to match the incomes of 85 of our cases with administrative data on tax credits and income assessments supplied (on an anonymous basis) by HMRC.
- Using these we can compare the total gross incomes reported during the year to the survey with those reported to HMRC after the end of the year. This is very reassuring in terms of the reliability of the survey. First, there was no apparent bias one way or another in the different kinds of report, with a difference in the average gross income reported for the year of only £28. The mean absolute difference was less than 6 per cent. Only in two cases was there a discrepancy of more than £2,000, one of which may reflect unusually high income receipts over Christmas period that were omitted in error in the tax credit assessment form returned to HMRC. In the other case, less was reported to the survey than to the HMRC, which may indicate a reporting lapse to our study.
- We can also compare the tax credit receipts reported to the study and the final assessment of *entitlement* made by HMRC within the year. These amounts would not necessarily be expected to be the same, but in half of the cases that we can compare, the difference was less than 5 per cent, and in two-thirds of them it was less than 10 per cent. Many of the differences can be explained by final receipts of WFTC at the start of the year, or by late revisions of tax credit awards that could not be corrected within the year. Only four cases had a discrepancy of more than £1,500, one of these explained by reported difficulties in payment administration.
- The administrative records also show the extent to which both income and tax credit assessments changed both during and after the financial year.
- As a result of income reassessments or other reported changes in circumstances, tax credit awards changed *during* the year for more than half of the cases. For those where the award did change, it did so an average of twice. One case had eight changes in the amount of tax credit award during the year. In twelve cases the revision of tax credit entitlement during the year was by more than £2,000, which explains some of the variability in tax credit receipts described in earlier sections.
- Looking at the 68 cases with assessments made after the end of the year, in 14 cases the final assessment of tax credit entitlement was more than £1,000 lower than that originally awarded; in seven cases it was more than £1,000 higher. These changes might be expected to be associated with a pattern of over- and under-payments by the end of the year which was consistent with the experience of tax credit recipients as a whole in 2003-04.
- In 68 cases we can compare the final assessment of income made after the year with that made at the start of 2003-04. In 33 of these, the difference was more than £2,500 – a substantial amount by comparison with the initial average gross income assessment of £10,000. However, these changes were in line with the experience of tax credit recipients as a whole with such income levels.
- Such changes illustrate the acute dilemma facing those administering the tax credit system. For some people there is a clear advantage if public transfers react to their rapidly changing circumstances. However, the scale of change also implies that very large adjustments can be needed to tax credit payments within the year to try to get the amount paid out during the year correct, and after it to correct for under- and over-payments.

Respondents' views of income variability

- As well as checking details of circumstances and income receipts, face-to-face interviews in December 2003 and June 2004 asked respondents about their own experiences of income variability.
- Few respondents reported irregular *timing* of income items in June 2004. Rather more reported that the *amounts* of particular items were variable, but still only reported this for 25 income items across 82 respondents.
- When asked in December 2003 whether they could have predicted in November the amount of total income they would receive that month to within £50, only 15 out of 90 respondents said that they could not have done so. Only ten of these said that this was a problem for them.

- The 15 cases reporting unpredictable income in November 2003 did tend to have more variable income across the year as a whole than the average for the sample as a whole. However, many with highly variable income across the year did not report unpredictable income for that month.
- In commenting on their reasons for responses, many said that they just had to cope with whatever income turned out to be. Some did point to variability in items such as pay or child support, but others talked about the problems caused by unpredictable *spending* items.
- Respondents appeared to be coping through careful budgeting – nearly all of them described themselves as ‘fairly’ or ‘very’ organised in managing their finances, sometimes on a daily basis. In planning ahead for basic expenses hardly any did so more than a month ahead, and a third planned a week or less ahead.
- It appears that this group manages by tailoring spending to match variable incomes, often with little margin for error. By implication, incomes received over relatively short periods, such as a month or four weeks, may matter considerably for their living standards at that time, rather than income averaged over longer periods, such as a year.

Conclusions

In this report we focus on three questions in particular. First, how representative is income over a relatively short period of that received over the whole year? In short, it is not necessarily very representative. This may have implications for the interpretation of income distribution statistics drawn from household surveys: some families’ circumstances will, for instance, look more favourable if aggregated over a

whole year, rather than just over a single month. However, it may be incomes over a short period that are most important to those with the least resources, and who have to budget on the basis of current income. Of course, not all the ‘variability’ measured in the way we do was undesirable: for a small number of the families, it represented a significant improvement in their circumstances over the year. For the great majority, however, the variation was not around any clear trend.

Second, we examined patterns of income mobility at a finer grain level than has been visible before. Those patterns involve greater volatility of income within the year (for this particular kind of working family) than many might have expected. Some of the families had patterns of income receipt that were very variable indeed. The patterns of short-term income variation within the year that we observe may also have implications for the measurement of income mobility between years. Part of this observed mobility may actually reflect differences between shorter-term variations, rather than a longer-term change in circumstances.

Third, we investigated the extent to which state transfers smoothed families’ net incomes by comparison with those they obtain from the market. Here we found that both social security benefits and tax credits succeeded in reducing inequality *between* the total net incomes of the 93 cases, and did so to a similar extent. However, while both social security benefits and tax credits succeeded in reducing the variability of individual families’ incomes *within* the year, benefits did so to a somewhat greater extent than tax credits.

These findings illustrate a dilemma facing those administering systems such as tax credits. Such systems can be run on a basis of fixing payments for a while on the basis of *past* income. Alternatively

payments can be adjusted to reflect *current* incomes. On the one hand, the degree of variation we show occurring within the year suggests that families’ circumstances can change very rapidly, and that the justice involved in basing tax credits on past incomes would be rough. On the other hand, this degree of income variation makes administration of a system intended to adjust for it during the year very difficult. Given the generosity of the new tax credit system, making up more than a quarter of the sample families’ total net incomes, the ways in which credits are paid obviously have major effects on their income flows through the year, and hence on living standards that are often determined by short-term income receipts.

1 Introduction

Data on people's incomes are widely used for many different purposes. These include understanding the distribution of income between household types or between rich and poor, the impact of government policies towards taxation or tax credits and social security benefits, or the way in which incomes vary over time (DWP, 2004; Jones, 2005; Jenkins and Rigg, 2001). Sometimes these data are obtained from administrative records, such as the tax records used by HMRC to produce its Survey of Personal Incomes or the one per cent sample of National Insurance records used to give a picture of the distribution of individual earnings in the Office for National Statistics' (ONS) Annual Survey of Hours and Earnings (formerly the New Earnings Survey) each April. More commonly, however, the data come from interviews with households on their total incomes of different kinds, such as the Family Resources Survey (FRS) used by the Department of Work and Pensions (DWP) in its annual analysis of the income distribution published in *Households Below Average Income* (DWP, 2005).

There have been many improvements in such data sources in recent years, for instance through the larger sample size and more detailed income questions of the FRS by comparison with the survey previously used for much analysis of the national income distribution, the Expenditure and Food Survey, EFS (formerly known as the Family Expenditure Survey, FES) (ONS, 2004). However, there will always remain issues about the interpretation, accuracy and reliability of such data. Many of these questions have been examined in detail before, such as how to compare household incomes when they contain different numbers of people (technically, how to 'equivalise' them), what assumptions to make about sharing of

income within the household, or how to allow for the benefits in kind of living in subsidised housing or from owning one's own home. But one recurrent issue is the time period over which incomes are measured or reported, and it is this with which this report is concerned.

The time period for measurement

Even if income from all sources could be measured and reported with complete accuracy, the time period used to do this would still be an issue. People receive income from different sources over varying periods. Some are paid weekly, others monthly. Some kinds of income come at regular intervals, such as Child Benefit, which many receive once every four weeks, or dividends or interest payments made every six months or every year. But other kinds of income come at irregular intervals, such as money for odd jobs or child support payments from some former partners. The same family may, as we shall see, receive various kinds of income following several different payment patterns. At the same time, incomes from the same source can vary over time, for instance because of overtime or annual bonuses, but also as a result of pay increases, promotions, change or loss of job, or because benefits or tax credits are adjusted for inflation or because a family or household's circumstances have changed.

Measurements of the level and distribution of household incomes will therefore depend on the time period over which they are measured. One commonly used technique is to look at current 'normal' weekly or monthly income – converting income received over different time periods, and ignoring abnormal fluctuations. But even on this kind of basis

we would expect income to vary over the year – again, someone might have had a pay rise or have lost their job, for instance, so their income over the previous year would not equal simply twelve times their current normal monthly income. We might well expect incomes measured over a whole year to be more equally distributed than those measured over a week or a month. To the extent that we believed households could also manage their spending over longer periods, we might be less concerned about people whose income was below a certain level for just a short period, but not when the year as a whole was looked at. From this point of view, it would be very helpful to understand just how income does tend to vary across the year. This could answer two questions. First, how representative of income over a whole year is a snapshot of income at one point in it? Second, continuing the analogy, how does the snapshot which we take of income at a point in time vary depending on the 'shutter speed' – the width of the time period we take for measurement?

Income dynamics and mobility

What we know about longer-term variations in income in the UK has been greatly improved by the build-up of information from longitudinal data sources, such as the British Household Panel Survey. This interviews the same people at annual intervals, allowing us to measure how it changes over a gap of a year (Jarvis and Jenkins, 1996; Jenkins and Rigg, 2001; Rigg and Sefton, 2004; DWP, 2004; Hills, 2004, chapter 5). In the USA, similar information is available from the Panel Study on Income Dynamics (see, for instance, Blundell and Pistaferri, 2003). Such data move us much closer to a 'moving picture' of

household income, but it is still a rather jerky, old-fashioned, movie – we can see where people are at annual intervals, but we do not know what happened in between those annual frames.

If we had finer grain information about people's incomes we could understand much more about both the trajectories they followed – is it typically a single step up or down each year, or a more continuous change? We would also be able to reassure ourselves about whether the patterns of mobility we see from the successive annual snapshots are in a sense 'genuine', or whether they reflected, say, the choice of two short term periods when income had varied randomly from its stable average path. For example, it might look as if a household's income had dipped between two years, but that might just be because we had data on a 'good' period in the first year, but on a 'bad' period in the next.

However, we have very little information that sheds light on these questions. For the UK, Böheim and Jenkins (2000) identified two studies from the 1980s that had attempted to construct estimates of annual income from data contained in the Family Expenditure Survey (FES) in order to compare the distributions of annual and current monthly incomes. To do this, the studies used recall data from the FES on employment status over the previous year and whether respondents had received major social security benefits to try to approximate income flows over the past year. One study indicated a lower level of inequality when income was measured over a year than 'usual' monthly income, the other – perhaps surprisingly – that annual income was more

unequally distributed. The data these studies had to go on were very limited, however, and their estimates of annual income both indirect (derived from employment status, not specific income amounts) and based on recall data.

For their own estimates, Böheim and Jenkins were able to use the somewhat richer information contained in the BHPS. They constructed a synthetic measure of income for the whole year based on earnings measured at the start and end of it, and recall data on types of income and periods of unemployment collected at the end of it. Their results suggested that annual income estimated in this way had a distribution that was little different from that of 'usual' monthly income, for instance, with a difference in the Gini coefficient of inequality of just one percentage point in either direction in different years. However, the aim was again to produce an annual total, and not a pattern of income variation during the year. The BHPS data only allow a rather limited picture of income changes over the year: unless interrupted, earnings were assumed to move smoothly between the two observations a year apart; and income of other kinds and in periods of interrupted earnings were estimated.

More direct analysis of income variation within the year is possible in the USA, thanks to the Survey of Income and Program Participation (SIPP). This collects data on monthly incomes from a revolving panel, a quarter of whom are interviewed each month. Each respondent is interviewed every four months over a three year period, and data collected for income month-by-month over the previous four months. Using data from this, Iceland (2003)

shows, for instance, that when measured against the official poverty line, the US poverty rate was about three percentage points lower in each of the years 1996 to 1999 if incomes were added up over the whole year than if incomes in a single month were analysed. This was a very similar finding to that of Ruggles (1990, quoted in Böheim and Jenkins), using SIPP data for 1984, who also found that the poverty rate was three percentage points lower if incomes were aggregated over the whole year, rather than measured for a single month. These findings suggest that in the USA, at least, incomes do vary up and down from month to month, with some of the variation between households removed if the year is looked at as a whole.

These studies apart, we are not aware of any that have attempted to address the questions addressed in this report, which therefore attempts to fill a gap in our knowledge of variation of income within the year in the UK.

Impact of policy

Large parts of public policy are concerned with helping people smooth their incomes over time. This is most obvious in the case of pensions. Either through direct public action through taxes, national insurance contributions and the social security system, or through encouragement and tax reliefs, the state helps people smooth out their living standards between their working lives and their retirement. But other parts of policy are concerned with smoothing shorter term fluctuations: Income Support (IS) is, for instance, intended to ensure that people have enough to live on week-by-week. People who are

currently out of work may well be entitled to IS, even if in another part of the year they had a high enough income to take their average for the year as a whole above the minimum which the system is intended to guarantee. One question that finer grain data on income variability could help resolve is therefore the extent to which taxes, social security benefits and tax credits smooth net incomes by comparison with the incomes people derive from the market. Alternatively, does the way such transfers are administered lead to large fluctuations in income as people go through certain life events or labour market transitions – does it take a significant time for them to ‘settle down’ after such changes? If it does, worries about the administration of the tax and benefit system might act as a deterrent to people taking up a job or changing jobs.

Here there has been an important recent change in the principles governing the way in which some people with low- to middle-incomes receive help from the state. Before April 2003, there were three different methods governing the time period used to assess entitlements or liabilities of working age families:

- For many social security benefits, it would be their circumstances in a *particular week* that would matter – for instance, their entitlement to Income Support or Jobseeker’s Allowance if they had no other income or no work, regardless of what had happened to them earlier in the year. Similarly, for employees, the amount of National Insurance Contributions they are liable to pay depends on their earnings that week or month – unused amounts of the allowance on which NICs are not

levied cannot be carried forward to later weeks, for instance.

- By contrast, income tax liabilities depend on *annual* incomes. Unused tax-free personal allowances can be carried forward from one part of the year to another, and the Pay as You Earn (PAYE) system is designed to adjust tax payments each week or month through the year so that by the end of it, where possible, the right amount of income tax has been paid for the year as a whole. Where this is not successful, and someone fills in a tax return, they may be entitled to a refund or liable to pay extra tax (often collected through the PAYE system in later years) to get the amount exactly right for the year taken as a whole.
- The third principle applied to the Working Families Tax Credit (WFTC), following on from the system used for its predecessor benefit, Family Credit (and before that, Family Income Supplement). This was paid to working families with children, with the amount based on income *over a recent assessment period, but then fixed for six months* (originally for 12 months) at a time. Thus, suppose that a family had their WFTC award based on incomes over some weeks running up to their assessment date, but then one of them had a pay rise just after it. Their WFTC payments would none the less stay the same for six months, and the pay rise would only affect the assessment made six months later, when a new award (or none) would be made for the following six months.

When the ‘new tax credits’ – the Child and Working Tax Credits – were introduced in April 2003, replacing the WFTC, this third method was removed (HM Treasury, 2002; 2005a). The time

period for tax credit calculation was more closely aligned with that used for income tax, so the amounts people are entitled to depend on income across the tax year as a whole.¹ If a family’s income turns out to be lower than originally thought, they will be entitled to a catch-up ‘net payment’, but if it turns out to be higher (by a margin, at least)² they will have their entitlement correspondingly reduced, with a further claw-back from payments in later years if necessary. Rather than being fixed for six months at a time, the new tax credits can therefore vary across the year for a number of reasons:

- As in any system, there may be a gap without any payments while entitlement is assessed. For tax credits this can lead to a catch-up payment in respect of the year so far, before payments revert to a regular amount in later periods. At the start of the 2003-04 tax year, this was quite a common occurrence as the new system was introduced. The same pattern can also be followed later on in the year by those claiming for the first time (payments being potentially back-dated for up to three months before a claim is made).
- If someone reports a change in circumstances during the year – such as a new child, new partner, splitting up with a partner, or change in pay – the award may change within the year.
- During the year, people report their *actual* income for the tax year just finished. At the simplest, if this was the same or slightly higher than the assessment originally made for that year, the effect of this would simply be a new assessment for the new tax year, and perhaps a step change (up or down) in the amount of tax credits paid out (so that the total by the end of the year would be correct).³

¹The main exception to this is that if a family becomes entitled to Income Support for part of the year, they will automatically be entitled to the maximum Child Tax Credit for their children for that period, irrespective of income in the rest of the year

²The margin was originally set at £2,500, but will be raised substantially to £25,000 from April 2006 (HM Treasury, 2005b).

³In the particular year studied, 2003-04, people’s income in 2001-02 was used as the initial basis for the award; some families would have reported changes in circumstances during 2003-04 and might have had adjustments to tax credit payments made within the year; all would then have had to report their final incomes for 2003-04 by the end of September 2004 (January 2005 for the self-employed), which might then have led to further adjustments during 2004-05.

- If reported income was lower than the original assessment, people could be entitled to a lump sum catch-up payment.⁴
- On the other hand, if reported income was significantly higher than originally assessed for the previous year, people would be liable not just to downward adjustment in their credits for the new tax year, but possibly also to recover part of what were now seen as over-payments in the previous year, usually through a further downward adjustment until the end of the current year.⁵

Aim of the project

Given the lack of knowledge in this area and its potential importance both for understanding income distribution and for policy design, HM Treasury through its Evidence-Based Policy Fund and the Inland Revenue (now part of HM Revenue and Customs, HMRC) agreed to finance a study which would examine evidence on variation of income within the year for a group of particular interest, working families with children and with low to middle incomes.

This report presents the first results of this, from what, so far as we know, is a unique study, carried out during the 2003-04 financial year, during which families reported their income from all sources week-by-week across the entire year.⁶ The original aim was to collect data for the whole year for 60 families. In the event, the study was more successful than anticipated for such an intensive exercise, and we report results here for 93 families.⁷

The families all had children and, before the start of the year at least, had earnings and hours at levels which meant that they were entitled to the old WFTC. It is important to stress that the sample is not large enough to be representative of all families of this kind, but potential respondents were selected to include a mix of two parent and lone parent families, different numbers of children, owner-occupiers and tenants (including some entitled to Housing Benefit), higher and lower incomes within the range entitled to WFTC, and different parts of the country. The aim was to reveal the range of income patterns across the year followed by low- to middle-income working families, and so shed light on the three broad issues discussed above:

- How representative of total income for the year is income measured over a relatively short period (for reasons described below, we concentrate on four week periods)?
- What do patterns of income mobility look like at a finer grain level than has been visible before?
- How successful are state transfers in smoothing families' net incomes by comparison with those they obtain from market sources such as earnings, investment income or child support payments?

Nearly all of the families surveyed gave permission for their records to be matched (anonymously) with administrative data held by HMRC. We can therefore compare both the pattern of tax credit receipts reported by the families with that recorded by HMRC as their entitlements, and their

income across the year as a whole with that they reported to HMRC at the end of the year. As Section 7 discusses in detail, this comparison is very encouraging in terms of the validity of the data we use (at least in terms of the consistency between the two different kinds of report).⁸ For instance, comparing the total of gross incomes (as defined for tax credit purposes) reported to the survey through the year with those eventually reported in tax credit assessment forms, there is essentially no bias between the two sets of reports, and a mean absolute difference of less than 6 per cent (see Figure 7.1). This gives us a high degree of confidence that the variability we report over the year is for the most part a genuine phenomenon, and not an artefact of reporting lapses that we were unable to correct.

The report has the following structure: Section 2 describes the survey and how it was carried out; Section 3 gives an initial description of the data obtained; Section 4 describes the basic pattern of variability the data reveal; Section 5 examines the relationship between income variability and family characteristics; Section 6 looks at differences in variability between income components and totals of income defined in different ways; Section 7 compares the incomes and tax credit receipts reported by our sample with HMRC's administrative records; Section 8 presents some of the opinions given by survey families of the predictability of their incomes in a follow-up interview at the end of the survey; Section 9 concludes.

⁴From 2007-08 such catch-up payments will no longer be made within the tax year, but would become part of the final adjustment of the award after the year-end (HM Treasury, 2005b).

⁵As, for the first year of the system, 2003-04, initial income assessments were generally based on income not in the previous tax year, but in 2001-02, such adjustments during 2004-05 might be larger than normal. From November 2006 there will be automatic limits on such adjustments to recover over-payments within the year.

⁶An earlier study, Harries and Woodfield, (2002) collected data on weekly incomes over a four-week period (as well as on spending) for individuals returning to work. Another earlier study, Garman et al. (1992), compared family incomes in three periods over one particular transition: before losing work, after losing work, and (for some) on return to work.

⁷We also have records for other families originally within the survey, but who did not complete full records for every week (see Section 2). Only cases with complete records for the year are included in the analysis in this report. See below for a discussion of whether this attrition is likely to cause any bias in the results.

⁸Of course, by the end of the year, our families were in the unusual position of having recorded their income through the year week-by-week, so the accuracy of reporting at the year-end may not be typical of other families.

As will soon be appreciated, the study, although exploratory in nature and covering a sample that is small by comparison with many cross-sectional household surveys, collected a mass of data: a total of 4,800 weekly income breakdowns for the 93 families, together with results of face-to-face interviews with them. This report is essentially descriptive, containing relatively straightforward analysis of the data collected. Further work at CASE in the coming year will analyse aspects of the data in more detail. At the end of that year, the dataset will be deposited at the Data Archive for wider use.

Summary

- This report presents the first results of a study financed by HM Treasury through its Evidence-Based Policy Fund and by the Inland Revenue (now part of HM Revenue and Customs). Data were collected by the National Centre for Social Research, and were analysed by the Centre for Analysis of Social Exclusion at the London School of Economics and Political Science.
- The study aimed to reveal the range of income patterns across a whole year for a group of particular policy interest, low- to middle-income working families with children.
- Such information has not been collected in the UK before. It sheds light on three key issues: how the distribution of incomes across a whole year compares with those measured over a short period; patterns of income mobility at a finer level than observed before; and the extent to which state transfers (benefits and tax credits) smooth incomes over the year. Such information may have implications both for measurement of income distribution and mobility, and for the design of state transfers.
- The study was more successful in obtaining information week-by-week across the whole year than anticipated, and the results in this report are based on data for a total of 4,800 weeks of income from 93 families. The families were all receiving the Working Families Tax Credit in the winter of 2002 to 2003, and data were collected for the financial year 2003-04.
- This was the first year of the 'new tax credit' system. Two features of this would affect income flows differently from later years. On the one hand there were some initial delays in payments of the tax credits. On the other, there were no adjustments made in 2003-04 to correct for under- or over-payments of tax credits in previous years, which will affect income flows from 2004-05 onwards.
- Given the sample size, it was not anticipated that the results would necessarily be representative of families of this type, but potential respondents were selected to include a mix of family types and a range of incomes and circumstances amongst the target group. Findings are therefore suggestive of the situation of such families, rather than giving a definitive indication of the exact proportions falling into any particular pattern of income variability.

Nearly all of the families agreed to allow matching of the information supplied with that from HMRC's administrative records. This comparison is very reassuring in terms of the validity of the data collected on total market incomes and on tax credits and their variation across the year.

2 The study

A detailed account of the way in which the data discussed in this report were collected can be found in the technical report written by the team of researchers at the National Centre for Social Research (NatCen) who organised and carried out the intensive fieldwork that it involved (Barnes, Hales and Lyon, 2004). This section summarises some of the main features of the innovative techniques used to collect such detailed data and to achieve such a low rate of attrition over up to 29 successive interviews.

2.1 The structure of the study

As no project of this kind had been carried out before, it required careful preparatory work before the main data collection through the period of April 2003 to March 2004. The study involved eight components:

- A development phase where initial designs of data collection instruments were tried out in a preliminary exercise with eight families. This helped improve the design of the fortnightly paper income diaries that were central to respondents' record keeping in particular.
- A pilot survey that started in mid-November 2002, with income data collected for six months from December 2002, which acted as a dry run for each part of the main stage. This involved recruitment, the initial interview, completion of fortnightly diaries by respondents and telephone interviews over six months, and a follow-up face-to-face interview at the end. 33 families were recruited for the pilot survey, of which two dropped out after the initial interview. By the end of the six months 16 of these families were still supplying

fortnightly income information (either through the paper income diary or by telephone), and ten had supplied continuous information throughout the full six months.

- The main stage began with a face-to-face interview in March 2003, which used a Computer-Assisted Personal Interview (CAPI) schedule, collecting basic personal information on the family and income data in a similar format to that used in collecting data for the Family Resources Survey (FRS). As with the pilot stage, the Inland Revenue supplied addresses of WFTC recipients in particular target areas. From these, 192 respondents were recruited for the main stage, which met both the target number and the quotas of respondents of different kinds (see Section 2.2).
 - Couple families nominated one member to act as the 'main respondent' (sometimes the man, sometimes the woman) who collected information for the diaries and responded to telephone interviews (although responses were sometimes given by the other partner).⁹
 - Respondents were left with an income diary to complete for the first two weeks of the survey at the start of April 2003. Figure 2.1 gives an example of a page of the diary, for the respondent to note down components of their income in the first week of the fortnight. Other pages allowed a record of income going to other household members, and the second half of the diary repeated the exercise for the second week. During the initial face-to-face interviews, respondents were given detailed training on how to fill in the diaries. There was also a helpline available.
 - While respondents were encouraged to return completed diaries each fortnight,
- the primary data collection method was a fortnightly Computer-Assisted Telephone Interview (CATI), with the diaries acting as a convenient *aide memoire* to help when the interviewer called. At the first CATI contact, 12 respondents explicitly dropped out, having changed their minds about participating, so that 180 families started the main stage. However, income data for the first two weeks (CATI or returned diaries, but generally both) were collected for only 170 of these. The CATI interviews were repeated every fortnight.¹⁰
- As a token of thanks for their participation in the study, and to encourage participation, families were given a £20 gift voucher after taking part in the initial (CAPI) interview, and a further £10 voucher for each month that they continued with the study.¹¹
 - Over time, and unsurprisingly given the personal effort involved, other respondents dropped out of the study. By the end of six months, 129 were still participating. They were asked to participate in a face-to-face interview, which collected both basic information on the family to check that circumstances had not changed, but also involved specific questions following up possibly anomalous features of the data collected over the first six months (such as what had happened in weeks when otherwise regular income items were missing). One hundred and fourteen respondents completed this questionnaire.
 - By the end of the 12 months 110 respondents were still in the study. NatCen invited 88 families that had supplied continuous information throughout it (or with data missing only

⁹The study followed the partner caring for children in the event of any splits, and collected information on the income of a new partner joining the family during the year. In the event, for the 93 cases analysed below, there were no splits in partnership during the year. One case involved a new partner arriving part of the way through the year (see footnote 14 below for changes known to have affected some of those who dropped out of the study before the end).

¹⁰An advantage of using the CATI system was that the program included checks on the data as details were entered on the computer. This was partly to avoid errors such as missed decimal points, but comparisons were also made with previously entered data and interviewers were instructed to ask for explanations of any differences of more than plus or minus ten per cent. The interviewers also had a key role in motivating respondents to continue in the study.

¹¹These vouchers did not affect their entitlement to benefits or tax credits. A very few conscientious respondents later reported 'income' from these vouchers in some of their fortnightly reports. Ideally, for consistency with others who did not do so, these should be omitted from the income records, but this has not been done for this report. The effect is, however, very small.

for a single fortnight) to take part in a final follow-up interview. This again checked family circumstances and followed up on any apparent anomalies or puzzles in the data which had been assembled for them, as well as asking about issues such as views on predictability of their outgoings and income, money management, and tax credits (see Section 8). Eighty-three respondents completed this interview.

- Using the information from these interviews to supplement the data

collected over the year, we identified a total of 93 cases that had supplied information from which we could construct the complete weekly income records that we analyse in this report.

- Finally, respondents had been asked at the start of the study whether they would give consent for the Inland Revenue to give information from their Tax Credit records to the researchers (on an anonymised basis). This meant that administrative and survey records of their incomes could be compared.

All but a very few (three of the 93 cases analysed later, for instance) did so, and some of the results of this are presented in Section 7 below for those that provided complete income records.

Further details of each of these stages and of the data collection instruments can be found in Barnes *et al.* (2004). This report presents findings only from the main stage of the study.

Main respondent's income

1 Did you receive a wage or salary in this week?

YES Go to tables **A** & **B** NO Go to question **2** page **5**

A

Wage or salary in your main job

Pay period

From To

Payslip date Tick if no payslip

Pay and allowances you received

Basic pay £ p

Overtime £ p

Bonus £ p

Tip £ p

Commission £ p

Working Tax Credit* £ p

Other £ p

Other £ p

Total gross pay £ p

Deductions

Income tax (PAYE) £ p

National Insurance £ p

Pension contribution £ p

Union subscription £ p

Other £ p

Other £ p

Total deductions £ p

Total net pay
(Total gross pay less total deductions) £ p

B

Wage or salary in your other job

Pay period

From To

Payslip date Tick if no payslip

Pay and allowances you received

Basic pay £ p

Overtime £ p

Bonus £ p

Tip £ p

Commission £ p

Working Tax Credit* £ p

Other £ p

Other £ p

Total gross pay £ p

Deductions

Income tax (PAYE) £ p

National Insurance £ p

Pension contribution £ p

Union subscription £ p

Other £ p

Other £ p

Total deductions £ p

Total net pay
(Total gross pay less total deductions) £ p

Figure 2.1 A page from the fortnightly income diary

2.2 Main stage sample structure and attrition

As explained in the introduction, the aim of the study was to investigate patterns of income variability amongst a group of families of both academic and policy interest. The study was therefore designed to collect data on different kinds of low- to middle-income working families with children, rather than to assemble a representative random sample of them (which would have required a much larger sample size at much greater cost). Table 2.1 shows the target composition of the original main stage sample and of the 192 respondents actually recruited. This target composition was chosen to reflect that of recipients of Working Families Tax Credit (WFTC) at the time, with the exception that, as fewer than a tenth of its recipients were two-earner couples, a target of 15 per cent was set to avoid very small numbers in this category. In the event, as Tables 2.1 and 2.2 show, the recruitment target for this group was slightly exceeded, and attrition was similar to other family types, so 15 out of the 93 cases analysed were two-earner couples at the start of the year, giving a reasonable number for analysis, but representing a rather larger proportion of such cases than in the WFTC population as a whole.

Given the cross-cutting nature of the characteristics, assembling a sample exactly matching all of them would have been unlikely, so maximum and minimum quotas were set a third below and above the targets. In the event, the sample matched the targets quite closely, as Table 2.1 shows:

- Slightly over half were couples at the start of the exercise, and slightly under half were lone parents. This compares with 46 per cent of all WFTC recipients in the UK who were couples and 54 per cent who were lone parents in November 2002 (Inland Revenue, 2003, table 1.1)
- A quarter had one child, half had two children, and a quarter had three children. This compares with national proportions of 39 per cent with one child, 37 per cent with two children and 24 per cent with three or more children, so the achieved sample somewhat over-represented two-child families.
- 57 per cent were tenants (just above national proportions for what had been WFTC recipients; Marsh and Perry, 2003, table 3.7).
- 23 per cent were claiming Housing Benefit, a potentially volatile component of income. Such respondents had proved harder to recruit at the pilot stage, and the measures taken to remedy this resulted in a slight over-sampling of such cases, above the original target.
- About a third of cases fell into three bands of former WFTC entitlement. More of them had lower entitlement (and so generally higher incomes) than the target of 36 per cent (which reflected national proportions), but the sample contained a good mix.
- When the original sample was drawn at the start of 2003, all potential respondents were receiving WFTC, and so had a member in work at the start of that claim period (in the second half of 2002). As explained above, the intention was to recruit a mixture of one and two earner families. By the time of the CAPI interview in March 2003, however, eight per cent of the recruited families had no adult in paid work at that point, three-quarters had one earner, and a fifth two earners.¹² 13 of the 16 respondents with no adult earner at CAPI stage were lone parents. As we shall see, the number of earners in the families continued to vary through the year.
- Finally, the respondents were spread, as intended across six regions of England.

All longitudinal studies suffer from attrition as they go on. Respondents can decide that continuing to take part is too onerous, or new family or work pressures may mean they have no capacity to do so. They can prove hard to contact, perhaps because of work patterns or because they move house and prove hard to follow. Some may die, go into hospital or other institutions, or move abroad. Between its first two years, the British Household Panel Study (BHPS) lost 12 per cent of its initial sample. Attrition continued in BHPS but at a slower rate so that, for instance, by wave 7, 76 per cent of initial respondents were still in the survey (Berthoud and Gershuny, 2000). With an intensive study of the kind reported here it was not clear what kind of attrition pattern to expect. On the one hand, the commitment to fortnightly contact might mean that respondents would quickly become fed up with the exercise and drop out. On the other, the regular contact might mean that response simply became a routine, and respondents less likely to lose contact, so that attrition might not be so fast. As noted above, respondents were given small vouchers as an incentive for each month they continued in the study.

The pilot stage suggested that some families would be willing to keep going for at least a six month period, something which we had not been sure of at the start. However, just over half of those participating in the pilot had dropped out by the end of six months, and under a third of the original sample had supplied continuous information. The original target for the project was to collect income time-lines for 100 families for a six month period, and 60 or more for a full twelve months. Given the experience of the pilot, including the fact that not all interviewers were able to fill their quota, the initial recruitment target was set at a total of 192 across all the interviewers.

¹²Data were collected for families, not for independent members of households. As will be seen below, some older children within the family also had earnings

In fact, thanks to some improvements in procedures between the pilot and the main stage and as a tribute to the assiduousness of the National Centre's face-to-face and telephone interviewers, a full quota of 192 respondents was recruited in March 2003, and 110 were still participating in the study a year later,

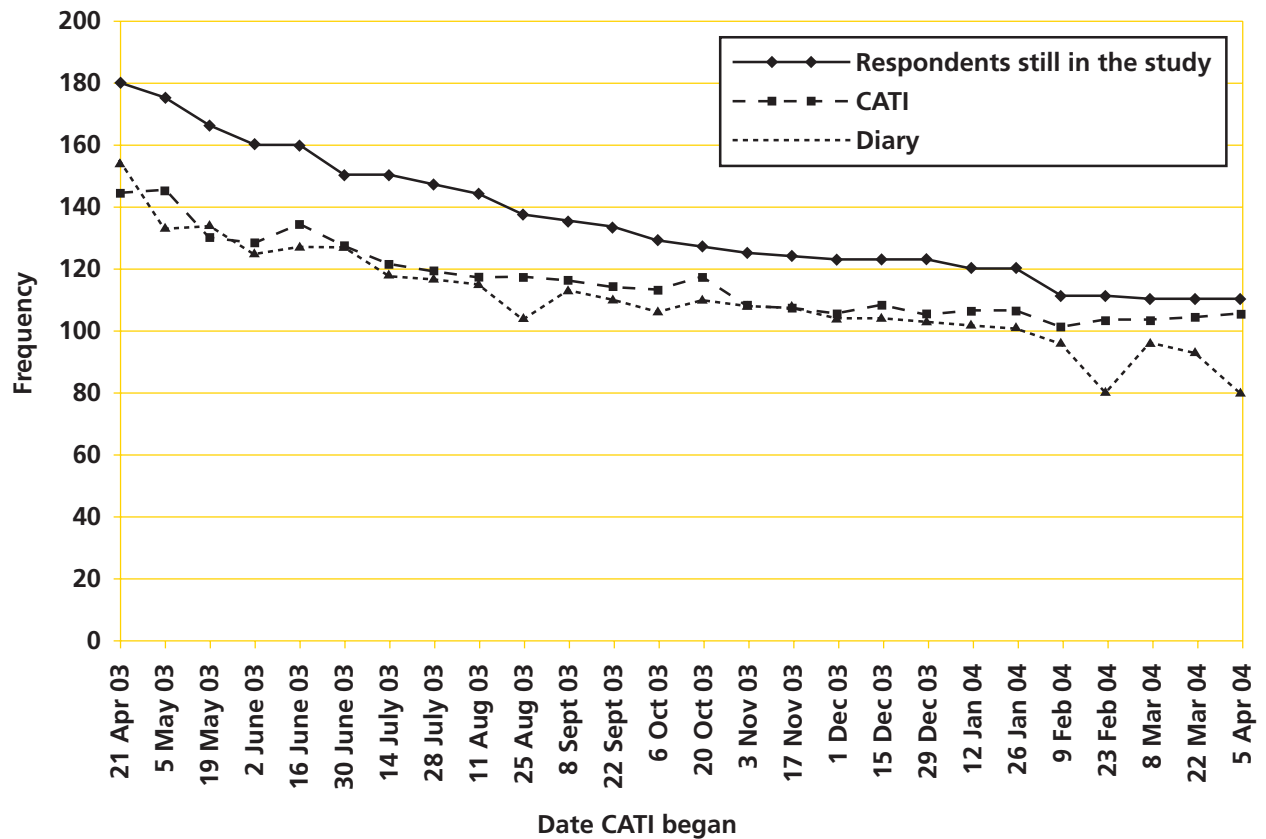
with income data from more than 100 still being collected in the telephone interviews for the last fortnight of fieldwork. As Figure 2.2 shows, attrition was slower in the second half than the first half of the study – half of the loss of original participants had happened by the sixth fortnight of data collection.

Table 2.1 Family characteristics at initial recruitment

Family characteristics	Target sample	Achieved sample	
	Per cent	Per cent	Number
Family type			
Lone parent	50	49	94
Couple	50	51	98
Number of dependent children			
0	0	1	1
1	40	27	52
2	36	47	90
3+	24	26	49
Tenure			
Own outright	5	4	7
Buying with mortgage	39	38	72
Part rent, part mortgage	1	1	2
Renting	54	57	109
Living rent free	1	1	2
Claiming Housing Benefit			
Yes	18	23	44
No	82	77	148
WFTC receipt (£/week)			
Low (<70)	36	42	81
Medium (70-100)	30	28	54
High (>100)	35	30	57
Number of adults in paid work			
0	0	8	16
1	85	73	140
2	15	19	36
Family work status			
Lone parent – in work	50	42	81
Lone parent – not in work	0	7	13
Couple – both in work	15	19	36
Couple – one in work	35	31	59
Couple – neither in work	0	2	3
Area			
London	16	16	30
South East	16	16	30
South West	16	16	30
Midlands	22	22	42
North East	16	16	30
North West	16	16	30
Total	100	100	192

Source: Barnes, *et al.* (2004), table 4.1.

Figure 2.2 Number of respondents still in the study and data collected each fortnight



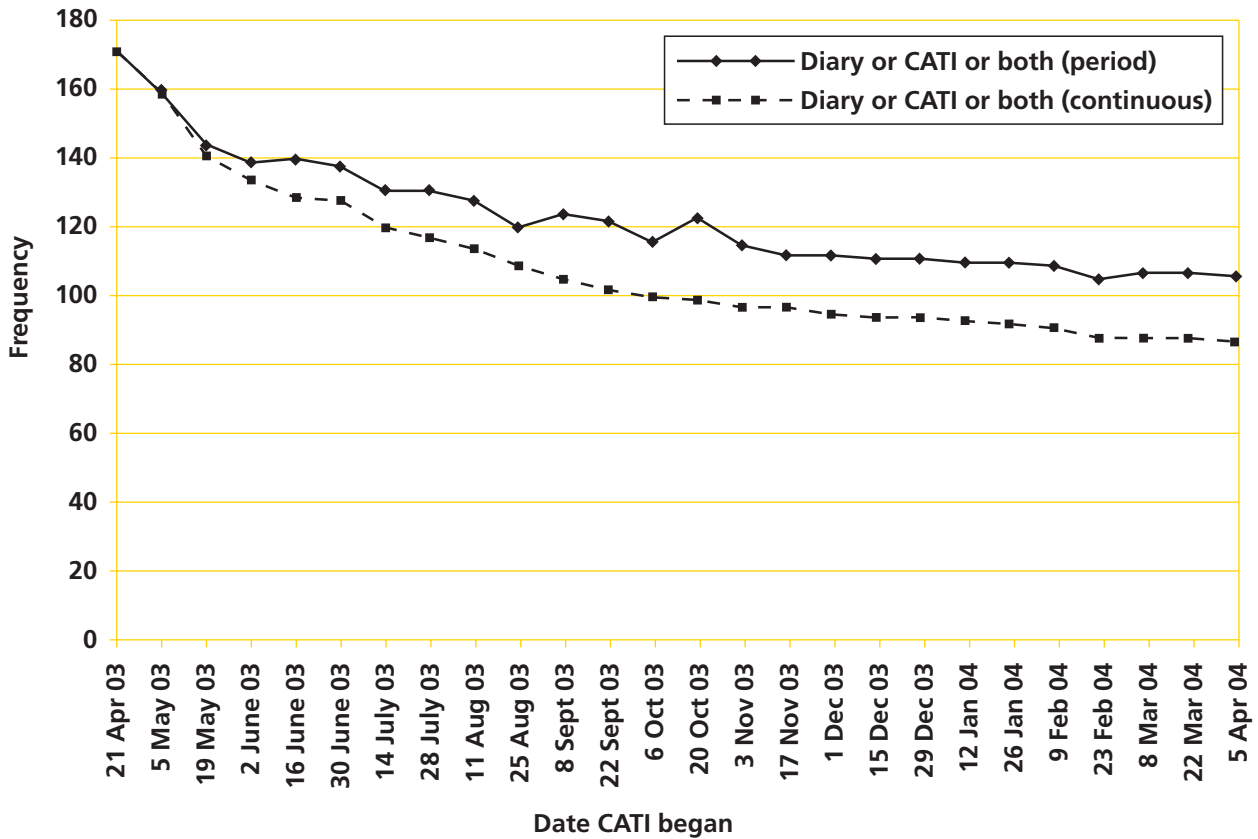
Source: Barnes, et al. (2004), figure 4.1.

Some of the participants missed income reports (by either CATI or returned diary) for some weeks so, as Figure 2.3 shows, the numbers who had supplied continuous information fell faster than the number of active participants. However, 93 supplied continuous information for all 52 weeks or direct information in the follow-up interviews

from which we could fill in missing items without having to make our own imputations of the missing data.¹³ This was more than half of those who had supplied information for the first fortnight. The analysis in Sections 3, 4, 5 and 6 below presents results across the whole year for this total of 93 cases.

¹³As we discuss below in connection with attrition, there were a further seven cases where with a limited amount of imputation we could construct a full record, but these are not analysed in this report.

Figure 2.3 Number of respondents supplying data each fortnight and number with continuous records



Notes:

1. Period effective information is the total of CATI returns plus diary returns for respondents who did not complete a full CATI interview.
2. Continuous effective information is defined as information given by CATI or diary in the period in question and all preceding periods.

Source: Barnes, et al. (2004), figure 4.1.

The aim of the study was to be able to examine patterns of income variability across families of different kinds, which was the motivation for the original recruitment targets. This could have been compromised if there was particularly high attrition amongst particular family types. In fact, as Table 2.2 shows, there was little differentiation in attrition rates amongst the different categories, comparing the 93 cases with continuous records with the 192 originally recruited. The continuation rate was slightly lower

than average for lone parents, families with three children and those who had the highest previous WFTC entitlement. It was somewhat above average for single earner couples. However, for none of the categories was attrition particularly high by comparison with others. There is no reason to suspect from these figures that we lost particular kinds of family during the year in a way that would bias the results described below strongly in any particular direction.

Table 2.2 Characteristics at initial recruitment: original sample and complete cases

Characteristics at initial recruitment (CAPI)	All families in original sample	Families who provided information for whole year*	
	Frequency	Frequency	Continuation %
Family type			
Lone parent	94	39	41
Couple	98	54	55
Number of dependent children			
0	1	0	*
1	52	23	44
2	90	49	54
3 or more	49	21	43
Tenure			
Own outright	7	7	*
Buying with mortgage	72	32	44
Part rent, part mortgage	2	1	*
Renting	109	52	48
Living rent free	2	1	*
Claiming Housing Benefit			
Yes	44	23	52
No	148	70	47
WFTC receipt			
Low	81	43	53
Medium	54	27	50
High	57	23	40
Number of adults in paid work			
0	16	8	*
1	140	68	49
2	36	17	47
Family work status			
Lone parent – in work	81	34	42
Lone parent – not in work	13	5	*
Couple – both in work	36	17	47
Couple – one in work	59	34	58
Couple – neither in work	3	3	*
Area			
London	30	16	53
South East	30	16	53
South West	30	16	53
Midlands	42	18	43
North East	30	14	47
North West	30	13	43
Total	192	93	48

Notes:

* Including from follow-up interviews.

Source: Initial face-to-face interviews in March 2003.

There is one further important aspect of potential differential attrition. This is that continued participation might be easier for those with the most regular income patterns, able simply to report the same income amounts for each week without too much effort. Those with more varied income patterns – and perhaps more complicated circumstances – might have been more likely to drop out. In this case our results below would *understate* the amount of income variability one would find in a more representative sample. Alternatively, those with unchanging circumstances might have dropped out of the study out of sheer boredom, which would have had the opposite effect. To check on whether there was any bias of this kind, we identified sixteen further cases where the respondents had completed at least the six-month follow-up interview, and where we could construct complete income records for at least 28 weeks. We then compared the variability of total incomes for these 16 ‘drop-out’ cases with that over the same lengths of time for the 93 cases for which we had complete records. This showed that the drop-out cases had a similar range of variability to the cases with complete records. Their average variability in the periods recorded was slightly lower than for the 93 cases, but their demographic circumstances more variable, including one couple who split after the period for which we can construct an income record. Overall, there is again little evidence of differential attrition in terms of variability of income in the first part of the year that would bias the results in any particular direction, although it does appear to have been harder to maintain records for the whole year for those experiencing changes in partnership status.¹⁴

The end result of the initial recruitment pattern and the rates of attrition of different family types is that the overall balance of the cases examined matches that of the population receiving WFTC in November 2002 fairly well. The following slight variations should be borne in mind when interpreting the later results:

- Rather more of the cases analysed were couples (58 per cent) than were lone parents (42 per cent), while nationally just over half of WFTC recipients were lone parents.
- As intended, more of the sample analysed were two-earner couples than the national proportion.
- Slightly more of the sample had low WFTC entitlement (and by implication higher income) than nationally.
- By the time of the start of the study in April 2003 a small number of cases no longer had an earner.
- Two-child families were somewhat over-represented.

As will be seen in Section 5 below, the first three of these mean that the sample is slightly disproportionately weighted towards family types that tend within the sample to have *lower* income variability than others. The fourth factor – a reflection of the dynamics of people’s lives rather than of sampling – is associated with *higher* income variability.

2.3 Data checking and cleaning

Given the amount of data collected and the intensity of the collection exercise, it was inevitable that there might be some problems with data quality. As those responsible for data collection put it, ‘...maintaining sample size meant a trade-off had to be made between sample size and data quality. For

example, too many checks within the CATI interview was likely to both lengthen the interview and irritate the respondent, thereby increasing the likelihood of attrition’ (Barnes, *et al.*, 2004, p.39). Some obvious errors occurred in compiling the original dataset from the interviews and diaries but were removed when NatCen produced a version of the dataset for analysis. This process included checking and correcting (if obviously incorrect) items such as:

- Extreme and implausible values of particular income items (occurring when, for instance, a decimal point had been entered in the wrong place).
- Totals not matching the total of the items they represented (for instance, total family earnings not matching the total of respondent and partner).
- Transposition of respondent’s and partner’s incomes in some weeks (perhaps because a different partner responded in a particular week).

In other cases there were temporary unexplained variations in what might have been expected to be constant items – such as the number of children. These were flagged in the dataset supplied to CASE, and we later made a judgement as to whether such variations were likely to be an error. Beyond this, our own inspection of an initial version of the dataset early in the summer of 2004 suggested anomalies where it seemed possible that an item had been omitted in error or misrecorded. In Section 3.2 below we explain how we used responses to specific queries about such anomalies raised in six month and final follow-up interviews in June 2004 to correct values in such cases to produce the final records used for analysis.

¹⁴As is explained in Section 5, we measured the variability of incomes using the Coefficient of Variation (CV) of incomes grouped in four-week periods. For the 93 complete cases, the CV averaged 16.5 per cent for the whole year (13 periods) and 16.4 per cent for the first seven periods. For the 16 drop-out cases the CV over seven periods averaged 14.6 per cent. For seven of these we could (with a small degree of imputation) construct 13 period records. The CVs for these cases averaged 13.6 per cent. Five of the drop-out cases had CVs below 10 per cent for the available record, nine between 10 and 20 per cent, and 2 above 20 per cent. This is similar kind of spread to the 93 full cases (see Table 5.1), although with rather more ‘medium variability’ cases. Within the sixteen cases, two lone parents repartnered and one couple split up during the period for which we have income data, and a further couple split up between the end of the income record and the six-month follow-up interview. This compares with one repartnering and no splits during the year for the 93 cases.

Summary

- The aim of the project was to collect detailed information on the incomes received week-by-week over a complete year by a sample of families. The sample was selected from families with children who had been receiving Working Families Tax Credit (WFTC) in the winter of 2002 to 2003.
- So far as we know, a study of this kind had not been carried out before. In preparation for the main stage of the study, a pilot survey was started in November 2002. The main stage of the study, analysed in this report, started in April 2003.
- In an initial interview in March 2003 details of income and circumstances were collected. Each family nominated a main respondent, who was trained in completing income diaries (each covering two weeks). The respondents were then telephoned fortnightly throughout the 2003-04 financial year to collect details of income in each of the previous two weeks (generally referring to these income diaries, which were later returned to the survey organisation).
- 192 respondents originally agreed to take part in the study, 180 of whom started the process of reporting income. Modest vouchers were given as incentives to those continuing with the survey each month. By the end of six months, 129 were still participating, and by the end of the year 110 respondents were still in the study, 93 of whom produced information from which we could construct income records for the whole year. This was a lower rate of attrition than we initially expected for such an intensive survey and meant that the sample analysed is more than 50 per cent greater than the original target.
- The original sample was selected to give a mixture of lone parents and couples, owners and tenants, one and two-earner couples, and those entitled to larger or smaller amounts of WFTC (and hence higher or lower incomes within the range entitled to it).
- There was no evidence of particular bias in the pattern of attrition over the year either by family characteristics or by the variability of their income in the first part of the year, although it does appear to have been harder to maintain records for the whole year for those experiencing change in partnership status.
- 114 participants took part in a face-to-face interview in December 2003, and 83 in a final follow-up interview in June 2004 which asked both about attitudes to income variability and about particular parts of the respondents' records where there were apparent anomalies or gaps in the fortnightly reports.
- Nearly all of the participants gave permission at the start of the study for their reports to be compared (on an anonymised basis) with the Inland Revenue's tax credit records.
- The 93 cases analysed in the rest of the report have a composition broadly matching that of WFTC recipients in November 2002, but with somewhat higher proportions than nationally of couples, particularly with two earners, and of those with lower WFTC entitlements.

3 The data obtained

The core dataset consists for each responding family of a set of 52 weekly records of income of different kinds:

- Gross and net earnings (before tax credits) paid that week to the respondent or their partner (possibly coming from more than one job).
- Any tax credits paid with the pay of either partner (such as the Working Tax Credit).
- Income received by children (such as from paper rounds or holiday jobs).
- Child support payments from absent parents.
- Other kinds of market income, including interest, dividends, and gifts.
- Tax credits paid directly to the family, such as the Child Tax Credit (and sometimes WTC at the start of a claim), and including tax credits for child care paid with WTC to the main carer.
- Child Benefit.
- Other social security benefits, such as Income Support, Jobseeker's Allowance, or Incapacity Benefit.
- Housing Benefit, if paid directly to the family, rather than given as a reduction in rent.

This last item is the most problematic. Many people receive their Housing Benefit (HB) not as a benefit payment, but as a reduction in the net rent they have to pay (potentially reducing it to zero for those receiving Income Support). Some people are only vaguely aware of its value. For those receiving the benefit directly, the core dataset does contain records of HB receipts, although these were received by only a few of the cases we examine, and even in some of these cases, there appears to have been a switch from cash payments to rent reduction during the year. For other HB recipients, we do not have weekly records of payments, but do have information collected at the initial (CAPI)

and six- and twelve-month follow-up interviews on the position at that time. Similarly, Council Tax Benefit is credited through a reduction in Council Tax payable, and we were not able to collect data on its value week-by-week, but did collect information about it at the start and end of the study.

In later analysis we hope to combine information from all of the components of the survey to reconstruct flows of HB (and Council Tax Benefit) through the year, but at this stage we have not done so. The analysis presented below therefore *excludes* Housing Benefit (and CTB) receipts, as to include it in the few cases where we have records of it being paid directly would not represent the position of the majority of its recipients, where we have only incomplete information on the way it changed over the year. This means that the total incomes we report are not strictly comparable with, for instance, the 'Before Housing Costs' (BHC) measure of income used in the DWP's annual Households Below Average Income (HBAI) analysis, as the BHC measure includes both of these items.

As far as measurement of income variability is concerned, income excluding HB and CTB could be more or less variable than that including them. On the one hand, a family's HB and CTB might be constant throughout the year, as they would be if their other circumstances were unchanged and rent as well as Council Tax was fixed at the start of the year (and payments were made regularly). In this case, income variability would be *lower* when they were included in the total. On the other hand, if HB and CTB receipts varied significantly during the year – as can be the case where there are problems in administration, as sometimes reported, and as certainly appears to be the case for Housing Benefit for some of our cases – variability of income including them might be increased.

3.1 Gaps and imputation

As discussed in the last section, although respondents had been queried during telephone interviews about major changes from fortnight to fortnight, initial inspection of the raw data collected revealed some anomalies and puzzles even for the cases where we had responses every week. For instance, regular receipts of Child Benefit might be missing in one period, pay might be missing in one month or week, or the amounts recorded in one period might be very different from otherwise regular payments. In other cases data were missing completely for a short period (for instance when people were on holiday). Respondents were asked about such anomalies and gaps (which would not have been evident in a one-off interview) in the six- and twelve-month follow-up interviews, and we used these responses to create the dataset used for analysis.¹⁵ Examples of the kinds of change made following such responses include:

- Pay (and associated tax credits) which were missing in certain periods (for instance around summer holidays – although some respondents were simply unpaid when on holiday).
- Weeks when otherwise regular benefit payments were missing (for instance, Child Benefit payments).
- Exceptional income items (such as interest or, in one case, an armed forces pension) reported in one period, where on checking they turned out to have occurred at other times as well.
- Unexplained temporary changes in characteristics, such as number of children or tenure, where inquiry suggested that this was simply a recording error.

As well as these changes resulting from the follow-up interviews, there were a few cases where we corrected elements in the dataset collected. The most important of these were cases where the

¹⁵Of course, these interviews could be more than six months after a period for which data was queried and respondents might not have been able to recall details. However, the main queries were about major items such as whether pay had been received during a holiday period, where this is less likely to be a problem.

same income had been recorded twice, in particular where a lone parent had recorded child support payments as her own income, but these had also been listed as ‘partner’s child support’, although the partner was, in fact, absent.

In this report we analyse the dataset as it results from these adjustments only. There are a few other cases where we suspect that there might still be gaps or errors in the incomes reported, but do not have positive confirmation from the follow-up interviews, and so have not made any corrections. It is possible therefore that some of the variability we report below represents variation in reporting accuracy over the year, and a more aggressive approach to imputation

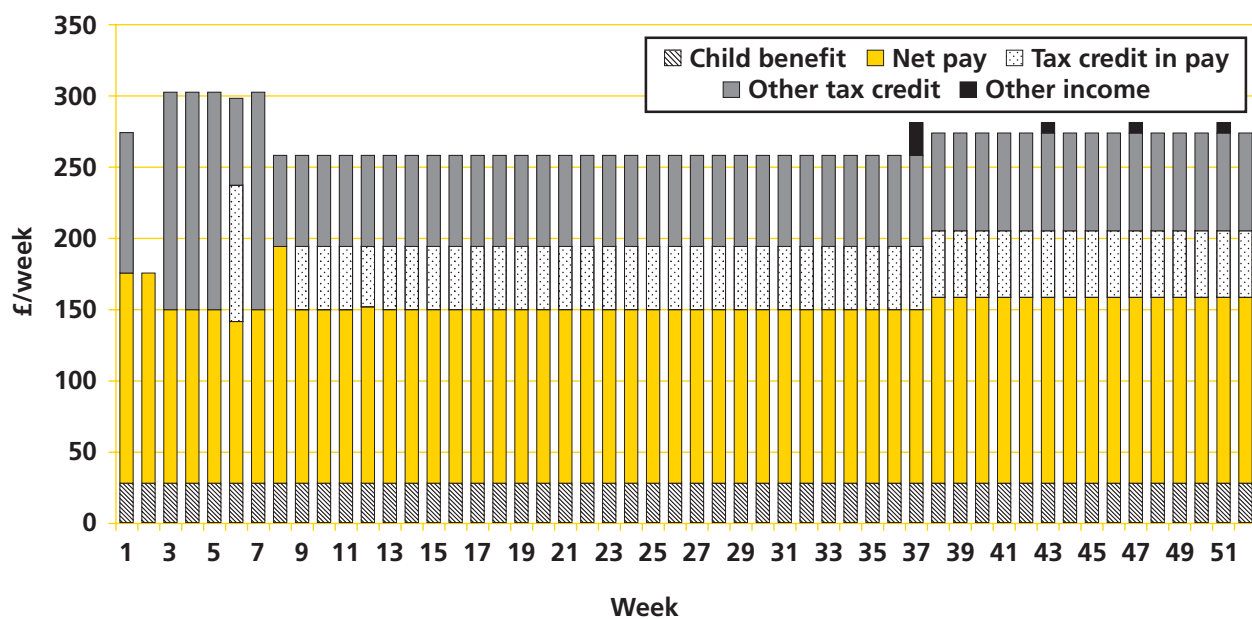
would have reduced it.¹⁶ However, this appears to be a relatively small problem overall – in nearly all the cases we report, there are plausible reasons for the patterns observed. In addition, the comparisons with administrative data discussed in Section 7 suggest that the dataset derived in this way is, in fact, complete or nearly complete.

3.2 Examples of weekly income patterns

Figure 3.1 gives an example of the data we have collected where the pattern is very regular from week to week. In this case the respondents are a couple with two children, one weekly-paid earner

throughout the year, who are owner-occupiers with a mortgage. Apart from a small fluctuation in the first few weeks associated with the introduction of the new tax credits and a pay increase in Week 38, their income is extremely regular. For most of the year it simply consists of the earner’s weekly pay, a tax credit (WTC) paid with that pay, and a tax credit (CTC) and Child Benefit paid directly each week. If all cases had been like this, the study would have yielded two valuable conclusions, that an income observation in one week is as good a guide to income over the year as any other, and that this group of families’ incomes follow a predictable, if rather boring, pattern.

Figure 3.1 Example case with regular weekly income



Note: One-earner couple with two children and mortgage.

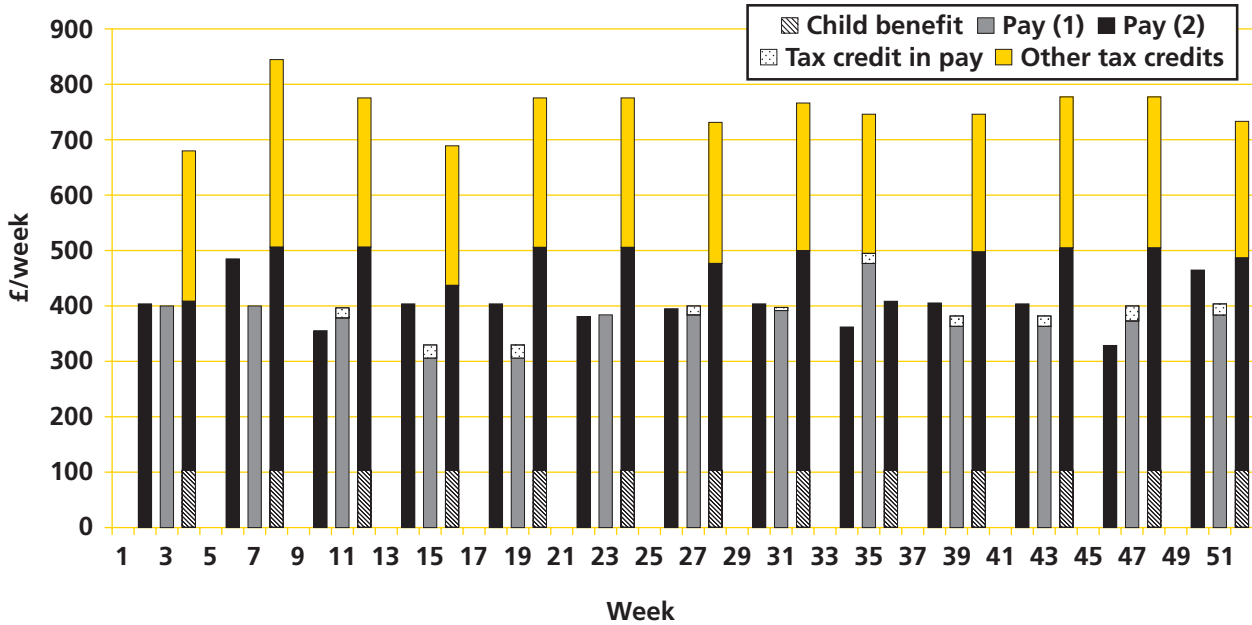
Few cases are quite so constant from week to week, however. Most obviously, some people are paid monthly or every four weeks, rather than weekly. Figure 3.2 gives an example of another predictable case, but one where payments come in some weeks rather than others. In this

case, a two-child couple both have earnings, each paid four-weekly in successive weeks, and with other income items – tax credits and Child Benefit – arriving with similar regularity. In a case like this income in a particular week would not give a good guide to their

circumstances, but aggregated over four weeks it would. Again, if most cases were like this, the implication would be that incomes were steady through the year, although care would have to be taken to ensure that the period to which they referred was understood.

¹⁶For instance, in the case illustrated in Figure 3.4 we could suspect that Child Benefit was actually paid in weeks 22 and 24. Income Support may also have been paid in week 6, but we have no direct evidence on which to make these assumptions. If these imputations were made, the effect would be to reduce the measure of variability used below, the coefficient of variation (CV) from 42.2 to 39.5 per cent. Conversely, if Child Benefit was imputed in Period 3 for the case illustrated in Figure 3.7, the effect would be to increase the CV from 8.8 to 10.2 per cent. In later work we will explore the potential effect on the overall results of such imputations.

Figure 3.2 Example case with regular fortnightly and four-weekly income



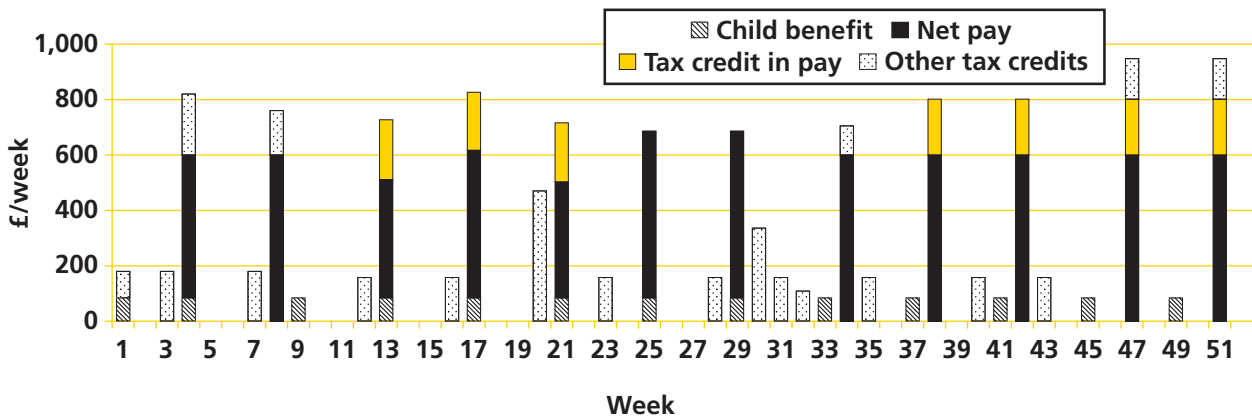
Note: Two-earner couple with two children and mortgage.

As it happens, only a small minority of our sample are of either of these kinds, and many follow surprisingly varied patterns. Figure 3.3 shows a case where, although there is no particular change in the family's circumstances across the year,

income follows a much less regular pattern. This case is a lone parent, paid monthly, with one child. Net pay varies from month to month between £450 and £600 per month in the first half of the year, although it settles down in the last

five months. Tax credits vary as well. Child Tax Credit arrives regularly through the year, but Working Tax Credit varies both in amount and in how it is paid. WTC is paid with pay in Weeks 13 to 21 and from Week 38, but directly at other times.

Figure 3.3 Example case with unchanged circumstances but varying income



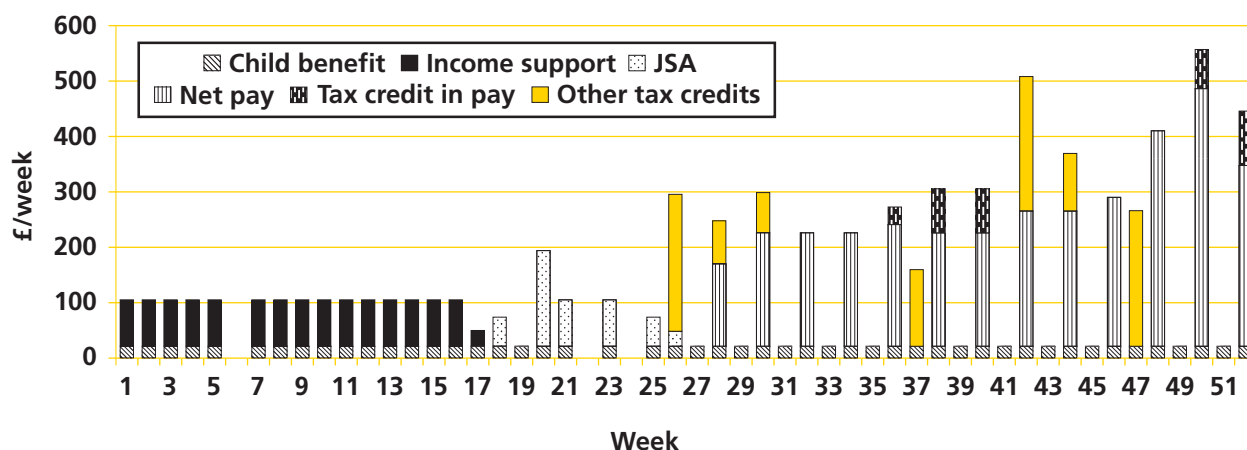
Note: Lone parent with one child and mortgage.

In other cases at least some of the income variation observed relates to a change in circumstances: children are born or leave home; lone parents become couples; people lose or gain jobs. In reaction to such changes not only market income changes, but so may people's entitlement to benefits and tax credits. Figure 3.4 gives an example of a case where income varies quite

substantially as a result of such a change. This case is for a lone parent has a single child. Unusually for the sample, she was no longer receiving tax credits by April 2003, but was now on Income Support. Her child reached the age of 16 in Week 17 of the study. As a result, she was no longer entitled to the Income Support which she had previously received every week. Instead, she moved to Jobseeker's

Allowance, payments of which took a few weeks to settle down, and Child Tax Credit, which took ten weeks for the first (catch-up) payment to arrive. She moved into a fortnightly-paid job from Week 28, coming off JSA, and by Week 48 her fortnightly net pay had risen to £400. More commonly, the variability we observe is around a level which does not trend upwards in this way.

Figure 3.4 Example case with changing circumstances



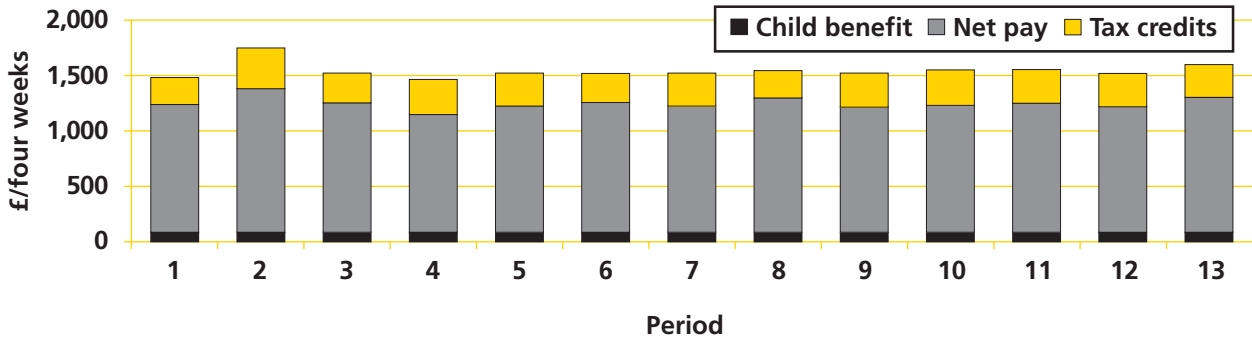
Note: Lone parent with one child; tenant

3.3 Four-weekly income analysis and monthly incomes

The examples above will already have made one finding from the study clear: for most families it does not make sense to look only at their income week by week, as many components are received less regularly than this. Many people are paid fortnightly or every four weeks rather than weekly, and many receive benefits and tax credits in four-weekly installments. While it might be

meaningful to look at variation literally from week to week for a small number of cases such as that shown in Figure 3.1, for most cases this would not make sense. Instead for many people it makes sense to look at what happens to their incomes over successive periods of four weeks. The analysis in later sections is therefore of family incomes over the year divided into thirteen four-week periods. Figure 3.5 shows the results of this transformation for the case previously illustrated in Figure 3.2.

Figure 3.5 Example with regular income presented over thirteen four-week periods



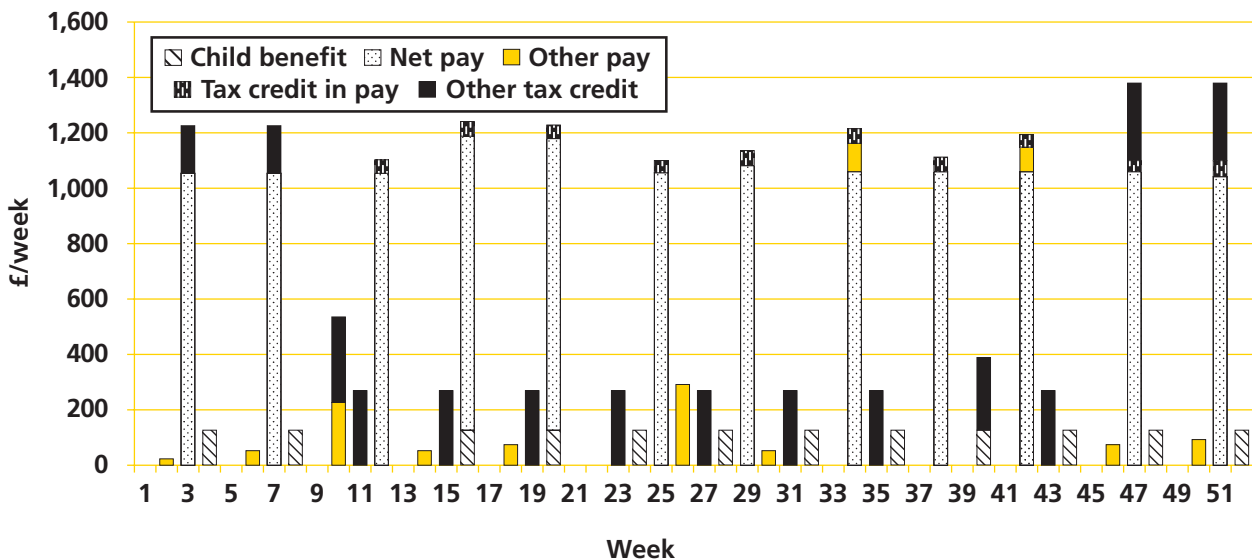
Note: Two-earner couple with two children and mortgage (as in Figure 3.2).

There was one further issue to be addressed before we could start analysis of income variability. That is that some people receive their pay monthly, sometimes with tax credits paid alongside pay at the same time. However, the data were collected weekly across the year. The effect of this can be seen in Figure 3.6. Here, income is paid in a fairly regular way throughout the

year, but its largest component is a monthly pay packet of around £1,060. For most of the year pay arrives with four-week gaps between each payment recorded in our data. However, every so often the accumulating lengths of months means that there is a five week gap. When income of this kind is aggregated into thirteen four-week periods, twelve of the periods have a

monthly pay receipt within them, but one of the thirteen does not. In this case there is a gap in Period 6 (Weeks 21-24). If we left the data in this form, the pattern would be dominated by a dip in the four week period which happened not to contain a monthly payment. It might look as if income was highly variable, just as an artefact of this effect.

Figure 3.6 Example case with monthly income items



Note: Couple with two children and mortgage.

There is no entirely satisfactory way of dealing with this problem. Where income diaries were returned we might be able to establish exactly what period each monthly payment referred to, and could then reappportion the monthly amounts over the thirteen four-week periods. However, we do not have these for all the respondents with income records, and while we could make a guess at the answer in some cases, there is no robust way of doing so. Instead we followed the following protocol:

- Where there were twelve monthly payments through the year, we reallocated a thirteenth of each of these amounts (and associated tax credits if these were equally regular) into the four week period where there was no payment. Just under half of our cases involved this kind of adjustment for the net pay of one or more of the adults. If monthly pay was

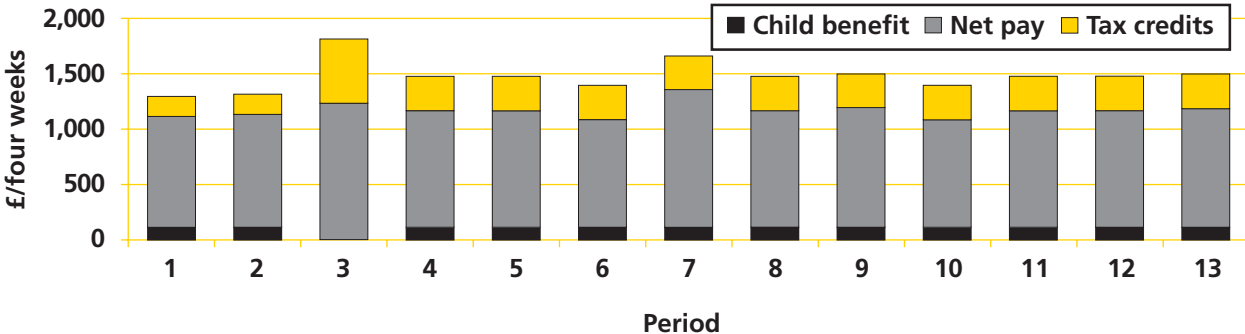
constant over the year, this would give a completely accurate impression of the income flow. Each four-week period would correctly be allocated twelve-thirteenths of monthly pay. However, in cases where monthly pay varied, the 'missing period' is being allocated what is in effect an average amount for the whole year. In some cases this may create a disturbance in income at that time which really reflects a change happening at another time in the year.

- In a significant minority of other cases with monthly income items there were other changes during the year, such as a job coming to an end, with people either becoming unemployed, or moving to a new job with a different payment pattern. This meant that a missing period could not be reallocated income from twelve other periods. In such cases, we took the

longest stretch of what appeared to be monthly income receipts, and applied a similar rule to apportion income to the missing period from the others within this stretch.¹⁷

Figure 3.7 shows the result of this procedure as applied to the case illustrated in Figure 3.6. While not entirely ideal, it gives a fair impression of income variability across the year, despite the differences in time periods over which components of family income are paid. Note, however, that variability week-by-week, which this process disguises, may still matter for some families, particularly if budgeting over very short periods (see Section 8). There may also, of course, be some cases where variation between two periods reflects a regular payment which has arrived only a few days late or early, but crossing the boundary between periods.

Figure 3.7: Example with monthly income allocated over 13 periods



Note: Couple with two children and mortgage (as in Figure 3.6)

¹⁷Thus, for instance, in a case where the first seven four-week periods contained six receipts of pay with one gap, a seventh of each amounts in the periods with pay would be reallocated into the 'missing period'. 14 cases had adjustments of this kind for part of the year.

3.4 Total incomes across the year

Table 3.1 gives basic information on average total income and its components over the 2003-04 financial year for our sample cases both as a whole and within various categories by (initial) characteristics.¹⁸ Net pay for the cases as a whole was £10,000, rather more than this for couples and owner-occupiers, and less for lone parents and tenants. For two-earner couples net pay approached £16,000. Children's income was generally small, but in a few cases was significant, particularly for the larger families. Other

market income was generally rather small, but averaged nearly £1,200 for lone parents, mainly as a result of child support payments. Child Benefit was an important item for all the families, obviously increasing in size as expected with the number of children.¹⁹ Other social security benefits were important for those that started the year with no earner (despite having previously received WFTC).

Tax credits were the second largest income item for the families, nearly half as much as their net pay. They were slightly greater for lone parents than for couples. The average of £4,610 of tax credit receipts

reported by our sample may seem large to readers unfamiliar with the tax credit system, but it is almost identical to the average entitlement to tax credits of £4,720 in 2003-04 for all UK tax credit recipients with children who were receiving more than the 'family element' of Child Tax Credit (and so comparable with those who would previously have been entitled to WFTC).²⁰

Together the elements of income gave average total net income for the year of £17,200, with differences between groups as one would expect.

Table 3.1 Average total net income (£) and components, by initial characteristics, 2003-04

	No. of cases	Net pay	Child's income	Other market income	Child benefit	Other benefits	Tax credits	Total
All	93	9,990	50	650	1,260	650	4,610	17,200
Lone parents	39	7,580	60	1,190	1,170	740	4,780	15,520
Couples	54	11,720	50	260	1,330	580	4,490	18,420
No earner	5	[1,980]	[0]	[210]	[1,190]	[4,650]	[3,320]	[11,350]
1 earner	73	9,380	50	770	1,270	490	5,040	17,000
2 earners	15	15,610	60	190	1,210	90	2,990	20,140
Owner-occupiers	38	11,860	60	910	1,240	330	4,350	18,750
Tenants and other	55	8,690	50	470	1,270	870	4,790	16,140
1 child	26	8,770	50	400	820	260	3,580	13,880
2 children	48	10,510	30	620	1,290	930	4,580	17,950
3+ children	19	10,330	120	1,060	1,780	460	6,110	19,650

Note: Benefits and total income exclude Housing Benefit and Council Tax Benefit. Figures rounded to nearest £10, so totals may not match due to rounding error. Figures for 'no earners' reflect only five cases.

Across the sample, and within each category, there is quite a wide degree of variation in the financial circumstances of the different families. Table 3.2 shows the number of cases within various ranges of total annual incomes divided by family type and by number of earners. Although the sample was selected from those

originally receiving WFTC in the winter of 2002-03, which restricted the income band we are covering, by 2003-04, some people's circumstances had changed considerably. For comparison it might be noted that ONS analysis suggests that mean *household* net income (excluding HB and CTB) for the population as a

whole in 2003-04, was £24,400 (Jones, 2005, Appendix 1, table 14).²¹ The range of incomes on this basis for households as a whole was from an average of £6,600 for the poorest tenth to £22,800 for the sixth lowest tenth.²² Our families thus had incomes ranging roughly from the second to the sixth tenths of the

¹⁸Note by comparison with Table 2.2 that there had been some changes in circumstances between the initial face-to-face interviews in March and the start of the income collection in April, with only 5 cases actually starting the year with no earner and slight variations in numbers of children.

¹⁹Based on the number of children each family had at the start of the year and rates of Child Benefit in force, the average entitlement to it might have been expected to have been £90 higher than the £1,260 shown, suggesting that the weekly reports had captured 93 per cent of the amounts the families were due.

²⁰HMRC (2005a), table 1.1. As discussed further in Section 7, *receipts* of tax credit in 2003-04 do not necessarily match the *entitlements* calculated by HMRC precisely.

²¹Some households in the ONS analysis contain more than one family, so the figures are not exactly comparable.

²²With households *ranked* according to income adjusted for family size, which the families in our sample in Table 3.2 are not. The income totals quoted are unadjusted in both cases, however, and so are comparable. Note also that the ONS analysis refers to households, rather than families, and a small number of households contain more than one family unit.

household income distribution. Within the group of non-retired households with children more specifically, the families were grouped within the second to fourth decile

groups (Jones, 2005, Appendix 1, table 21). These figures are consistent with the sample being drawn from families with children with low- to middle-incomes.

Table 3.2 Type of family in study by range of total annual net income (£)

Range of total annual net income (£000s)	All	Lone parents	Couples	No earners	One earner	Two earners
Under 10	9	9	-	3	6	-
10-12	3	-	3	1	2	-
12-14	12	6	6	-	11	1
14-16	13	6	7	-	13	-
16-18	13	6	7	-	11	2
18-20	18	4	14	-	13	5
20-22	12	4	8	-	8	4
22-24	5	1	4	1	3	1
Over 24	8	3	5	-	6	2
All	93	39	54	5	73	15

Note: Income excludes Housing Benefit and Council Tax Benefit. Families classified by initial characteristics in April 2003.

Finally, Table 3.3 and Figure 3.8 give an indication of how reported incomes varied on average across the year between the four-week periods we analyse. For net pay, there is no clear picture of seasonality, apart perhaps for the peak reached in Period 9, the four weeks

ending in mid-December, just before Christmas. Other market income is higher in Period 4 (July) than in other periods, though it is not obvious why this should be. Otherwise the most pronounced pattern is that tax credits (including final WFTC payments for some families) were a

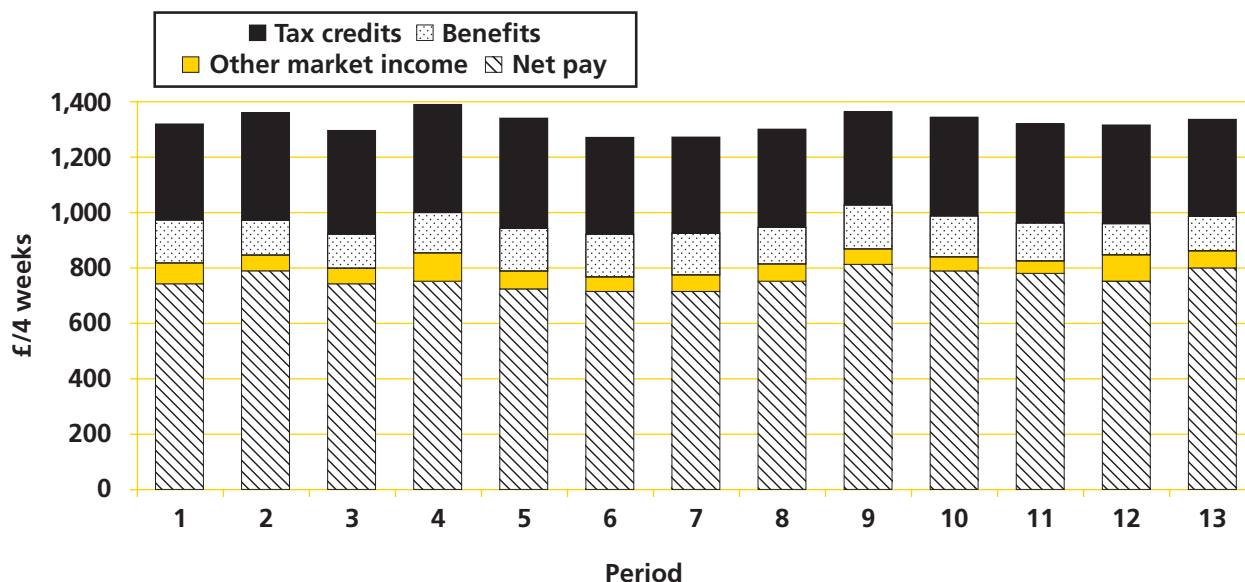
little lower in the first period than in the rest of the year as the new system was introduced, and somewhat higher in periods 4 and 5 when catch-up payments were being made to some families whose payments of new tax credits had not started immediately.

Table 3.3 Average income by component and four week period (£)

Period	Net pay	Child's income	Other market income	Child benefit	Other benefits	Tax credits	Total
1	756	3	56	102	73	330	1,320
2	795	0	46	94	50	365	1,350
3	756	0	39	94	45	363	1,297
4	763	3	86	103	43	391	1,389
5	738	0	52	103	52	385	1,330
6	736	4	38	92	51	353	1,274
7	736	8	42	98	48	351	1,283
8	765	6	37	97	44	354	1,302
9	806	6	55	94	52	351	1,365
10	795	5	52	94	46	341	1,334
11	777	6	40	98	47	350	1,318
12	767	5	61	96	46	341	1,316
13	798	5	44	94	48	338	1,327
Total	9,990	50	650	1,260	650	4,610	17,200

Note: Averages for 93 cases.

Figure 3.8 Variation in average four-weekly income over the year



Note: Averages for 93 cases.

Summary

- The cases in the study showed considerable differences in the income patterns they followed. While a few had regular and fairly constant income items across the year, many had substantial variations during the course of it.
- While we have data on incomes week-by-week, patterns of payment mean that it makes sense to analyse these aggregated into thirteen four-week periods.
- For those with monthly income items, analysis on this basis requires apportionment of these into (up to) thirteen four-weekly periods, to avoid artificially large variations between periods.
- The analysis in this report excludes income from Housing Benefit and Council Tax Benefit. Income including them may be either more or less variable than that of income excluding them.
- As intended, the cases cover a range of different types of family both in terms of characteristics and income level.
- Average total net family income for the cases was £17,000 (excluding Housing and Council Tax Benefits). Most of the families had total net incomes in the range between £12,000 and £22,000. This corresponds roughly to the second to the sixth tenths of the income distribution for all households (some of whom contain more than one family unit) in 2003-04, or from the second to the fourth lowest tenths of the distribution of non-retired households with children.
- Their net pay averaged £10,000. It made up two-thirds of total net income for the couples in the study, but about half for lone parents.
- Their other market income was significant – averaging £1,200 over the year for lone parents, mainly from child support payments.
- Their income from social security benefits averaged £1,900 over the year. It was most important for the small number of families that started the year without an earner.
- Tax credits made up a substantial part of these families' incomes: 24 per cent of total income for couples in the study, and 30 per cent for lone parents. The total amount received averaged £4,600, very close to the average national entitlement for families with children who were entitled to more than just the family element of Child Tax Credit in 2003-04.
- For the sample as a whole there was no pronounced seasonality in income receipts over the year. There was somewhat higher net pay in the period just before Christmas. Tax credits receipts were lower in the first period, and higher in the fourth and fifth periods than in the rest of the year.

4 The trajectories followed by total family incomes over the year

One way of analysing the data we have is to group the cases by the type of trajectory that their incomes follow over the thirteen four-week periods for which we have data. Previous analysis of annual panel data from the British Household Panel Study (BHPS) has done this to analyse the patterns followed by people's incomes over up to ten annual observations of income (Rigg and Sefton, 2004; Hills, 2004, chapter 5). Given that one might expect even the most stable of incomes to vary a little over time, it is a matter of judgement how one distinguishes between trajectories following one pattern or another. Our initial expectation was that at least a significant minority would have incomes remaining within quite narrow boundaries from period to period, and that others might do so either side of a step up or down in income resulting from an annual pay rise or some other change in circumstances. What we found, was, however, rather different, as we show below.

Building on the definitions used in such previous research, and following inspection of the data, we divided the cases into eight different trajectory types defined below.²³ We examined each case using the criteria successively in the order given, so that the case was allocated to the first trajectory type for which it met the conditions. In the absence of previous research of this kind, the labels

applied to these types are our own.

- a) **Highly stable** income across the year: cases where total income in each of the thirteen periods is within plus or minus 10 per cent of the case's mean income for the year (and so within a band twice as wide as that observed for the sample as a whole in Figure 3.8).
- b) **Stable cases**, where income in at least eleven of the periods was within plus or minus 10 per cent of its mean, and for the other one or two was within 20 per cent of the mean.
- c) **Broadly stable** cases, where income in at least eleven periods was within the wider range of plus or minus 15 per cent of the mean, and for the other one or two was within 25 per cent of the mean.
- d) **Stable cases with blips**, where income in at least ten periods was within 15 per cent of the mean, but in up to three periods could be much further away.
- e) **Rising** income during the year: cases where income in each period in a first part of the year was below the mean for the year as a whole, and for the rest of the year was above the mean (with no more than one period in total breaking with this pattern).
- f) **Falling** income during the year: cases where income in each period in a first

part of the year was above the mean for the year as a whole, and for the rest of the year was below the mean (with no more than one period in total breaking with this pattern).

- g) **Erratic income**: remaining cases where income in at least ten periods is within 25 per cent either side of the mean.
- h) **Highly erratic income**: all other cases.

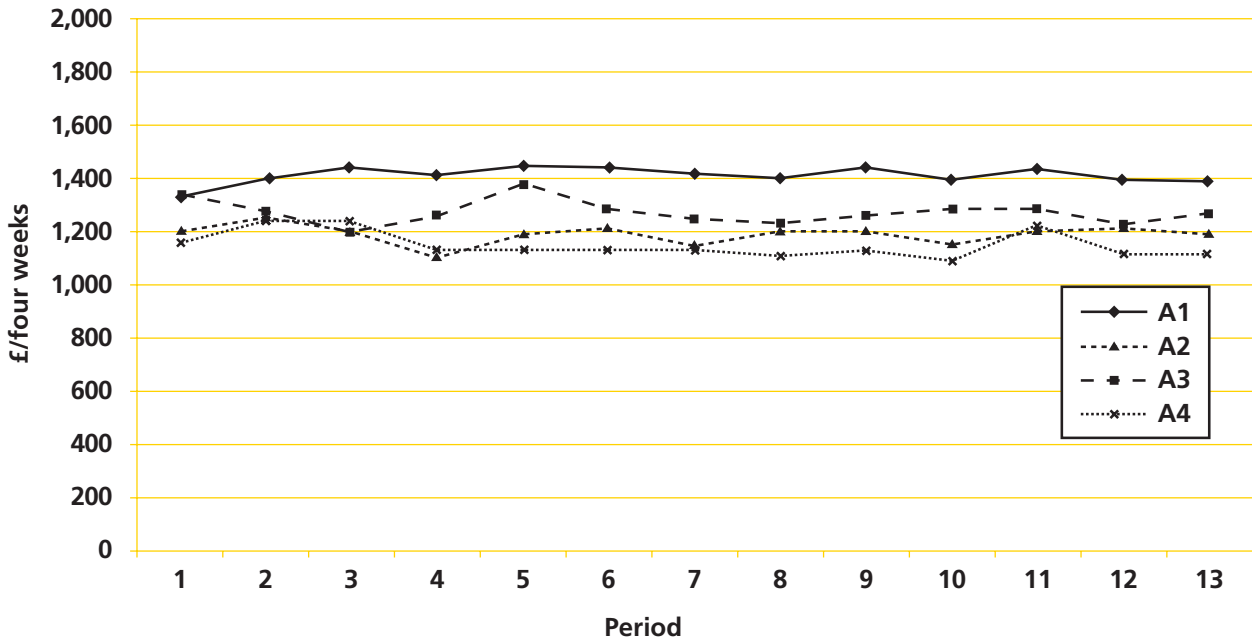
Given the small numbers falling into each category, some of these categories are grouped in tables below presenting information on sub-groups of the sample.

To illustrate both the implications of these trajectory types and to give an impression of the data we have collected, Figures 4.1 (a)-(h) give examples of time-lines for total net family income for up to four cases falling within each of these categories, with the time-lines for each case labelled A1, A2, and so on (only three cases were in category (f)). We describe in the text below one typical case of each kind.

The cases illustrated in Figure 4.1(a) have roughly constant income over the year. Case A1, marked with diamonds in Figure 4.1(a), is that of a couple with three children with regular pay totalling around £800 in each four weeks throughout the year, and with equally regular income from child benefit and tax credits.

²³In later research using the data it may be useful to investigate how the trajectories group using more sophisticated techniques, such as cluster analysis.

Figure 4.1(a): Highly stable cases

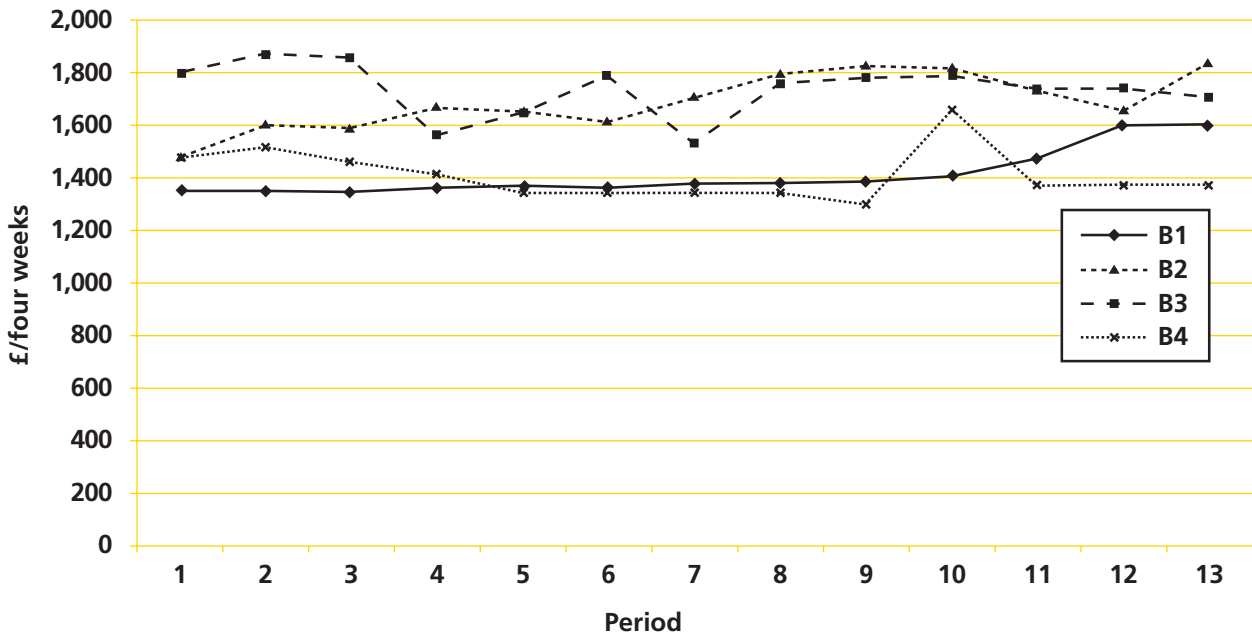


The cases shown in Figure 4.1(b) also have income much the same over the year. As an example, Case B1 (marked

with diamonds) is also for a one-earner couple with three children. Their four-weekly pay is constant throughout the

year at just under £800, but their income from tax credits rises in the last twelve weeks of the year.²⁴

Figure 4.1(b): Stable cases



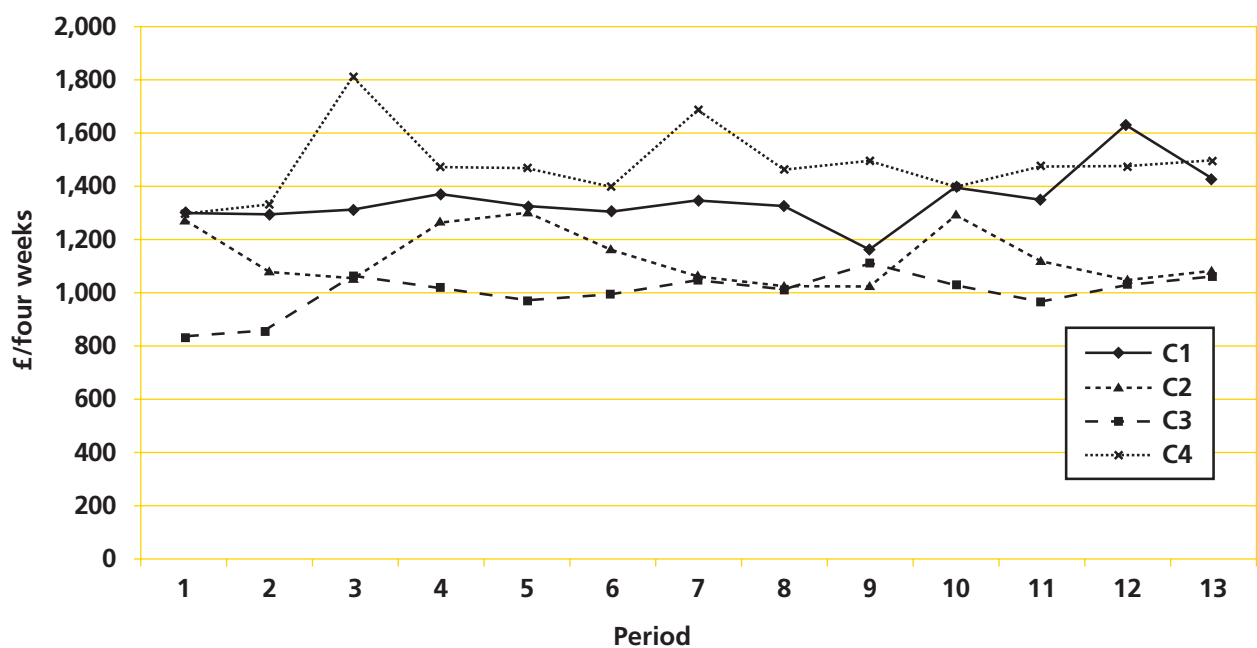
²⁴From the administrative data described in Section 7, we know that this results from a new assessment of entitlement by HMRC in January 2004, based on reported income for 2003-04 that was slightly lower than it had been in 2001-02

The cases shown in Figure 4.1(c) have more variable income (with income differences between particular periods of up to 30 per cent of the case's mean), but it remains broadly stable over the year. For instance Case C1 is a one-earner couple with two children. One

partner's net pay is fairly constant at around £400 every four weeks for the first eight periods, but then drops in Period 9 before rising to a new and higher level from Period 10 as they switch to a job paid about £300 every fortnight. This change in job is associated

with a ten week gap in WTC receipts before a catch-up payment in week 47. Payments of Incapacity Benefit are made regularly to the respondents' partner throughout, as are direct payments of Child Tax Credit to the family.

Figure 4.1(c): Broadly stable cases



The fourth group of cases shown in Figure 4.1(d) also have incomes that are fairly stable across the year, but with some periods – ‘blips’ – varying substantially from the mean. Case D3, marked with squares, is typical of this

group. They are a one-earner couple with two children. Net pay is fairly stable at around £300 per week throughout the year (until an increase in the last period). However, for the first two periods they did not receive any tax

credits (although they had already been assessed at the level they stayed through the year in February 2003).²⁵ They then received a lump sum catch-up payment of £900 in the third period, after which income settled down.

²⁵Note that, as former WFTC recipients, most of the cases we examine already had an income assessment for the year made before it started (confirmed by the administrative data discussed in Section 7). However, payments did not necessarily start immediately, as can be seen from the aggregate data in Figure 3.8. For some cases there was therefore a gap between the start of the year and the first payments of the new tax credits.

Cases following a rising trajectory are illustrated in Figure 4.1(e). Case E4, for instance, is the lone parent previously illustrated in Figure 3.4, who moves from Income Support to Jobseeker's Allowance and then into work, with pay rising towards the end of the year.

By contrast, the three cases in Figure 4.1(f) have incomes that fall over the

year. Case F1 is a two-child family. One partner starts with net pay of around £1,000 per month, but this falls to under £400 in the middle of the year, and to zero for the last four periods, partly offset by new receipts of £250 of Incapacity Benefit every four weeks from Period 9. The other partner has more stable net earnings of around £280 every four weeks.

The group illustrated in Figure 4.1(g) have much more variable incomes. Case G3 is the lone parent whose income was previously shown in Figure 3.3, whose net pay varies between £450 and £600 per month, and whose Working Tax Credit receipts also vary during the year.

Figure 4.1(d): Stable with blips

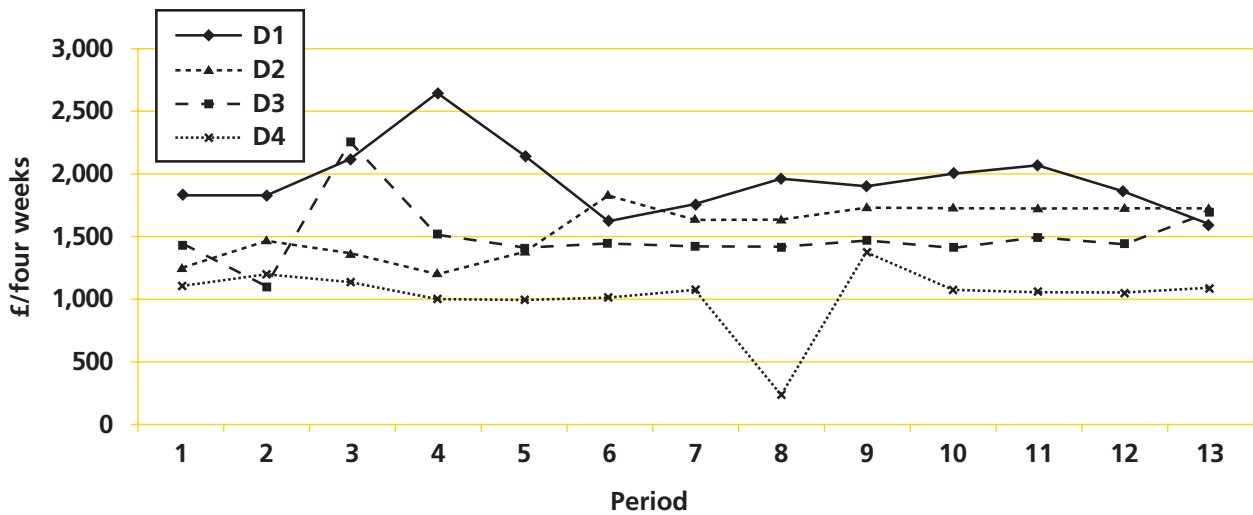


Figure 4.1(e): Rising cases

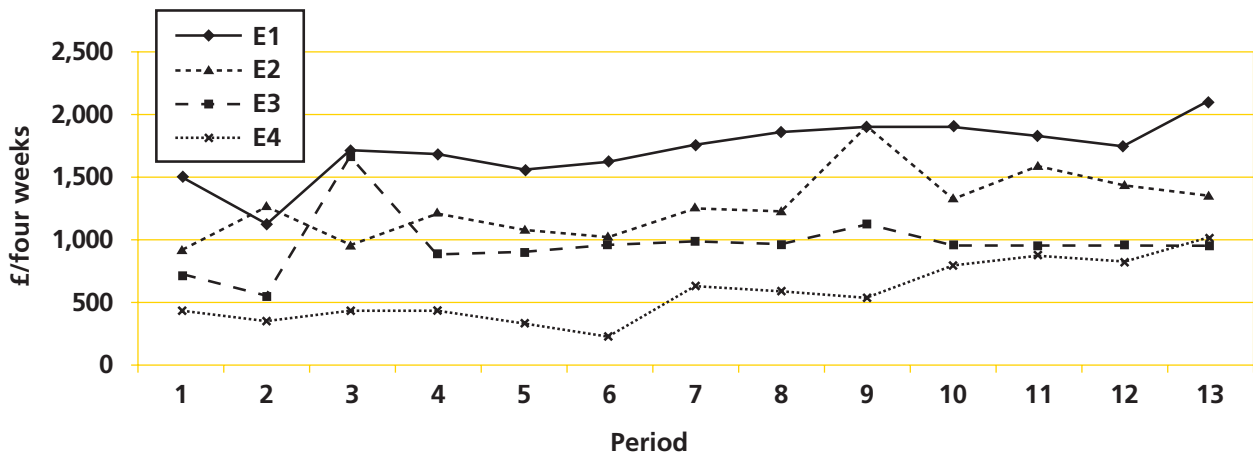


Figure 4.1(f): Falling cases

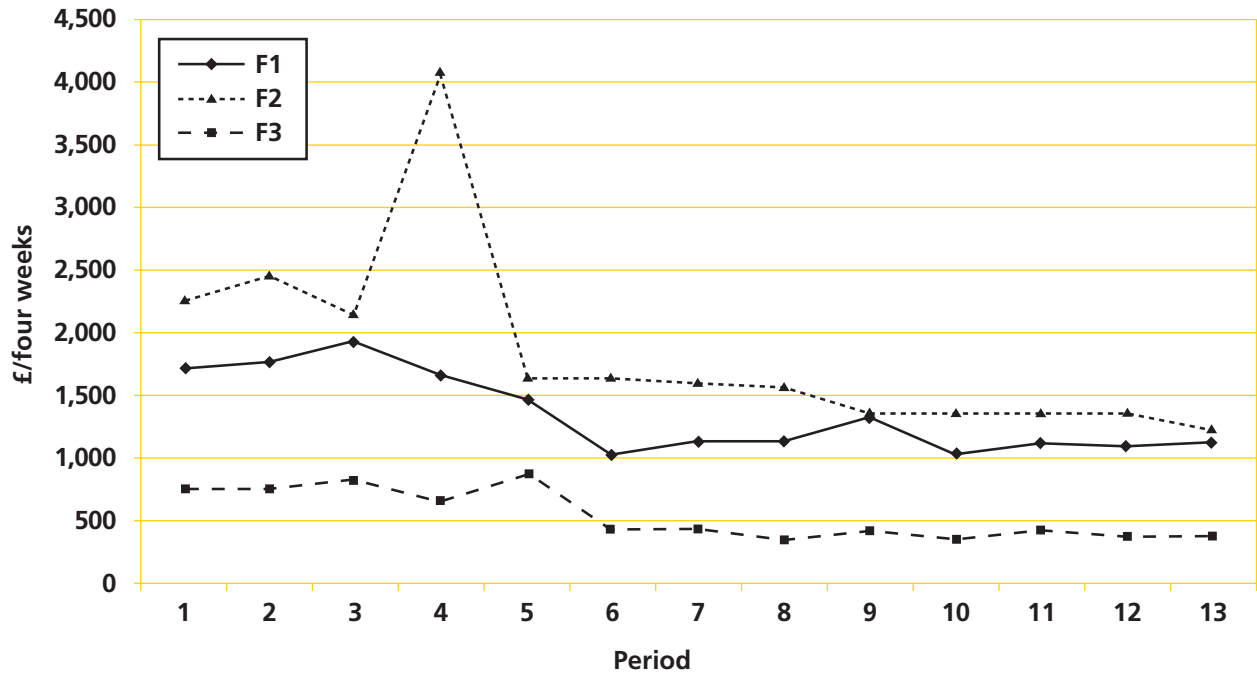
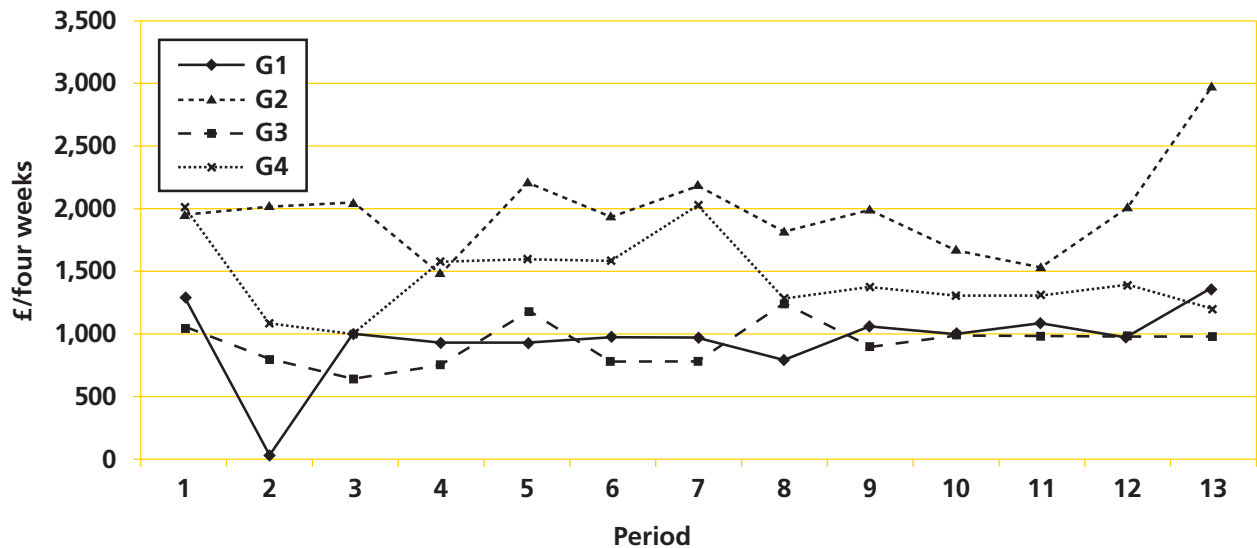


Figure 4.1(g): Erratic cases



Finally, the cases illustrated in Figure 4.1(h) have very large changes in income from period to period. This can be driven by a variety of factors. Case H1 is a two-child couple with one earner who changed jobs. As can be seen, this led to a period without income in the middle of the year

(period 7), but eventually somewhat higher pay.²⁶ Their tax credit claim was not assessed until July 2003, after which they received a lump sum of £2,000. After further adjustments in August and September (with a gap in receipts in one period), their tax credits eventually settled

down to £100 per week for the last five periods. The variation in income was partly driven by job changes, but also partly by the delay in their initial claim (or assessment) for tax credits.

²⁶Similarly, Case G1 in Figure 4.1(g) appears to have changed jobs between the first and third periods to one with a lower rate of pay, resulting in a period with no recorded pay in between.

Figure 4.1(h): Highly erratic cases

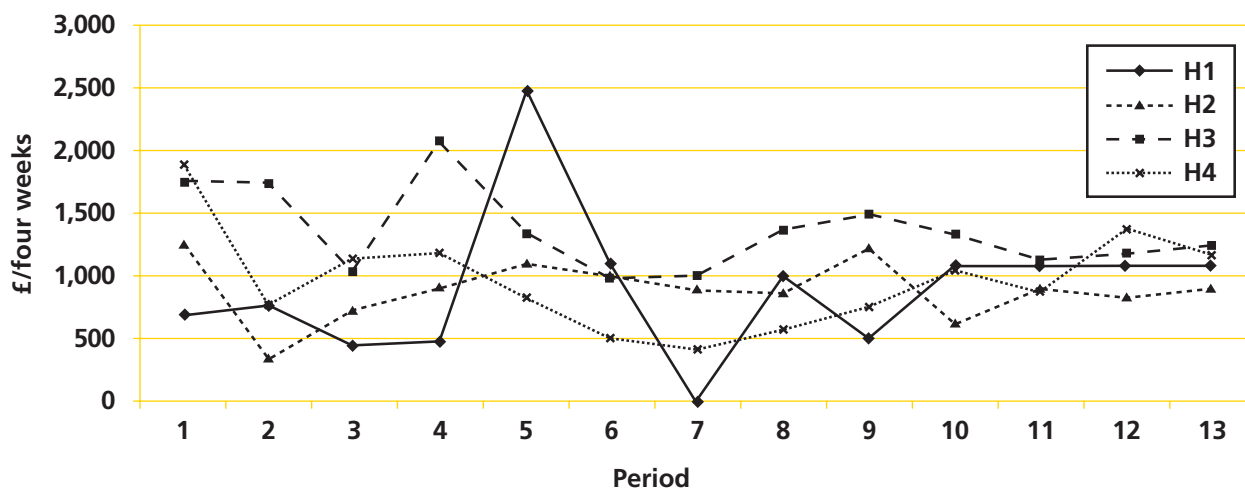


Table 4.1 shows how many of the 93 cases fall into each of these trajectory types, both as a whole and grouped by some initial characteristics. Several features of this are striking. First, only seven follow what we describe as 'highly stable' trajectories, with income varying within a range of 90 to 110 per cent of its average for the year, and fewer than a third of the cases follow any of the three

generally stable categories. More common than any of these are what we have described as 'stable with blips', that is at least ten of the periods remaining within 15 per cent of the mean, but other observations outside this range, often a long way outside it. More than a quarter of the cases are what we have called 'erratic' or 'highly erratic', without any clear pattern over the year, and with

at least four periods falling outside a range of 85 to 115 per cent of the mean. Within the sample, couples are more likely than lone parents to be in the more stable categories. None of the five cases initially without an earner is in the three more stable categories. A higher proportion of tenants are in one of the two erratic categories than of owners.

Table 4.1 Type of family (by initial characteristics) by trajectory type (number of families)

	All	Lone parents	Couples	No earner	One earner	Two earners	Owners	Tenants	
(a) Highly stable	7	}	7	-	7	-	3	4	
(b) Stable	8		8	-	17	4	12	9	
(c) Broadly stable	13		16	16	2	26	4	13	19
(d) Stable with blips	32	}	3	1	5	1	1	6	
(e) Rising	4		4	3	1	5	1	1	6
(f) Falling	3		11	15	2	18	6	9	17
(g) Erratic	18	}	15	2	18	6	9	17	
(h) Highly erratic	8		11	15	2	18	6	9	17
All	93	39	54	5	73	15	38	55	

What may be more important, however, is the way in which different kinds of events during the year affect income. While there are not as many such events within a single year as we observe in longer-term panel data, there are still

some significant changes in circumstances affecting half of the cases we examine. Table 4.2 shows how the trajectories followed (in five groups) break down between the following (overlapping) categories:

- **Demographic** changes, including a change in the number of children or in partnership status during the year (13 cases). Five of these cases involved an increase in the number of children during the year, seven a decrease in

the number of children, and one a case where a lone parent was joined by a new partner.²⁷

- **Labour market** changes, where one or more of the adults stopped or started receiving pay at some point during the year, or moved to a different pattern of pay (eg, from weekly to monthly) during it, suggesting that they had changed jobs (28 cases).
- **Benefit** changes, where one or more kinds of social security benefit (excluding Child Benefit) stops or starts during the year (12 cases).

- **Tax credit** changes, where one or more kinds of tax credit (paid with pay or directly, and to the respondent or partner) stops or starts during the year (*excluding* during the first three periods to avoid the period when the new tax credit system was introduced), with the change sustained for at least two periods.²⁶
- **No changes** of any of these kinds.

The table suggests that within the sample only those with no identified change of these kinds (half of all the cases) had highly stable incomes, and a

smaller proportion of these than of others were erratic or highly erratic. By contrast, a much higher proportion of those with an identified labour market change were erratic or highly erratic (12 out of the 28 cases of this kind). On the other hand, the cases with demographic change include some with stable or broadly stable trajectories, as well as others that were erratic.²⁷

Table 4.2 Events during the year by trajectory type (number of families)

	Demographic change	Labour market change	Benefit change	Tax credit change	None of these	All
(a) Highly stable	-	-	-	-	7	7
(b)/(c) Stable or broadly stable	6	6	3	1	8	21
(d) Stable with blips	2	6	2	5	19	32
(e)/(f) Rising or falling	1	4	3	1	2	7
(g)/(h) Erratic or highly erratic	4	12	4	5	9	26
All	13	28	12	12	45	93

Summary

- We defined eight different types of trajectory that the families' reported incomes could follow over the thirteen four-week periods, ranging from what we describe as 'highly stable' to 'highly erratic'.
- Only seven of the 93 families had incomes fitting our 'highly stable' pattern, that is, varying less than 10 per cent either way from their annual average. Only a third had income in at least 11 periods within 15 per cent of their mean, and within 25 per cent of it in any other periods.

- A third of cases had income we describe as 'stable with blips', that is, with income in at least ten periods within 15 per cent of their mean, but varying by 25 per cent or more from it in some periods.
- A quarter of the cases had 'erratic' or 'highly erratic' reported incomes, with at least four of the 13 periods outside the range from 85 to 115 per cent of their annual average.
- Bearing in mind that sub-groups of our sample contain only small numbers, smaller proportions of lone parents, of those without an earner at the start of

the year, and of tenants had more stable income patterns than of other groups.

- Those with the most stable incomes did not have what we identified as changes in demographic composition (mostly changes in numbers of children under 16), in labour market position, or significant changes in benefits or tax credit payment patterns during the year.
- A higher proportion of those whose labour market position clearly changed during the year had 'erratic' or 'highly erratic' incomes.

²⁷As noted above (footnote 12) there are a further 16 cases where we can construct income records for a significant part of the year. Two of these were for lone parents we know repartnered, and two for couples that split. Looking at the rates of partnership change for all families with children in 2003 (Barnes, *et al.*, 2005, table 2.9) one might have expected 4 lone parents within the 109 cases to repartner and 2-3 couples to split, so the sample families as a whole appear not atypical, but fewer with partnership change reported for the whole year.

²⁸Or cases where there is a single period where tax credits stop with consistent sequences of receipts at different levels either side of it.

²⁹Note that some cases experienced more than one kind of change: 15 experienced two changes (the most common combination being labour market and benefit change), and one case experienced labour market, benefit and tax credit change.

5 The extent of income variability within the year

This section discusses the extent of variability in total net incomes of our 93 cases across the year, and some possible implications of this for our understanding of statistics for income distribution and income dynamics. The following section examines the variability or stability of the main components of income.

In interpreting the findings, it is important to remember that lapses or inaccuracies in reporting income can create spurious variability. As described in Sections 2 and 3, we followed up inconsistencies with respondents in the six-month and final face-to-face interviews. However, it is possible that problems remain, particularly for the small number of our cases who did not take part in the final interview. We can, however, check the scale of remaining problems in several ways:

- First, in the next two subsections, we examine what happens to variability if we exclude for each case the period with the income furthest from the case's mean for the year. This would be expected to reduce the measured variability significantly, but if the overall findings were being driven by such outliers, possibly reflecting reporting lapses, the variability found would be reduced considerably.
- Second, in Section 7 we compare the gross income and tax credit receipts reported to us through the year with

administrative records to see whether the totals we obtain match those reported to HMRC after the end of the year and whether the pattern of variation in tax credit receipts is plausible given changes in assessments of entitlement during the year.

- Third, if the results were driven by random reporting errors, we would not expect to see much differentiation between families in different circumstances or affected by different events during the year. To the extent that we do see differences in patterns which plausibly relate to differences between groups, this suggests that random measurement error, at least, is not the cause of the patterns seen.

As will be seen, in all three respects the results are reassuring. We will, however, explore in later work the impact of taking a more aggressive approach to imputation of potential reporting lapses to examine whether the overall findings are materially affected.

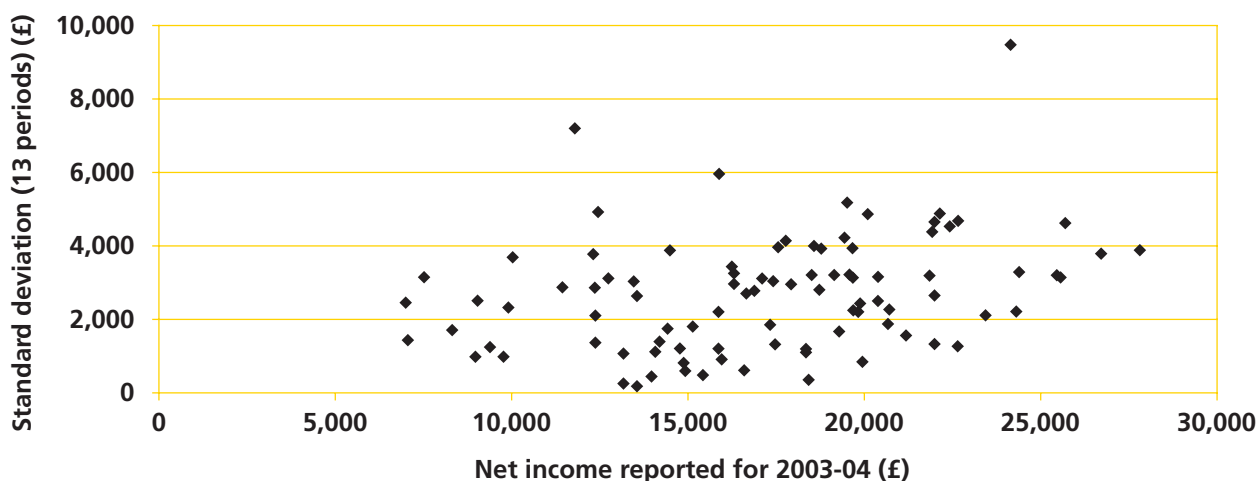
It should also be remembered that 'variability' is not necessarily always bad for the families involved. For instance, in a small number of cases (such as that illustrated in Figure 3.4) what we are measuring below is a change in income that reflects an improvement in their circumstances. Such cases are unusual, however: in the great majority of cases

what we are reporting is variation around incomes that follow no strong trend over the year. Even so, families will not necessarily find such variation a problem: they may have the capacity to smooth out their spending by budgeting over longer than the four-week periods we examine here. We present some evidence on this in Section 8.

5.1 The degree of variability in total income

The analysis in Section 4 gives a striking picture of the extent to which, even within a relatively small number of cases in fairly similar circumstances, incomes often vary considerably across the year in very different ways. This section approaches the degree of variability more systematically, presenting information on the way this is related to both initial characteristics of the families and to events that affect them during the year. First, Figure 5.1 gives an idea of the absolute amount of variation in income across the thirteen periods for our sample, as measured by its standard deviation, presented in relation to the families' total net incomes reported to the study. This already suggests both that there are significant differences between the cases, and that for some of them the variation in income in absolute terms is quite large.

Figure 5.1: Standard deviation of income by net income for year



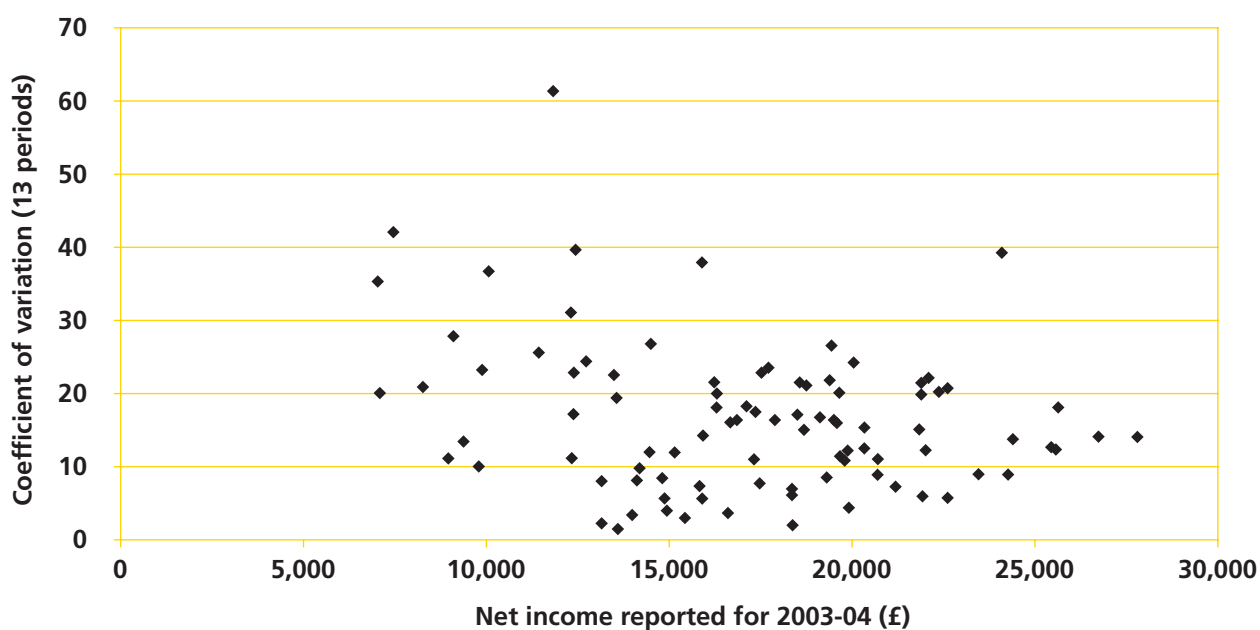
Note: 93 cases.

However, the absolute degree of variation measured in this way is likely to be larger, the greater a family's income, and indeed the figure suggests that this is true to some extent. But for particular families what is likely to be important is the extent to which their income varies relative to its average level. The index used below to measure variability of income is therefore the coefficient of variation (CV) of total income over the thirteen periods (that is, the standard deviation as a percentage of that case's mean income).

One advantage of this as a summary measure is that it gives an impression of how likely it is that information collected for a particular four week period would fall a certain distance from the annual average. If observations during the year were normally distributed,³⁰ we would expect 20 per cent of them to lie more than 1.25 times the CV per cent away from the mean and 10 per cent of them more than 1.66 times the CV per cent away from it.

Figure 5.2 shows the CVs for all 93 cases plotted against each family's total net income for the year. As might have been expected from the previous section, there is quite a range of variation within the sample. It is also noticeable that in these terms, measuring variation in relation to average income across the year, it is those with lower incomes, below around £15,000, that appear to have the most variable incomes, although some of those with higher income also have CVs above 20 per cent, and many of them have CVs above 10 per cent.

Figure 5.2: Variability of income by net income for year



Note: 93 cases.

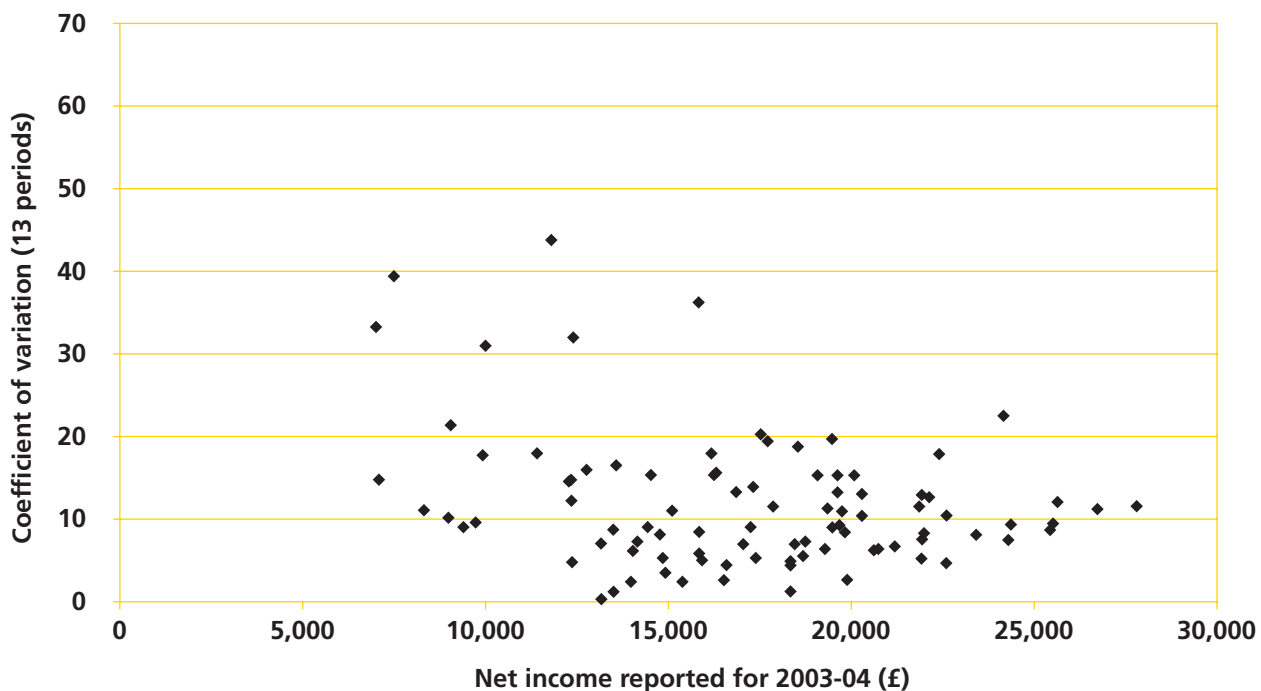
The variation seen does not seem simply to be the result of a few unusual cases – which might reflect reporting lapses. The single case with a CV of 60 per cent is unusual, but one third of the sample, spread across income levels, have CVs of over 20 per cent – implying that a fifth of their four-week income observations might be expected to vary from the average for the year by more than a quarter.

To test whether the results are driven more systematically by particular circumstances or reporting problems in one unusual period for each case, Figure 5.3 shows the pattern of CVs obtained if for each case we eliminate the period where reported income is furthest from the mean for that case, and look just at the remaining twelve periods. This reduces measured variability, as one would expect. The average CV across 13

periods for all cases is 16.5 per cent, and this is reduced to 11.8 per cent when measured across the most stable twelve periods. However, variability is by no means eliminated: half of the cases still have a CV of more than 10 per cent and a quarter have one of more than 15 per cent. The phenomenon we are observing clearly is not just a matter of single unusual periods within a year.

³⁰Which, of course, they may well not be for individual cases, as the patterns shown in Section 4 suggest. But see Figure 5.4 for a graphical representation of variation relative to each case's mean for the sample as a whole.

Figure 5.3: Variability of income (excluding outliers) by net income for year



Note: 93 cases.

Returning to the results for all thirteen periods, we have already seen that patterns of income variation appear to differ between types of household, and between those affected by different kinds of event during the year. The same is true of the degree of variability. Table

5.1 shows both the average degree of variability for different kinds of case, and the numbers of cases of each kind with higher or lower degrees of variability, using CVs of 10 and 20 per cent as cut-offs for these categories. This leaves just under a third of the cases in the 'low'

variability category, more than a third in the middle category, and one third in the 'high' variability category. In itself, this is already a perhaps surprising finding: incomes for this group appear to vary much more than we as authors expected in advance.

Table 5.1 Income variability (13 periods) by initial characteristics and events during year

	Average CV	Low variability (CV <10)	Medium variability (CV 10-20)	High variability (CV >20)	(Number of cases)
All	16.5	25	37	31	(93)
Lone parents	18.4	6	18	15	(39)
Couples	15.1	19	19	16	(54)
No earners	25.8	-	-	5	(5)
One earner	16.0	21	31	21	(73)
Two earners	16.0	4	6	5	(15)
Demographic change	14.9	4	5	4	(13)
Labour market change	21.8	5	9	14	(28)
Benefit change	20.5	3	2	7	(12)
Tax credit change	21.9	-	8	4	(12)
None of these	14.5	15	17	13	(45)

Note: Cases may experience more than one kind of change in the year.

Looking at patterns by family characteristics (and remembering the relatively small numbers of cases for each sub-group), lone parents are less likely to have low variability than couples, and the small number of cases starting the year without an earner all have high variability in their incomes across the rest of the year. Using the same broad categories of change in circumstances during the year, both labour market and benefit change are particularly associated with high variability. On the other hand 'demographic change' is not particularly associated with high variability in general – these are mostly cases where the number

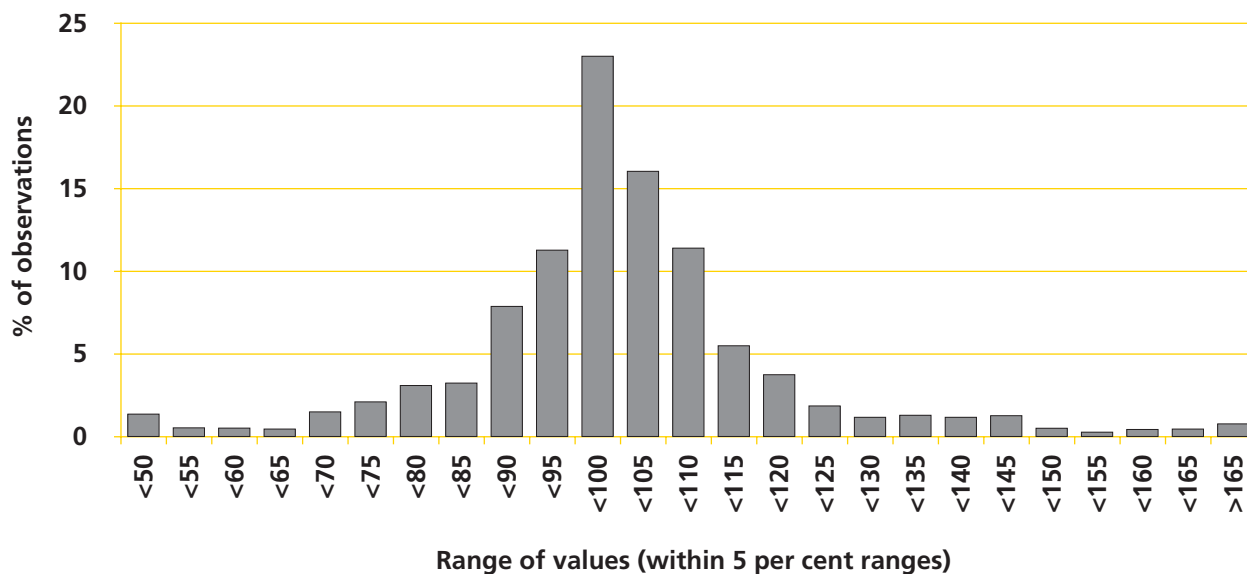
of children changes, associated in some cases with maternity leave and a change in earnings, but in others not. Cases which are affected by none of these changes on the definitions used are – unsurprisingly – more likely than others to have low variability, but the effect is not great: thirteen of the 45 cases with no identified change in circumstances still have high variability in their incomes during the year.

5.2 Implications for cross-sectional income measurement

These results suggest that for this sample, drawn from low- to middle-income

working families with children, net incomes measured over a comparatively short period (in this case four weeks) often vary from those that would represent income over a whole year to a significant degree. Figure 5.4 shows the extent of this variation. As can be seen, only 40 per cent of the 1,200 observations we have of income over four weeks lie within a range of plus or minus 5 per cent of the case's annual mean income, and only 61 per cent are within 10 per cent of the mean. Eighteen per cent of such observations are outside a range of 80 to 120 per cent of the case's mean.

Figure 5.4: Distribution of period income as percentage of annual average income



Note: 1,209 observations.

The implications of this are potentially quite important. Typically, when income is measured in sample surveys such as the Family Resources Survey, it is income in the most recent relevant payment period that is used as the basis to estimate total income. If this meant simply income over the last four weeks (or month), Figure 5.4 suggests that the result could often be very different from the case's annual average. However, in UK surveys what is used varies from this in two important ways. First, for some income components, such as interest receipts, the relevant period may be longer than four weeks or a month.

Second, what is asked for is often 'usual' or 'normal' income of that kind – inviting respondents, for instance, to ignore special bonuses in pay, or perhaps to average out 'catch-up' lump sum payments of tax credits over the period to which they apply. Observations of 'usual' income may be a better guide to annual income than our simple measure of income actually received within a four-week period.

In later work we hope to examine the effect of such definitions, estimating what each of our families might have reported as their 'usual' income at each

time throughout the year, and then examining how this relates to their annual average.³¹ For the moment, it can be noted that if one again excludes the period in which income is furthest from each case's mean – eliminating the most *unusual* income – the effect is that two-thirds of observations, rather than just 61 per cent, are within plus or minus 10 per cent of the mean. The proportion outside a range of plus or minus 20 per cent of the mean is reduced to 14 per cent from 18 per cent. Again, however, this suggests that the problem is only reduced, and by no means eliminated by excluding outliers.

³¹We would also be able to compare this with what they reported as their usual income in the initial March 2003 interview before the income records start.

The effect is much the same if, instead of income received over four weeks, we examine income averaged over successive *pairs* of periods, that is, over eight weeks.³² The distribution of these observations is noticeably narrower than that with four-week observations, but still only 67 per cent of the eight-week observations are within plus or minus 10 per cent of the case's annual mean income, and 14 per cent lie more than 20 per cent away from it. The standard deviation for this distribution is lower, at 14.2, than the 19.3 for the four-week periods shown in Figure 5.4, but a great deal of variation remains.

This greater variability in income over shorter periods is, of course, what one

might expect, and if it is income over such short periods that is most important in determining household well-being (see Section 8 below), it is the incomes over a short period that matter. This may be particularly important for those with the lowest incomes and the smallest margins in their weekly budgets.

However, to the extent that households are able to move resources between periods through short-term saving or variations in banks accounts, it may be longer periods that matter more. Previous research on panel data shows that when incomes are averaged over longer periods, there is less inequality in household incomes than when they are averaged over short periods (for instance,

Jarvis and Jenkins, 1996, using panel data of annual income observations from BHPS). An indication of this effect is given in Table 5.2. This looks at the variation in income *between* our 93 families when income is measured over different periods (as opposed to the variation in each case's own income *over the year*, which we have looked at until now). Specifically, it shows two measures of the variation or inequality of income across our sample as the window of observation is widened from the last of our thirteen periods of observation to include progressively more periods until finally we are looking at income for the year as a whole.³³

Table 5.2 Variation in income between families depending on length of period over which income is measured

Four week periods included	Coefficient of variation	Gini coefficient
13	31.5	17.1
12-13	28.9	15.9
11-13	27.4	15.4
10-13	27.3	15.3
9-13	27.5	15.5
8-13	27.8	15.6
7-13	28.2	15.9
6-13	28.3	15.9
5-13	28.0	15.8
4-13	28.0	15.8
3-13	27.8	15.7
2-13	27.8	15.7
Whole year	27.6	15.6

Note: 93 cases.

First, as expected, the overall level of inequality between the cases we have examined – from a fairly narrow part of the population – is less than one would see across the population as a whole: a Gini coefficient for annual net income (unadjusted for family size) of 16 per cent is much lower than would be seen

in a cross-section of the whole population. Income inequality is also as expected lower when income receipts in longer periods are examined than just in the final four weeks of the year. But what is striking about these findings is that by the time receipts in three periods – 12 weeks – have been included, there

is no further reduction in income inequality as the window of observation is widened to a year. In other words, in these cases income receipts over four weeks or a month appear more unequally distributed than annual incomes, but receipts over three months do not seem to be.

³²The periods overlap, so Periods 1 and 2 create one observation, and Periods 2 and 3 another.

³³The window of observation widens from the end of the year to avoid the variation over short periods being affected by the introduction of the new tax credits at the start of the financial year.

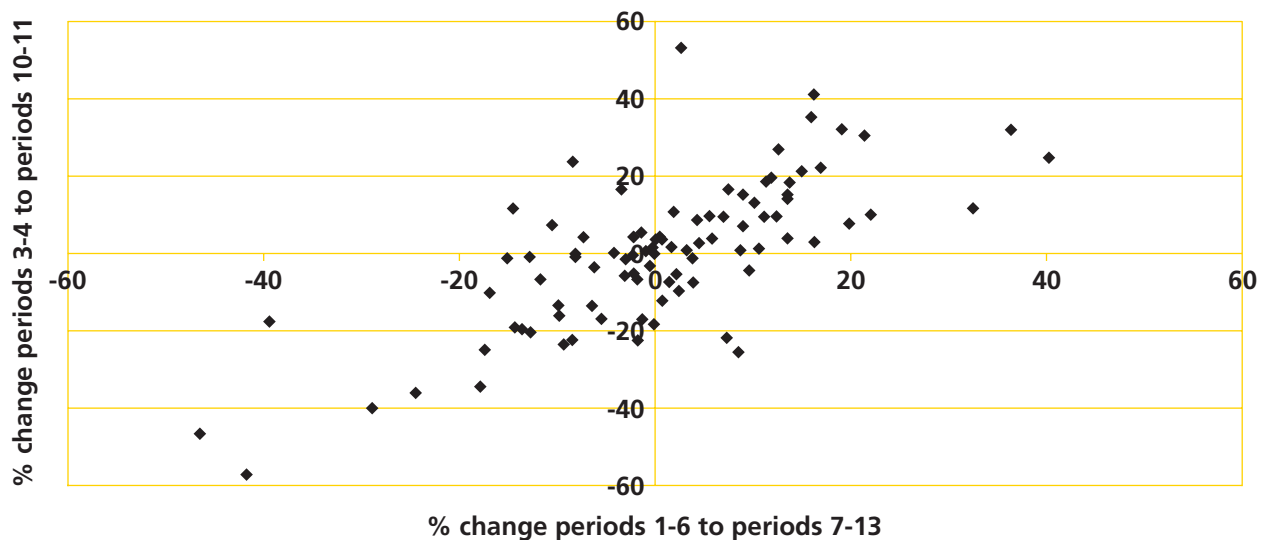
5.3 Implications for measuring income mobility

Just as these results confirm that the income period chosen over which to measure people's incomes can affect the measured extent of income inequality significantly, so they suggest that the ways in which we measure income mobility may be affected as well. Some

of the movement in income which we see comparing observations a year apart, for instance, may be the product of shorter-term, and, for some, less significant, variations. With observations within a single year we cannot explore the extent of this kind of effect over such a long period, but the data do allow us to see how changes between single pairs of months about six months apart

compare with the differences between incomes averaged over the whole of the first and second halves of the year. This is done in Figure 5.5. This shows the relationship between the percentage change in income for our cases from the first six to the last six periods of the year and the percentage change in income between shorter, eight week, periods at the centres of each of these.

Figure 5.5: Income changes depending on length of income periods compared



Note: 91 cases (figure excludes outliers at 116, 95 and 2,124).

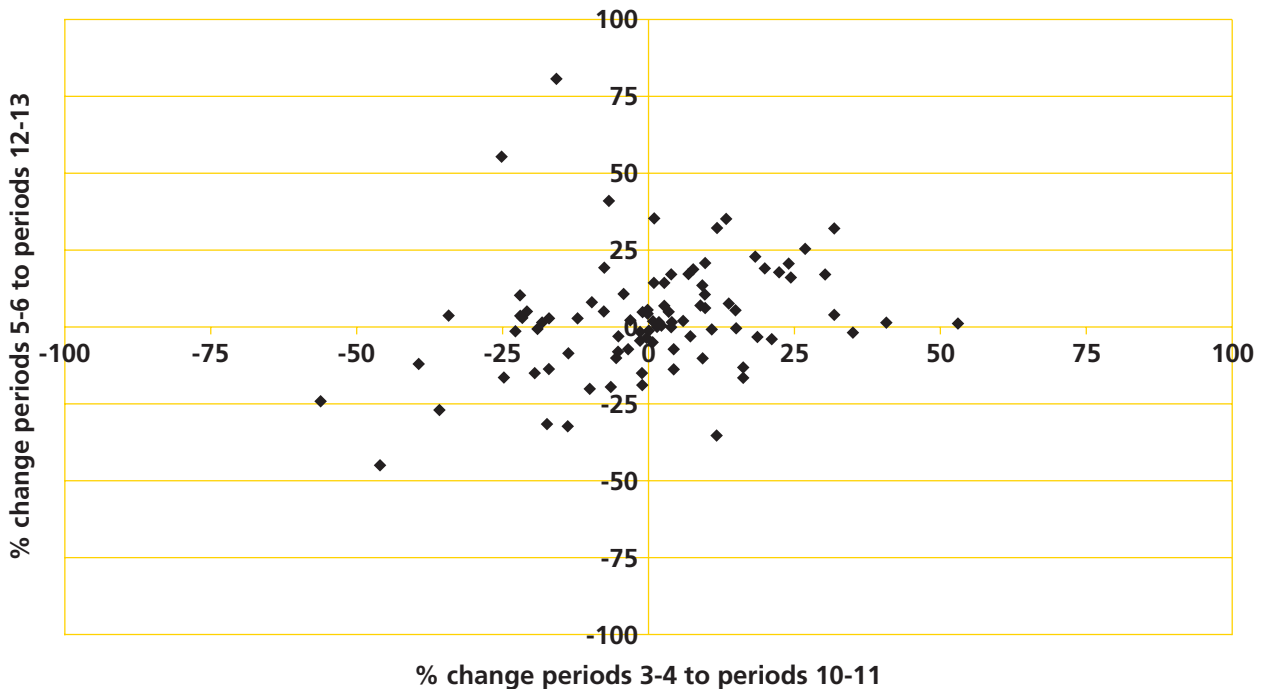
First, the figure shows substantial changes in income between the first and second halves of the year, even when receipts are compared between two 24-week periods. It also suggests that there can be considerable differences between income changes as measured between periods of different lengths (although again in future work we hope to explore whether this is reduced by a focus on 'usual' income, rather than most recent receipts). The correlation coefficient between the two sets of changes is only 0.44, and 36 of the 93 cases have an

absolute difference in the measured change of more than 10 percentage points. In other words, in a third of the cases, an income change measured between two eight-week periods would differ by more than 10 percentage points from that comparing two 24-week periods with the same central date.

The effect is even more striking when different pairs of eight-week periods are chosen for comparison, as shown in Figure 5.6. Here the income changes from periods 3 and 4 combined to periods 10 and 11 combined are

compared with those from periods 5 and 6 to periods 12 and 13. The correlation coefficient for these sets of changes is only 0.13, and in more than half (50) of the 93 cases the difference is more than 10 percentage points. The mean absolute difference is more than 18 percentage points. In other words, if changes in receipts are compared between neighbouring eight-week periods the same (24 week) distance apart, the income changes found will depend considerably on precisely which periods are chosen for comparison.

Figure 5.6: Income changes using different pairs of periods



Note: 91 cases (figure excludes outliers at 116, 95 and 2,124).

These results are striking. Some of the differences will be reduced by looking at 'normal' rather than actual income in the most recent period (as, for instance, the British Household Panel Survey does in measuring 'usual' employment income in the most recent week or month). Equally, for some cases the effects we are showing may reflect lapses in data reporting. However, even

allowing for these, the results suggest that some elements of measured income mobility from year to year may reflect the way in which incomes 'wobble' across the year. For instance, if it happens that in the first year chosen for comparison the wobble was downwards and in the second it was upwards, there could be an apparent significant increase in income across the year, even if

average income for each year as a whole was unchanged. This kind of measurement effect may be one of the explanations of what Stephen Jenkins (1998) has described as a 'rubber band' picture of income mobility over longer periods – many households' incomes appear to change between snapshots in successive years, but over the longer run, their incomes do not change very much.

Summary

- As a summary index of the extent to which incomes vary across the year for our sample cases, we measured the 'coefficients of variation' (CVs) in the incomes over thirteen four-week periods.
- The average coefficient of variation for the 93 cases was 16.5 per cent. One third of the sample had CVs in their total net incomes over 13 four-week periods of over 20 per cent.
- This measured variation did not result simply from outlying unusual periods. We also measured variation over twelve periods, excluding the observations furthest from each case's mean income. This reduced the average coefficient of variation to 11.8, but for half of the cases it remained above 10 per cent.
- Higher proportions of sample cases with incomes below £15,000, of lone parents, and of the small number of cases starting the year without an earner experienced high income variability than of others.
- Those experiencing what we identified as labour market change or changes in payment patterns of benefits or tax credits had higher variability than others. Those experiencing demographic change (mostly in their number of children) did not. More of those with no identified change in circumstances had low variability (but some of these cases also had high variability).
- Looking at the sample of four-week income observations as a whole, only 40 per cent of the 1,200 observations were within plus or minus 5 per cent of the case's average for the whole year. Eighteen per cent of them were outside a range of plus or minus 20 per cent of the case's average.
- Widening the 'window' within which incomes are observed to eight weeks reduces the variation between observations and the case's annual average, but 14 per cent of observations remain outside a range of plus or minus 20 per cent of the case's average.
- This degree of variation has potentially important implications for understanding the meaning of income distribution derived from cross-sectional surveys: income measured over a short period may vary significantly from income over the whole year (although the use of 'normal' or 'usual' pay in some surveys may remove some of the variation that we observe).
- The amount of income inequality measured *between* the 93 cases, is reduced as the window of observation is widened from four to twelve weeks. However, the inequality between the incomes for the whole year of the cases is no lower than that between incomes they received in the last twelve weeks of the year.
- The variability observed may also have implications for measuring income mobility: part of the change observed when comparing observations a year apart may reflect short-term 'wobble', rather than an underlying longer-term change (although again part of this problem may be removed where surveys look at 'usual' pay).
- As an indication of the scale of such effects, within our sample there are large differences for many cases depending on whether income changes between the first and second halves of the year are measured using incomes measured over 8 or 26 week windows.
- Even larger differences in income changes are seen when neighbouring eight week windows are used as the starting point for measuring income change over the following 24 weeks.

6 Income variability by component

The previous section presented findings in terms of families' total incomes in each period. We also have, however, information on how each component of income varies from period to period as well. In this section we examine the variability of income, depending on which broad component is included. Specifically, we examine income in the following categories:

- The *net pay* of the respondent and of any partner. As can be seen from Table 3.1 above, this was the largest part of the total net income of our sample, making up 58 per cent of it on average.
- Other *market income* of the family, including children's income, interest and dividends, child support payments, and gifts. These represented 4 per cent of the total on average.
- Income from *state benefits*, including Child Benefit, Income Support, Incapacity Benefit, etc (but not Housing Benefit). These were 11 per cent of the total on average.
- *Tax credits*, whether paid directly to the respondent or partner, or paid through their pay packet. These were the second largest part of the total, making up 27 per cent of it. This is a much larger proportion than one would expect for the population as a whole, reflecting the selection of the group from those who were receiving WFTC in 2002-03.

The main part of the analysis below adds each of these components in turn, looking at the variability of income including each successive component,

that is for net pay, net market income, net income including benefits, and then total income (including tax credits).

As we will see, the other components of income all show greater variability over the year than net pay. However, this does not mean that the other components of income actually have a *destabilising* effect on incomes over the year. For instance, benefit income may vary precisely because net pay has changed – for instance, if someone loses their job or becomes disabled, their net pay will go down or disappear and their income from benefits may go up to compensate at least partly for this. Income including state benefits may therefore be more stable than market income – indeed, that is one of the key aims of the social security system. Similarly, benefits or tax credits may give a reliable part of people's incomes while other parts vary. Even if they were completely fixed, with no offsetting variation at all, the coefficient of variation of income including them would be lower than that of net pay, as the absolute variation from net pay would be spread across a larger total income for each case. As far as the individual families were concerned, this would reflect the way that incomes and spending would be easier to plan allowing for some fixed components than in their absence. We therefore also look at the variability of income totals defined in different ways to examine the effect of adding in the other components.

It should also be noted that in the absence of protection from social security benefits, for instance, families might – indeed, would have to in some cases – behave differently, finding some

means of earning even very low wages if there was no alternative. As with most analyses of the impact of taxes and transfers, the figures presented below are 'first round' effects, not allowing for such behavioural impacts.³⁴

6.1 Variability of income components for the sample as a whole

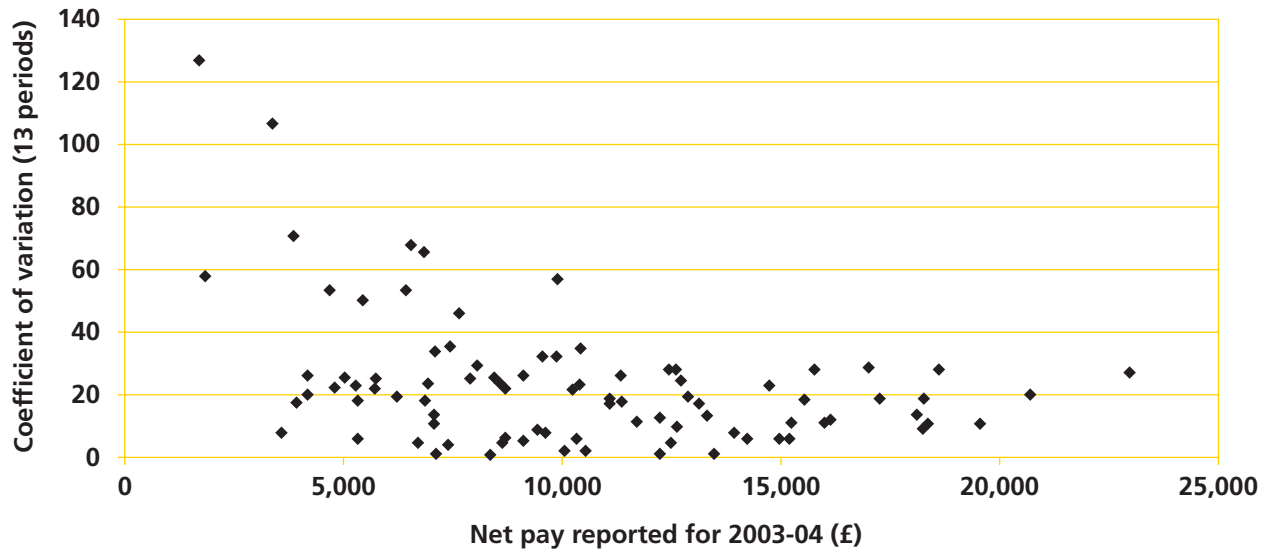
Figure 6.1 shows, in the same format as Figure 5.2, the coefficients of variation across 13 periods for the 90 of the 93 cases we examine that received net pay in the year. Figures 6.2-6.4 show the equivalent scatter-plots for other market income, state benefits, and tax credits.

Looked at by itself, net pay is more variable than total net income, with quite a large number of cases having a coefficient of variation for it over the 13 periods of more than 20 per cent.³⁵ The greatest variation – with CVs over 40 per cent – affects those with net pay of less than £10,000 over the year as a whole, in some cases reflecting interruptions in earnings, not just pay fluctuations in a single job. For instance, the case showing the largest CV for net pay, more than 120 per cent, is that of a lone parent who has earnings over the first five periods, but then has no work and is on Income Support for the rest of the year. The other case with a CV for net pay over 100 per cent is that of the lone parent, previously illustrated in Figure 3.4, who started the year receiving Income Support, but who moved into paid work in the second part of the year, with increasing pay by the end of it.

³⁴It should also be noted that the design of the Working Tax Credit in particular is to give a boost to income for those moving into work at more than 16 hours per week (with extra for those working 30 hours). Its design is in part intended to increase the difference between incomes in and out of work, which can increase measured income variation for those doing so. However, this is of less relevance for most of the sample described here, as apart from five cases, they start the year with at least one earner.

³⁵Net pay may vary – particularly near the start of the financial year – not just because gross pay changes, but also because PAYE tax codings change. This is reflected in the figures presented.

Figure 6.1: Variability of net pay by net pay for year



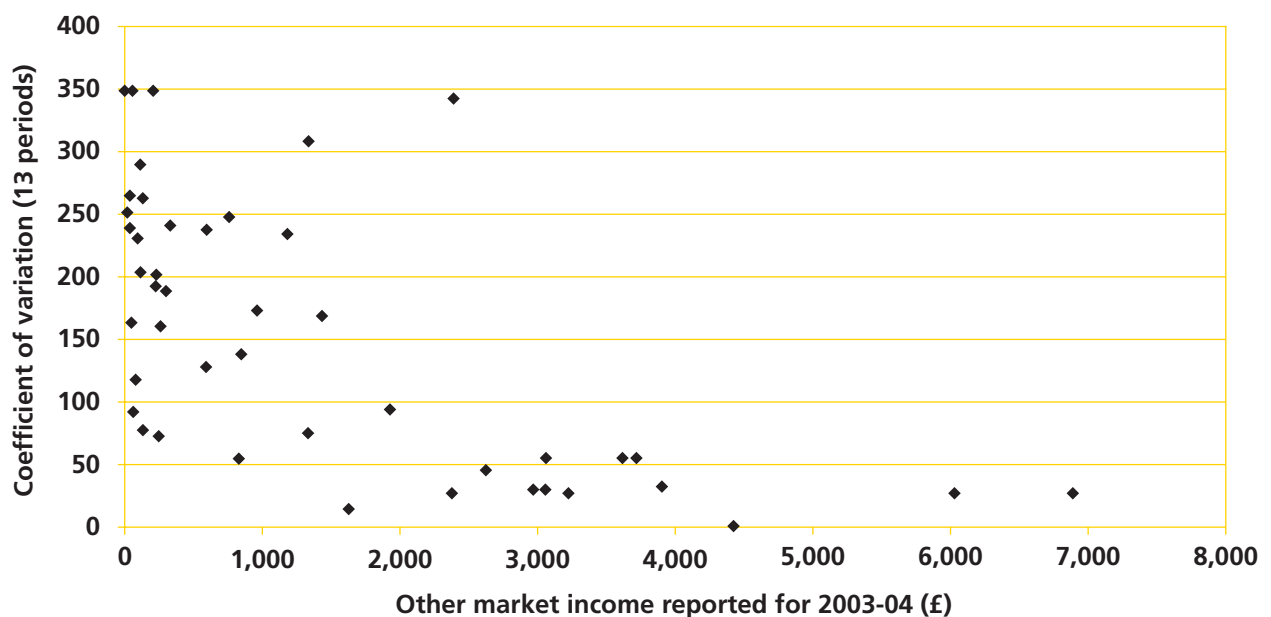
Note: 90 cases with net pay reported during the year.

Other market income emerges in this analysis as the most variable part of income for many cases. This is unsurprising given that for some, as can be seen from Figure 6.2, this simply reflects very small amounts of other income that are received in just a few periods during the year. In some cases,

these one-off payments can be substantial – as in the case of one lone parent receiving £2,400 from a maturing insurance policy in just one period. However, for nearly all the other cases receiving more than £2,000 in other market income over the year, this represents child support payments. While

some of these are paid regularly, with low (or even zero) variability, for several cases – according to their own reports, at least – payments are irregular and often have gaps, leading to higher variability than most cases show for net pay.

Figure 6.2: Variability of other market income by other market income in year



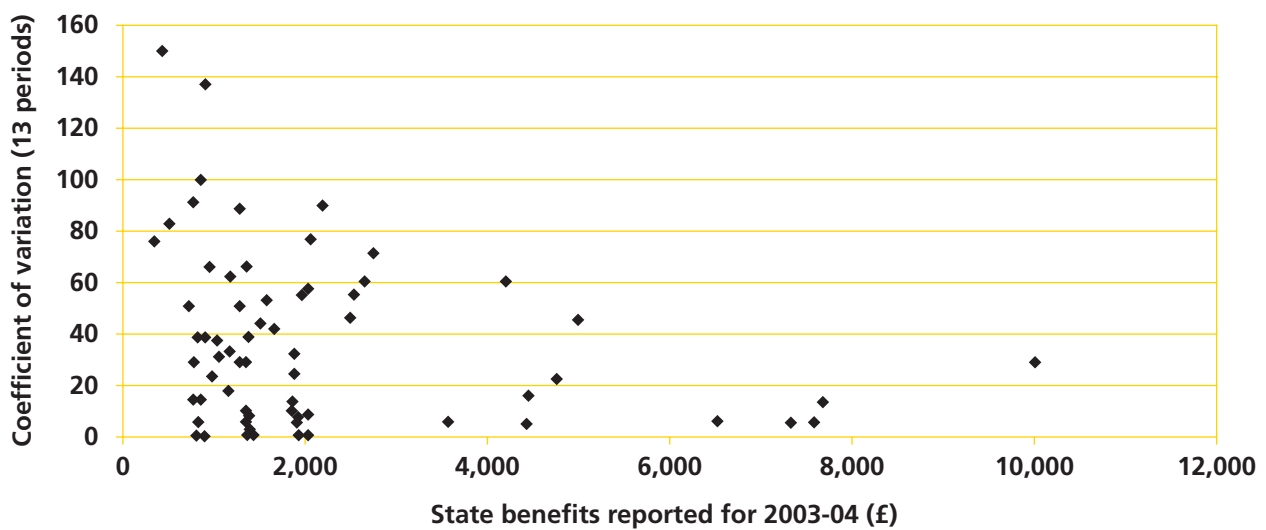
Note: 58 cases with other market income reported during the year.

Benefit income tends to fall into two groups, as can be seen in Figure 6.3. For quite a large number of our cases, the benefits shown are made up only of Child Benefit payments, for many of them coming completely regularly during the

year, as can be seen from the overlapping points representing the amounts for one, two and three children. Other cases also report only Child Benefit receipts, but with some gaps in receipts, leading to the variability shown. Some of this may reflect

reporting lapses. Where amounts over £2,000 are received in the year, however, this represents benefits such as Income Support or Incapacity Benefit, sometimes received only for part of the year, but sometimes regularly throughout it.

Figure 6.3: Variability of state benefits by state benefits for year



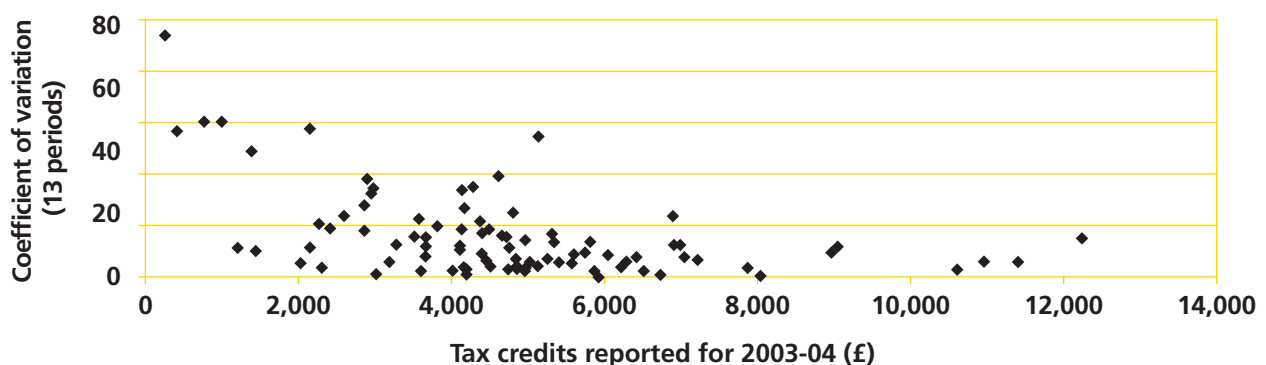
Note: 92 cases with state benefits reported during the year.

Finally, Figure 6.4 shows recorded receipts of *tax credits* during the year. These are the second largest part of income for our sample as a whole. While for some cases they are recorded as arriving regularly through the year, for many cases they are more variable than net pay, with, for instance, many of

those reporting more than £3,000 in tax credits over the year, also reporting a pattern of receipts with a CV of over 20 per cent. Again, of course, some of this variability may reflect reporting lapses. However, for this item, we are able to compare reported total receipts over the year with the HMRC's administrative

records. As we discuss in Section 7 below, for most cases the total recorded receipts match the administrative records well, pointing to the conclusion that the pattern of variability shown is a genuine phenomenon, not an artefact of imperfect data collection.

Figure 6.4: Variability of tax credits by tax credits for year



Note: 91 cases reporting tax credit receipts during the year.

As in the last section, we can also test the extent to which these results reflect the impact of very unusual outliers by looking at variability over twelve periods, excluding the one in which tax credit receipts were furthest from the annual mean. This generally involves omitting an early period in which an initial catch-up payment was made, or omitting the first period, when final receipts of WFTC arrived before payments of the new tax credits started. In a few cases the omitted period is at the end of the year, generally because a new assessment had led to a sharp cut-back in payments to try to arrive at the right total of payments by the year-end. If this is done, the mean CV of reported tax credit receipts falls from 39 per cent for the 13 period payments (as shown in Figure 6.4) to 33 per cent for the 12 periods excluding the furthest outlier. Again, some fall is to be expected,³⁶ but the remaining variability suggests that the pattern shown in Figure 6.4 is not just a matter of single unusual payments.

It should be borne in mind when looking at these findings that the year of the

survey, 2003-04, was the first year of the new tax credits system, and there were acknowledged problems with its introduction, so these patterns may not be typical of later years. However, the special circumstances of 2003-04 cut both ways. On the one hand, there were problems with establishing the new payments system,³⁷ and initial income assessments were based on incomes in 2001-02, two years earlier, potentially leading to large changes in circumstances being reported during the year. Both of these might lead one to expect tax credits payments to have been more variable in 2003-04 than they will be in later years. On the other hand, tax credit payments in 2003-04 were not affected by the recovery of what turned out to be 'over-payments' made in earlier years which have had a considerable effect on payment patterns since 2004-05.³⁸ This would imply that payments in 2003-04 would be less variable than in later years. In addition, it might be noted that even in later years initial assessments can also start based on income from two years before, leading to potentially large adjustments

when a tax credit assessment form for the previous year is eventually completed during the year.³⁹

As discussed above, what matters most, however, is not the variability of income components in themselves, but what happens to income variability when they are included. This can be seen in Table 6.1. This shows the overall mean value of each income component, and then of total incomes including each successively, followed by the associated coefficients of variation. As the effect on variability may vary depending on the order each component is added in, the table shows a total for 'net income including benefits' (but not tax credits) and another for 'net income including tax credits' (but not benefits). To avoid the distorting effect of the three cases with no net pay during the year, the second panel (and the analysis in Tables 6.3 and 6.5 below) shows the results only for the 90 cases with positive net pay during the year.⁴⁰ The final row repeats the information for total income including both benefits and tax credits which was already shown in Section 5.

Table 6.1 Income variability by component of income

Income component	Mean value over the year (£)	Mean coefficient of variation (positive cases)
Net pay	9,990	23 (90)
Other market income	700	193 (58)
State benefits	1,900	30 (92)
Tax credits	4,610	39 (91)
Income measure (cases with positive net pay)		
Net pay	10,320	22.6 (90)
Net market income	11,030	23.1 (90)
Net income including benefits	12,760	18.3 (90)
Net income including tax credits	15,750	19.0 (90)
Total income	17,480	16.3 (90)

³⁶Although, interestingly, in six cases the CV over the 12 periods excluding that furthest from the mean is higher than for the 13 periods. This happens because they have periods with no receipts at all, and removing a period with a positive payment increases the relative importance of these periods.

³⁷The cases examined here, as former WFTC recipients might be expected, however, to have been transferred to the new system more quickly than others, and most at least started the year with initial income assessments already made unlike new claimants.

³⁸See Parliamentary and Health Service Ombudsman (2005) and Lane, Wheatley and Bremner (2005) for discussion of the large changes in payments that such recoveries have led to for some families. See HMRC (2005b) for an analysis of the extent of under- and over-payments in 2003-04.

³⁹For instance, someone who completes their assessment form for 2004-05 in September 2005 may have received tax credits for the first six months of 2005-06 based on their income in 2003-04. At this point they may report changed circumstances and a new income now being received two years later.

⁴⁰The three cases with no net pay in the year do have a small amount of 'other market income', but this arrives in only a few periods, leading to very high CVs for what is, in these cases, very low net market income.

As the figures above suggested, the average variability of the other components of income is greater than that of net pay, and that of tax credits is greater than that of state benefits. Looking at the lower panel, although other market income is small, averaging only £700 per year, the effect of including it is that net market income is more variable than net pay, with a CV of 23.1 per cent compared to 22.6 per cent for net pay. If state benefits, averaging £1,700 for these cases, are added to this, the CV reduces by 4.8 points to 18.3 per cent. For some cases regular income from Child Benefit leads to somewhat more regular total income; for others more substantial payments of benefits during periods without earnings have precisely the intended effect, offsetting variations in pay, and leading to more stable income over the year.

Looking at cases individually, in 70 out of the 90, the variability of income including benefits is the same or less than that before allowing for them, and in only one case is the CV increased by more than 5 percentage points when benefits are included in income.

If tax credits are added to net market income, the effect is also to reduce the CV, again despite the higher variability in tax credit receipts themselves than in net pay. However, the impact is a little smaller than that of benefits despite the amount of credits being more than twice as large on average, a reduction of 4.1 points, giving a CV of 19 per cent for income including tax credits. For the majority (62) of the cases, adding tax credits to net market income again reduces variability or leaves it unchanged, but for a significant minority,

28 cases, adding in tax credits increases the CV, in twelve cases by more than 5 percentage points.

At the final stage, adding in either tax credits or benefits to give total income further reduces variability. If benefits are added to income including tax credits, the CV is reduced by 2.7 percentage points; if tax credits are added to income including benefits, the reduction is 2 percentage points.

The figures in Table 6.1 are averages for the sample as a whole. As Figures 6.1 to 6.4 showed, there are some cases for which income components are very stable, but others for which particular components are much more variable. Table 6.2 shows the numbers of families within ranges of variation for different components of income by their (initial) characteristics.

Table 6.2 Type of family (initial characteristics) by variability of income components (number of cases with positive components)

	All	Lone parents	Couples	No earner	One earner	Two earners	Owners	Tenants
Net pay								
Low CV	26	5	21	-	22	4	14	12
Medium CV	22	8	14	-	16	6	12	10
High CV	42	24	18	2	35	5	12	30
Other market income								
Low CV	1	1	-	-	1	-	-	1
Medium CV	1	1	-	-	1	-	-	1
High CV	56	25	31	3	43	10	22	34
State benefits								
Low CV	37	16	21	1	30	6	12	25
Medium CV	8	3	5	-	7	1	2	6
High CV	47	20	27	4	35	8	24	23
Tax credits								
Low CV	21	8	13	-	18	3	9	12
Medium CV	17	5	12	1	14	2	6	11
High CV	53	25	28	3	41	9	22	31

Note: 'Low CV' is under 10 per cent; 'medium CV' between 10 and 20 per cent; and 'high CV' is over 20 per cent (as in Table 5.1).

Several features stand out from this:

- Lone parents and tenants are more prone than others to have particularly high variability of net pay (with a CV of over 20 per cent).
- Where families have other market income (such as investment income, child support payments or children's earnings) it is almost always very variable by comparison with the other items.
- State benefit receipts are more polarised, with 37 of the cases having low variability in them, but 47 cases having high variability. This bipolar distribution affects each of the sub-categories shown.
- More than half of the cases have high variability in their tax credit receipts,⁴¹ and this again applies within each of the categories, notably regardless of the number of earners. However, a significant proportion of those with one earner at the start of the year do receive tax credits with low variability.

Once again, of course, it may be that it is the contribution of each component to income variability *as a whole* that matters most for families in planning their lives, rather than variability of that item itself.⁴² Table 6.3 shows the mean coefficient of variation for income under five definitions by initial characteristics. What is most striking here is that it is the generally more disadvantaged groups – lone

parents and tenants – where the effect of adding in benefits and tax credits is greatest in reducing income variability. For instance, net market income for lone parents and tenants (with a substantial overlap, of course) has CVs of 31 and 29 per cent respectively. These are reduced to 22 and 21 per cent allowing for benefits, or to 24 and 23 per cent if tax credits are allowed for. If both are included, the CVs are reduced to 19 and 18 per cent. This is not enough to reduce their income variability to that of the more advantaged categories, but it does remove most of the gap. Benefits do, however, reduce the variability for one-earner families to the same level as for two-earner families.

Table 6.3 Type of family (initial characteristics) by variability of income under different definitions (average coefficient of variation)

	All	Lone parents	Couples	One earner	Two earners	Owners	Tenants
Net pay	22.6	29.8	17.6	21.6	18.9	15.0	28.2
Net market income	23.1	30.8	17.8	22.1	19.5	15.4	28.8
Net income including benefits	18.3	21.7	16.0	17.8	17.7	14.0	21.4
Net income including tax credits	19.0	23.5	15.9	18.2	17.1	13.9	22.7
Total income	16.3	18.3	14.9	16.0	16.0	13.1	18.7

Note: 90 cases with positive net pay only. Results for cases starting with no earner not shown as only two such cases have positive net pay later in the year.

6.2 Variability of income components and events during the year

What one would expect is that those showing the most variability in particular kinds of income would be those affected by particular kinds of event during the year. Table 6.4 shows how the numbers of cases with variability in particular

components falling in different ranges of variability relate to whether they are affected by particular kinds of event during the year (as defined in Section 4 above). These patterns are perhaps unsurprising given what we have seen so far: those with identifiable changes affecting components of income are particularly likely to have high variability in that item.

However, it should be noted that such changes are not a necessary condition for high variability – for instance, 16 of the 44 cases without any of these identified changes over the year none the less have high variability in their net pay, and 23 of them have high variability in their tax credits (despite the exclusion of cases where there was a clear break in tax credit arrangements after the first three periods of the year).

⁴¹If each case's period with the furthest outlier of tax credit receipts is excluded, the number of cases with a CV of over 20 per cent for tax credit receipts in the twelve periods falls to 38 cases.

⁴²Although this is not necessarily the case, for instance, if particular income sources are ear-marked for particular uses, or if one member of a couple receives a particular income source and total incomes are not shared equally between a couple.

Table 6.4 Variability of income components by events during the year (number of cases)

	Demographic change	Labour market change	Benefit change	Tax credit change	None of these	All
Net pay						
Low CV	4	1	1	3	19	26
Medium CV	-	9	2	4	9	22
High CV	7	18	9	5	16	42
Other market income						
Low CV	-	-	-	-	1	1
Medium CV	-	-	-	-	1	1
High CV	10	17	5	6	22	56
State benefits						
Low CV	3	11	-	2	21	37
Medium CV	1	2	1	1	4	8
High CV	9	14	11	9	20	47
Tax credits						
Low CV	2	4	2	-	14	21
Medium CV	4	6	3	-	7	17
High CV	7	17	7	12	23	53

Note: 'Low CV' is under 10 per cent; 'medium CV' between 10 and 20 per cent; and 'high CV' is over 20 per cent (as in Table 5.1).

Again, perhaps more significantly, the results allow us to see whether changes to particular income components such as benefits and tax credits reduce part of the variability associated with labour market and demographic change in particular. Table 6.5 shows the average coefficient of variation for income under the five definitions by events during the year. These results are striking. First, it can be seen that the average variability of income for those *unaffected* by any of the identified changes is much the same,

whatever income definition is used. Indeed, the CV of total net income is virtually the same as that of net pay for these cases. It is in the other cases, whose circumstances change during the year, that benefits in particular have a stabilising effect, as do tax credits, albeit to a smaller extent. Looking at the third column of the table, adding in either state benefits or tax credits has a particularly large stabilising effect for cases with 'labour market change' in the year. The impact of state transfers is very

much as might be hoped therefore – offsetting much of the income variability in market income that arises from labour market shocks.

Returning to the discussion at the start of Section 5, such figures also provide further reassurance about the overall quality of the data: we do not appear to be presenting patterns of variability that occur from random reporting errors, but rather patterns that are linked to people's circumstances and changes in them.

Table 6.5 Variability of income under different definitions by events during the year (average coefficient of variation)

	All	Demographic change	Labour market change	Benefit change	Tax credit change	None of these
Net pay	22.6	22.6	37.4	50.5	27.0	14.6
Net market income	23.1	21.6	37.2	49.5	27.7	15.8
Net income including benefits	18.3	16.2	25.4	28.0	21.3	14.5
Net income including tax credits	19.0	17.0	27.7	30.6	27.9	15.1
Total income	16.3	16.7	21.8	20.5	21.9	14.3

Note: 90 cases with positive net pay only.

6.3 The effect of the new tax credit system

While these findings are encouraging in certain respects, it might seem surprising that tax credits do not have *more* of a stabilising effect on income during the year than they do – and indeed, in nearly a third of the cases income is more variable after allowing them than before. This is particularly given that the amounts involved are quite large – an average of £4,600 per family in the sample – and that the structure of tax credits is designed to give most help to those with lower incomes, with entitlement to tax credits often rising when a family reports a fall in income. If one looks at the variation of total income *between* cases (as in Table 5.2), the coefficient of variation falls from 47 per cent for net market income, to 37 per cent including benefits, and to 27 per cent for total income including tax credits as well. In other words, adding in tax credits has a comparable effect to adding in social security benefits in reducing the inequality of income between the cases in our sample. However, as we have seen, tax credits make a smaller contribution to stabilising income *across* the year.

Part of this reflects the way in which tax credits are designed, by comparison with

social security benefits. Some social security benefits, such as Income Support, have very sharp rates of reduction as income rises: their intention is precisely to fill in gaps when families have no or very low market incomes.⁴³ Tax credits by contrast have lower rates of withdrawal as income rises in order to reduce their disincentive effect (and the first £2,500⁴⁴ of income increase was ignored in any reassessment in 2003-04). They may therefore vary less across the year as market incomes rise and fall, and so have less of a ‘stabilising’ effect than benefits for each pound of fiscal cost.⁴⁵ In addition, of course, as highlighted in the introduction, the time period over which they are calculated, and payments adjusted to give the correct total, is the whole year (or even beyond it), rather than a particular week.

It is also possible that the finding could reflect the particular circumstances of the year we examine, when the ‘new tax credits’ were being introduced for the first time, replacing – for these families, at least – the old Working Families Tax Credit system. As has been documented elsewhere, and is evident from inspection of our cases, it took some time for tax credits under the new system to settle down. For many of our families there was a pattern involving low or no receipt

of tax credits in the first few weeks, followed by a larger than normal lump-sum receipt, before a more regular pattern was established. The variability induced by this may not be typical of that which could be expected in later years. On the other hand, as discussed above, there are factors that may go the other way, as during later years people will be affected by within-year adjustment of tax credits to recover ‘over-payments’ (or make up for ‘under-payments’) in the previous year, which was not a feature of 2003-04.

Table 6.6 therefore examines what happens to variability of both tax credits themselves and of income before and after they are included depending on whether the first three or last three periods (12 weeks) are included in the analysis. It shows the coefficients of variation of income and this component over two alternative groups of ten periods, as opposed to the full thirteen period analysis given above. The table also shows what happens if the length of analysis covered is reduced to the last eight periods, excluding the first *twenty* weeks of the year (as this takes us beyond the period when higher than normal tax credits were being received by the sample as a whole, as indicated by Figure 3.8 above).

Table 6.6 Average coefficient of variation depending on length of analysis

	Thirteen periods	P1 to P10	P4 to P13	P1 to P8	P6 to P13
Net income including benefits	19	19	16	18	14
Tax credits	39	39	31	39	21
Total income	16	16	14	16	12

Note: 93 cases.

⁴³In the case of Income Support and means-tested Jouseker’s Allowance, benefits are withdrawn pound for pound over a small disregard.

⁴⁴To be increased to £25,000 from April 2006.

⁴⁵Equally, though, the way in which the tax credit taper is moderated means that adjustments for changes in income from previous years (or for past over- or under-payments) means that such within-year adjustments are less *destabilising* than they would be with a sharper taper.

It can be seen from the table that tax credits and net income including benefits are both somewhat less variable over the later ten periods than over the first ten periods. However, there is no increase in the stabilising effect of tax credits when the first three periods are excluded. As can be seen from the more detailed breakdown in Table 6.7, the effect of looking only at the last ten periods is to remove some of the cases with very high variation in tax credits that are seen if

the whole year, or just the first ten periods are analysed, but many remain. Indeed, there is no larger reduction in the number of highly variable cases as the income definition widens to include tax credits in the later ten periods than over the earlier ten periods.

It is only when all of the first twenty weeks are excluded, and the focus is on the last eight periods that tax credits become much more stable, with a

variability just over half that of that during the first eight periods. As Table 6.7 shows, the number of cases with a low CV for tax credit receipts (over this shorter period) rises to half of the cases recording them. However, the overall effect of adding in tax credits in reducing the variability of total net income shown in Table 6.6 is no greater in the last eight than the first eight periods, reducing it by 2 percentage points in each case.

Table 6.7 Variability of tax credits and income with and without them depending on length of analysis (number of cases)

	Thirteen periods	P1 to P10	P4 to P13	P1 to P8	P6 to P13
Net income including benefits					
Low CV	27	33	36	37	50
Medium CV	28	26	29	25	20
High CV	38	34	28	31	23
Tax credits					
Low CV	21	24	31	24	44
Medium CV	17	15	30	14	16
High CV	53	52	39	53	29
Total income					
Low CV	25	28	41	29	58
Medium CV	37	38	31	35	17
High CV	31	27	21	29	18

Note: 93 cases. 'Low CV' is under 10 per cent; 'medium CV' between 10 and 20 per cent; and 'high CV' is over 20 per cent (as in Table 5.1).

Putting all this together, removing the first three periods when the new tax credits were first being introduced from the analysis does not increase the extent to which tax credits reduced income variability in 2003-04: considerable variability in tax credits remained through the rest of the year. However, if the focus is narrowed to the last 32 weeks of the

year, tax credit receipts did become somewhat more stable. In the next section, we examine the administrative records which we were able to link to our data to look at why such variations occurred. The reasons include: families reporting changes in circumstances during the year, such as jobs starting or ending; income for 2003-04 newly

reported during the year (leading to adjusted entitlements from those originally calculated using 2001-02 income); and, according to a few of our respondents, problems in the way in which payments of their tax credits were administered during the year.

Summary

- Net pay is more variable than total net income, especially for lone parents and tenants, and, of course, for those stopping and starting jobs.
- Other market income is highly variable, both because of small amounts of one-off income items, but also because of irregularity in larger receipts, for instance, of child support payments.
- Benefit incomes are on average more variable than net pay, but have a mixed pattern: some cases have stable receipts, for instance of Child Benefit, but others have highly variable receipts of other kinds (such as from Jobseeker's Allowance).
- Tax credit receipts are also more variable than pay on average, and have a mix of stable and more variable payment patterns.
- The greater variability of these items than pay does not necessarily mean, however, that they have a destabilising effect on total incomes, as their variations can offset those in net pay. Adding in other market income does increase variability compared to net pay, but adding in either social security benefits or tax credits reduces variability.
- It is for the more disadvantaged groups – lone parents and tenants – that adding in benefits and tax credits has the greatest stabilising effect.
- For those without an identified change in circumstances in the year, adding in benefits and tax credits has only a limited effect in reducing income variability. By contrast, for those cases with an identified labour market change, benefits have a large stabilising effect, as do tax credits to a somewhat smaller extent.
- Tax credits reduce inequality *between* the incomes of the 93 cases by as much as benefits do. However, although their value for the cases in the sample is twice as large as that of benefits, adding in tax credits has a smaller effect on reducing variability of their incomes *across the year*.
- Part of the reason for this is the less sharp means-testing of tax credits than some benefits. Another part of it reflects the way tax credits are designed, with their calculation based on income across the year as a whole and adjustments during the year to try to ensure the correct total is paid by the end of it, rather than reflecting income in a particular week.
- Part of the variability of tax credits might have resulted from problems associated with the introduction of the new tax credit system in the first few weeks of 2003-04. However, considerable variability in tax credit receipts remained even after the first 12 weeks. It is only after the first 20 weeks of the year that tax credit receipts became somewhat more stable. They had no greater a stabilising effect on income as a whole in the last eight or ten periods of the year than in the first part of the year.

7 Comparisons with administrative records

One of the advantages of our dataset is that at the start of the survey, nearly all of the families gave permission for their records to be linked – anonymously – by the researchers to HMRC's records of their tax credit claims. HMRC were then able to supply us with such records for 86 of the 93 cases for which we have complete income data for the year. In one case, the lone parent who repartnered during the year, it was not possible to use the record, as we only had information for one of the partners (the main respondent to our survey). The results below are therefore based on a maximum of 85 cases, although information of some kinds is only available for a smaller number.

The interviewers used to recruit the families all had experience of surveys such as the Family Resources Survey, and so familiarity with the kinds of financial arrangements relevant for the research and confidence in asking for such details from respondents. Respondents were also encouraged to refer to documents such as pay-slips where possible, so the data collected should be of high quality. However, the administrative records allow us to check on its validity in three ways:

- First, we can compare the total gross incomes (as defined for tax credit purposes) reported to the study week-by-week during the year with the amounts reported to HMRC for families' tax credit assessments after the end of the year.
- Second, we can compare tax credit *receipts* reported by the families during the year with *entitlements* calculated by HMRC at different points throughout it. For reasons discussed below, these amounts would not necessarily be expected to be identical, but in most cases they would be expected to be fairly close.
- Third, we can examine the patterns of changing tax credit entitlements calculated during the year to see whether they would be expected to lead to some the variations in receipts

reported by the families in the sample. These patterns also allow us to see whether the sample case are particularly unusual in the way they were affected by the tax credit system in 2003-04.

The structure of the records available to us is that at each date when HMRC assessed or reassessed the claim, they contain an updated view ('award version') of circumstances during successive parts ('time-slices') of the year during which they remained constant. Thus a first assessment might be made on the basis that circumstances would be unchanged over the year, but by the final assessment there could be several time-slices – for instance because of changing employment, number of children (or loss of entitlement to 'baby tax credit' on a first birthday), etc. Each award version also contains the latest assessments of total gross income (for tax credit purposes) and tax credit entitlement for the year as a whole. These records do not tell us exactly how much was being paid week-by-week either as direct payments of tax credits or indirectly through employers, although we can usually (and reassuringly in terms of the quality of our data) tie together the dates at which reassessments were made with subsequent changes in receipts reported by our respondents. We can, however, compare total tax credit receipts for the year and total income reported to us with the administrative records of total income and entitlement for the year at different assessment dates. We concentrate below on three such dates for each case:

- The initial assessment made at or just before the start of the year, using this to compare HMRC's initial assessments of income (based on reported income in 2001-02) and tax credit entitlements with later ones.
- The last assessment of income and tax credit entitlement made within 2003-04. We use these both to look at changes in assessments made within

the year (as these can lead to changes in the flows of payments) and to compare receipts of tax credits reported to the survey with the last within-year assessment of entitlement for the year made by HMRC.

- The *final* assessment made after the end of the year⁴⁶ (usually on the basis of the claimant's tax credit assessment form) of income reported to the HMRC for the year, which we can compare with the total of income reported week-by-week to us. For some of our cases there had been no further assessment after the end of the year, perhaps because there had been no tax credit assessment form returned, so we are only able to do this for 68 cases. Where there are such records we can also calculate the post-year adjustment (correcting for under- or over-payments) of tax credit entitlement for 2003-04 resulting from the change in assessed income (and other circumstances) between the last in-year assessment and the final assessment. This would result in a payment of arrears or recovery of over-payments from tax credits due in 2004-05. We can also look at the differences between initial income and tax credit entitlement assessments and those finally made after the end of the year.

7.1 Incomes reported to the study and to HMRC

First, by matching the survey and administrative data, we can compare our records of total gross income for the year as a whole with those collected by the Inland Revenue through tax returns after the end of the year. For the 63 cases where we can do this, the results are shown in Figure 7.1. In principle, the amounts involved should be very close. Discrepancies would result from either differences in people's accuracy – or willingness – in reporting their incomes either to the study or to HMRC. Of course, people might have items of

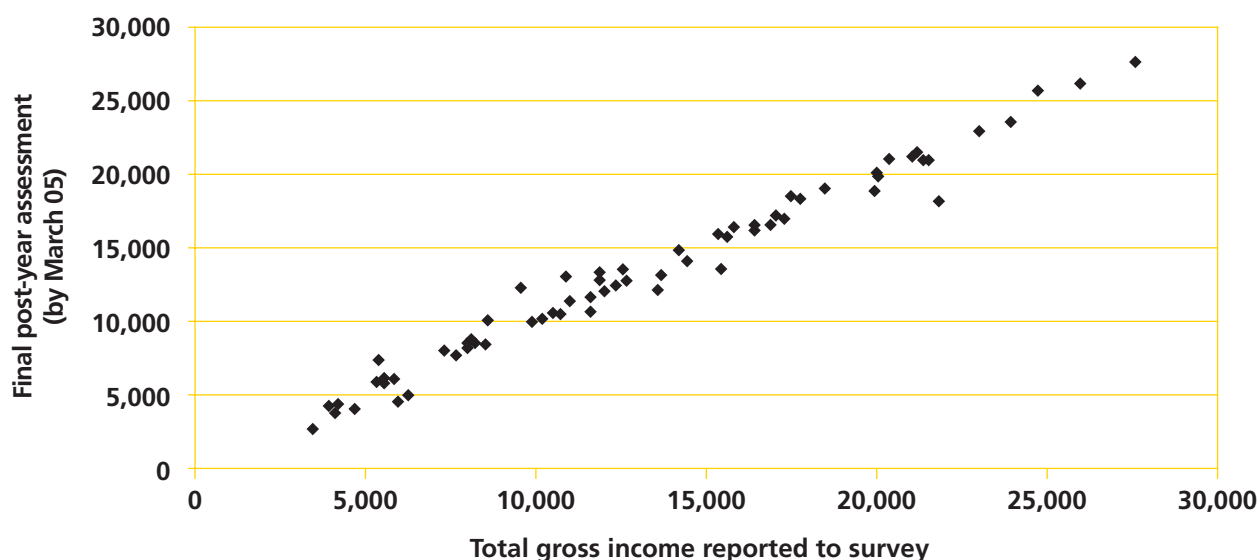
⁴⁶Up until March 2005.

income which they failed to report either to the survey or in their tax return, so we cannot use the results to reach a definitive conclusion on their honesty. There may also be differences between

the two amounts reflecting the precise timing of income receipts at the start and end of the tax year. Note that the incomes involved here differ from those which we have used in earlier analysis.

The income relevant for tax credit purposes is gross income (before deduction of income tax and NICs), and excludes most social security benefits and the income of children.⁴⁷

Figure 7.1: Reported gross income and final 2003-04 assessment (£)



Note: 63 cases where assessments made after end of tax year.

The gross incomes reported by our cases through the year are remarkably close to HMRC's final assessment for the year, with most of the cases lying very close to the leading diagonal of the diagram. Indeed, three-fifths (40) out of 61 cases⁴⁸ reported gross incomes during the year to us that were within 5 per cent HMRC's final assessment, and four-fifths (49) were within 10 per cent of it. The mean absolute difference was less than 6 per cent.

In only two cases was there a discrepancy of more than £2,000 between the two assessments. In one of these cases the gross income reported to us was nearly £22,000, compared to only £18,000 in the assessment after the end of the year. It may be that our calculation of gross

income has not allowed for some deduction allowable in such assessments. Alternatively it is notable that in this case significantly higher than normal pay was reported in the Christmas period, and it may be that this was omitted in error when the tax credit assessment form was later completed. The other case with a discrepancy of over £2,000 was one where a larger amount was reported at the end of the year to HMRC than during the year to the study. This may indicate that the incomes reported to us were incomplete in this case. But looking at the figure as a whole, this does not appear to be a widespread problem at all.

There are reasons why one might expect income collected week-by-week to be either more or less accurate than income

reported at the end of the year. More attention might be given to the single exercise at the end of the year than to the fortnightly reports during the year, and people might use their end of year P60 certificates from employers, leading to the annual report being more accurate. On the other hand, income collected at the end of the year might omit items which had been forgotten – or not recorded – earlier in the year. Interestingly, our results show no bias one way or another – the average income reported to the survey was just £28 above that reported to HMRC, with 30 cases reporting more to the survey, and 32 reporting more in their tax credit assessment forms. Of course, the families participating in the study were rather unusual in that they had been recording

⁴⁷In terms of reported incomes, we use the total of gross earnings by the respondent and any partner (after pension contributions), and additional income from sources such as investments and property (above a £300 threshold). In principle, contribution-based JSA and some forms of Incapacity Benefit should also be included in gross income. However, other kinds of JSA and IB are not included, and we cannot tell from the database which kind is involved. This only affects five of the cases, and where it does, it appears from the administrative records that the form of JSA or IB received was not part of gross income for tax credit purposes. We therefore excluded all social security receipts from the gross income reported here. Gross income for tax credit purposes also includes the value of company cars, health insurance and vouchers given by employers. Although the income diaries had an entry for 'other pay and allowances', respondents were not prompted for such items. It is possible – although perhaps unlikely for this group – that this could cause a difference in the gross incomes reported in a few cases.

⁴⁸Excluding 2 cases with zero or very low assessments.

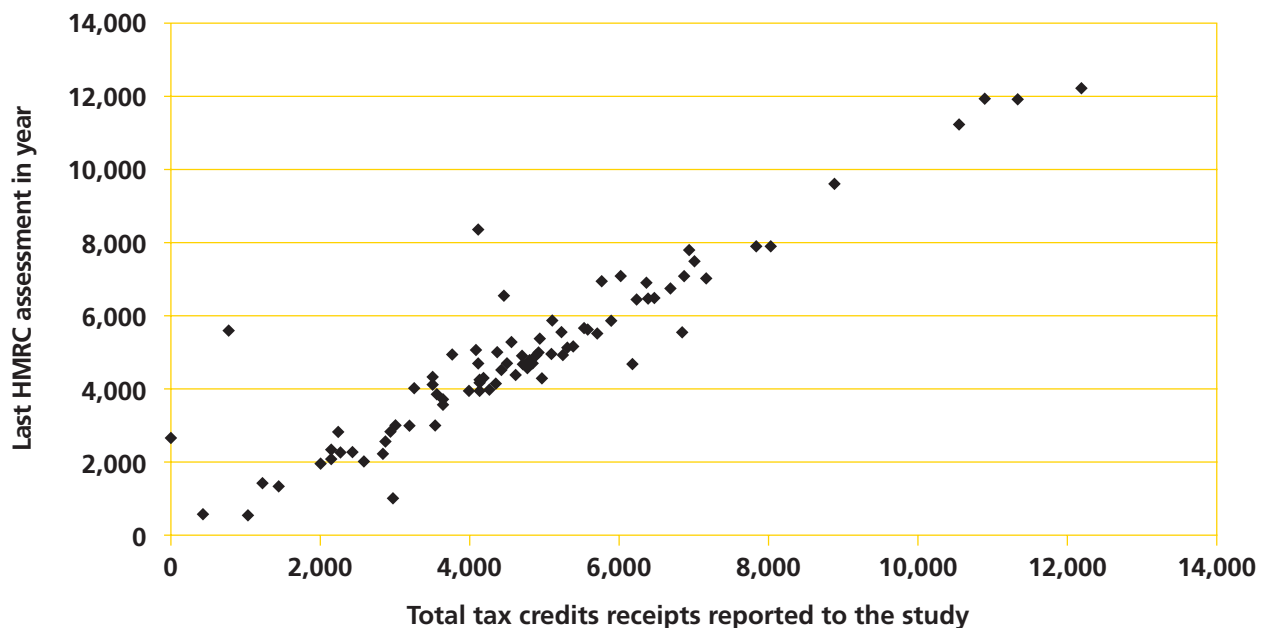
their incomes week-by-week across the year, and they may even have used the notes they made before filling in the income diaries when they completed their tax credit forms at the end of the year. None the less, the results are very reassuring, both for the quality of the data which the survey collected week by week throughout the year (but also for the quality of recall data for a whole year collected at the end of it).

7.2 Tax credit awards and reported receipts

We do not have information on the week-by-week flows of *payments* by HMRC to our cases, but we do have information on the *awards* for the year as a whole on which the flows are based. We can therefore compare the tax credit receipts reported by our cases during the whole of 2003-04, with their entitlements as calculated by HMRC in the last assessment made before the end of the tax year 2003-04. We use this

version of the assessment as this will usually be the closest to what would normally have been paid out in tax credits during the course of the year – any later assessments would only affect payments after the year we study, even though they relate to it. This comparison, the results of which can be seen for the 85 cases where we can do this in Figure 7.2, again gives us reassuring information on the quality of the data collected, and therefore on the variations over time reported by our respondents, at least so far as this component of income is concerned.

Figure 7.2: Reported tax credits and last 2003-04 assessment (£)



Note: 85 cases.

If all reported tax credit receipts during the year were exactly equal to HMRC's calculation of entitlement, all the points in Figure 7.2 would again lie on the 45 degree line. As can be seen, the great majority of them are very close to that line. In nearly half (39) of the cases, the reported receipt is within 5 per cent of the last award within the year, and in two-thirds (56) it is within 10 per cent. In two-thirds (55) of the cases, the reported receipts are within £500 of the last award. That there is a small amount of variation for many cases and a larger amount for others is due to several factors:

- At the start of the year many families report receiving amounts which appear to be their final receipts of WFTC relating to the previous six months, and not to the new tax credits.
- When a new assessment is made during the year which results in a newly calculated entitlement for the year as a whole which is lower than before, HMRC adjusts payments for the rest of the year downwards to try to ensure that the amount paid out by the end of the year is correct. However, if the amount *already* paid

out exceeds the new award, reducing tax credits to zero until the end of the year will not be enough to eliminate the overpayment. This explains, for instance, the case shown with a receipt of £3,000, but a last award in the year of only £1,000. In other cases, a change in award was made close to the end of the tax year, too late to make a difference to any of the payments made within the year.

- At least one of our respondents reported in their final follow-up interviews that there had been problems with the actual payments of the credits to which they were entitled. This explains, for instance, the case with a last award of over £5,000, but receipts of less than £1,000.
- Other unknown factors, including, of course, reporting errors by our respondents. Only in three of the remaining cases is there a large (more than £1,500) unexplained shortfall of reported receipts compared with their last awards. In these cases the explanation may be reporting errors that we were unable to correct using information from the follow-up interviews.⁴⁹

Overall, the picture suggests that nearly all our respondents reported tax credit receipts which reflected their calculated awards well. Under-reporting may be somewhat more likely than over-reporting, but the

amounts involved are not large for all but a small minority of our cases. Taken together with the results for gross incomes (mainly earnings) in Section 7.1, and allowing for what we would expect for Child Benefit, the components of income where we can make a check of this kind account for nine-tenths of the sample's total, and there is no evidence of substantial discrepancies.⁵⁰ As a corollary, the patterns of variation in incomes over the year that we described earlier in the report do not appear to be due in any large degree to reporting errors.

7.3 Tax credit changes during the year

The previous section suggested that tax credit receipts varied for our cases during the year, and that this did not result simply from a delay in initial payments, followed by a catch-up payment. The administrative data allow us to see why this might have occurred by comparing HMRC's

assessments for our cases for the year made at different stages. First, for all of those for which we have administrative data, we can see how many times calculated tax credit entitlement changed from the start of 2003-04 to its end (this may be less than the number of reassessments, of course, as entitlement wouldn't necessarily change each time).⁵¹ The breakdown is given in Table 7.1. More than half of the cases for which we have records had a change in their assessed award during the year. Where there were changes, this happened twice on average. In eight of our cases changes were made four or more times in the course of the year, one of them eight times. Although changes in assessments do not necessarily mean a change in payments, they often will, and it is perhaps therefore hardly surprising that we found the degree of variability in tax credit receipts that we described in Section 6.

Table 7.1 Number of reassessments where amount of tax credit award changed within 2003-04 tax year

Number of reassessments	Number of cases
None	38
1	25
2	10
3	4
4 or more	8
Total	85

The first column of Table 7.2 shows the cumulative impact of changes through the year on awards. Nearly half had the same award in force at the end of the year as at its start (40 cases, in fact, rather than the 38 shown in Table 7.1, as

in two cases a first change during the year was later reversed). But for the others quite large changes had been made. 19 cases had their award raised, by an average of £1,600, five of them by more than £2,000. On the other hand,

26 cases had reduced awards, by an average of £1,700, seven of them cut by more than £2,000. Again, such changes explain much of the variation in receipts during the year described in Section 6.

⁴⁹In one case, no follow-up interview was completed. In another, the follow-up interview suggested that gaps in recorded income towards the end of the year should be corrected, but gave no information about some earlier gaps. In the third case, the weekly income records contained no record of Child Tax Credit receipt, even though the interviews said that the family was receiving it. However, we had no way of establishing the correct amount.

⁵⁰There may be a shortfall averaging up to £90 in reported Child Benefit receipts (see Section 3).

⁵¹The figures shown also exclude further reassessments recorded as happening on the same day, as it is assumed that this would not result in more than one change in the award.

Table 7.2 Range of differences between initial and later tax credit awards, 2003-04 (number of cases)

Range of tax credit change	Change from initial to last award applying within year	Change from last award within year to final post-year	Overall change from initial to final post-year award
Award reductions			
Over £3,000	5	1	5
£2,001-3,000	2	1	4
£1,001-2,000	8	1	5
£201-1,000	7	16	15
Up to £200	4	15	6
No change	40	22	18
Award increases			
Up to £200	2	4	1
£201-1,000	5	5	7
£1,001-2,000	7	0	3
£2,001-3,000	3	1	4
Over £3,000	2	1	-
Total	85	67	68

We can also compare the last award applying *within* the year with the final assessment (up to March 2005, at least) made *after* the year end. This can be done for 67 cases, and the results are shown in the second column of Table 7.2. While for 41 of the cases there was either no further change in award, or one of less than £200, for 26 of them there was a change in the award – and hence a probable need for lump sum payments or reductions in payments in later years to correct for under- or over-payments – by more than £200. Three of the cases had their awards for 2003-04 cut by more than £1,000 after the end of the year, and two had awards increased by more than £1,000.

These changes did not, of course, have any effect on the flow of payments recorded in our survey within 2003-04, but they do indicate the kind of further variations which would have affected their tax credit payments in the following year.

This allows us to see whether the cases in our sample are particularly unusual by comparison with the generality of tax credit cases of this kind, and so whether their experiences are potentially atypical. In its comparison of actual tax credit payments in 2003-04 with its final assessments of entitlement made after the year-end, HMRC shows that one third (33 per cent) of all recipients were *over-paid* during the year. In 11 per cent of all cases, the overpayment was by more than £1,000 (HMRC, 2005b, tables 1 and 3). At the same time, 12 per cent of all cases were *under-paid*, with 3 per cent of all cases underpaid by more than £1,000. This suggests that our cases were not particularly unusual: nearly a third (19) of the 67 cases shown in the second column of Table 7.2 had their award reduced by more than £200 after the year-end, which might be expected to be associated with an ‘over-payment’. Three of the 67 cases had their assessments reduced by more

than £1,000 after the year-end, which might be expected to lead to an over-payment of this scale. In addition, the final column of the table shows that by the time of the final assessment 14 out of 68 cases had an award which had been reduced by more than £1,000 from its original level. Some of the additional 11 cases included here might also have received an over-payment of this size, as it might not be possible for such a large change – if made late in the year – to have been corrected by reducing payments for the rest of the year.

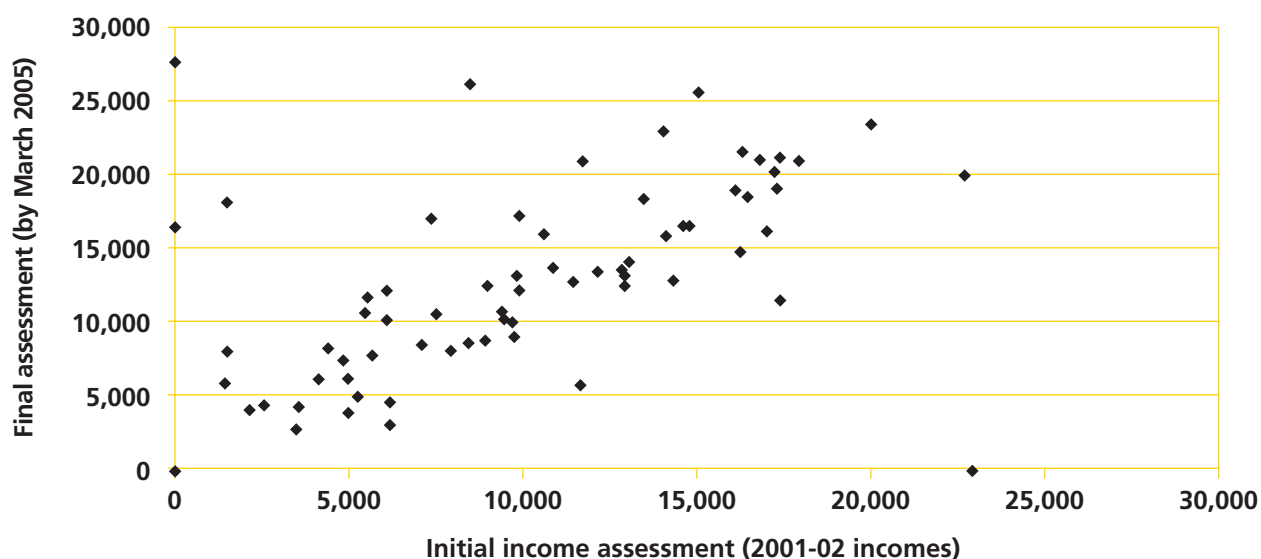
Many of these reassessments occurred because there was a large difference between income as assessed when initially calculating tax credit entitlement, usually based on income reported for 2001-02, and the amounts later reported for 2003-04. Again, the administrative data allow us to see whether the cases analysed in this report are particularly unusual, and

whether the reported pattern of changing tax credit receipts was plausible. Figure 7.3 shows, for the 68 cases where we can do this, HMRC's final assessment of income in 2003-04 (made up to March 2005) by comparison with the assessment originally

made at the start of 2001-02.⁵² On average, income finally assessed for 2003-04 was £2,700 higher than the original assessment based on 2001-02 income. For many of our cases there was a significant difference between the two assessments,

although there was also a group of cases (lying near the leading diagonal) whose incomes changed relatively little between the two years.

Figure 7.3: Initial and final income assessments, 2003-04 (£)



Note: 68 cases with final income assessments made after the year-end.

These differences explain much of the reason why tax credit assessments changed for so many of the cases. If income had fallen, or if it had risen by more than £2,500, tax credit entitlement and payments could be adjusted as a result (they could also be adjusted if other circumstances had changed). It is immediately apparent that as well as many of the cases having falls in income, many had increases well above the £2,500 threshold (originally set at this level because it was thought this would minimise the proportion of recipients

who might have their entitlement cut). Nor is it a simple matter of all incomes rising in proportion between the two years. There is clearly a great deal of variation around the rising average.

The range of variation between assessments made at different times can be seen in more detail in Table 7.3. Looking at reassessments within the year, 11 cases had an assessed income decline, 6 of them by more than £2,500. At the same time 23 cases had an income increase, 17 of them by more than £2,500. 14 of the cases had a

change of more than £5,000. Thus we would expect that in a third (28) of the cases for which we have administrative data, tax credit entitlement would have been changed during the year simply as a result of income reassessment, in some cases by a considerable amount. Even where such reassessments were made, the final assessment could still be substantially different – as the second column shows, 7 of the 32 cases we can examine in this way had a further change, up or down, by more than £2,500.

⁵²In one case we have corrected what appears to be a clear data error in the final administrative record for income, where previously recorded income appears to have been divided by ten, and where our own survey reports suggest that the higher figure was correct. However, in the analysis in Table 7.2 we have left unchanged the increase in tax credit entitlement after the end of the year apparently generated by this error.

Table 7.3 Range of differences between initial and later income assessments, 2003-04 (number of cases)

Range of income change	Change from initial to last assessment within year	Change from last assessment within year to final post-year	Overall change from initial to final post-year assessment
Income falls			
Over £5000	4	1	3
£2501-5000	2	1	1
£501-2500	4	1	7
Up to £500	1	3	3
No change	5	3	1
Income rises			
Up to £500	1	8	4
£501-2500	5	10	20
£2501-5000	7	2	14
£5001-7500	4	3	7
Over £7500	6	0	8
Total	39	32	68

The last column shows the ranges of variation between initial and final post-year assessment illustrated in Figure 7.3, covering both cases where there had been no reassessment within the year, and for those with a further change reassessment following the tax credit assessment form returned after the end of the year. In only eight out of the 68 cases for which we can make this comparison was the income finally assessed for 2003-04 within £500 of the 2001-02 income originally used to make initial assessments of entitlement to the new tax credits. In 33 cases there had been a change of more than £2,500 –

a considerable amount by comparison with the average income originally assessed for these cases of £10,100.

This scale of variation is again not out of line with the experience of tax credit recipients as a whole. Of the 2.6 million tax credit recipients in 2003-04 with 2001-02 incomes below £20,000 (from whom our cases are largely drawn, as can be seen from Figure 7.3), 38 per cent had a rise in income by 2003-04 (where this is known) large enough to take them into a higher income band. Eleven per cent had a fall large enough to take them into a lower income band.⁵³

This kind of information illustrates the acute dilemma facing those administering the tax credit system. On the one hand it shows the extent to which circumstances do vary from year-to-year, and hence for some people the advantage of public transfers reacting to their changed circumstances. On the other, it shows the very large adjustments which have had to be made to tax credit payments both within the year to try to get the amount paid out during the year correct, and after it to correct for under- and over-payments.

⁵³ HMRC (2005b), table 6. The relevant income bands are £5,000 wide.

Summary

- We were able to match the incomes of 85 of our cases with administrative data on tax credits and income assessments supplied (on an anonymous basis) by HMRC.
- Using these we can compare the total gross incomes reported during the year to the survey with those reported to HMRC after the end of the year. This is very reassuring in terms of the reliability of the survey. First, there was no apparent bias one way or another in the different kinds of report, with a difference in the average gross income reported for the year of only £28. The mean absolute difference was less than 6 per cent. Only in two cases was there a discrepancy of more than £2,000, one of which may reflect unusually high income receipts over Christmas period that were omitted in error in the tax credit assessment form returned to HMRC. In the other case, less was reported to the survey than to the HMRC, which may indicate a reporting lapse to our study.
- We can also compare the tax credit *receipts* reported to the study and the final assessment of *entitlement* made by HMRC within the year. These amounts would not necessarily be expected to be the same, but in half

of the cases that we can compare, the difference was less than 5 per cent, and in two-thirds of them it was less than 10 per cent. Many of the differences can be explained by final receipts of WFTC at the start of the year, or by late revisions of tax credit awards that could not be corrected within the year. Only four cases had a discrepancy of more than £1,500, one of these explained by reported difficulties in payment administration.

- The administrative records also show the extent to which both income and tax credit assessments changed both during and after the financial year.
- As a result of income reassessments or other reported changes in circumstances, tax credit awards changed *during* the year for more than half of the cases. For those where the award did change, it did so an average of twice. One case had eight changes in the amount of tax credit award during the year. In twelve cases the revision of tax credit entitlement during the year was by more than £2,000, which explains some of the variability in tax credit receipts described in earlier sections.
- Looking at the 68 cases with assessments made after the end of the year, in 14 cases the final assessment

of tax credit entitlement was more than £1,000 lower than that originally awarded; in seven cases it was more than £1,000 higher. These changes might be expected to be associated with a pattern of over- and under-payments by the end of the year which was consistent with the experience of tax credit recipients as a whole in 2003-04.

- In 68 cases we can compare the final assessment of income made after the year with that made at the start of 2003-04. In 33 of these, the difference was more than £2,500 – a substantial amount by comparison with the initial average gross income assessment of £10,000. However, these changes were in line with the experience of tax credit recipients as a whole with such income levels.
- Such changes illustrate the acute dilemma facing those administering the tax credit system. For some people there is a clear advantage if public transfers react to their rapidly changing circumstances. However, the scale of change also implies that very large adjustments can be needed to tax credit payments within the year to try to get the amount paid out during the year correct, and after it to correct for under- and over-payments.

8 Respondents' view of income variability

The final type of data we can analyse in this report comes from the views of the respondents given in face-to-face follow-up interviews. Most of the data come from the interviews carried out after the end of the survey year, and after preliminary examination of the records collected.⁵⁴ 83 of these interviews were carried out, 82 of them relating to the 93 cases analysed in earlier sections. As well as checking on respondents' circumstances and following up queries on the weekly income data, these interviews explored views on various aspects of their income. In this section we look at whether they thought various income items were predictable or not; whether they could predict income and

outgoings; and related aspects of budgeting. Where appropriate we relate the views to the analysis given in earlier sections on the variability of the income reported to us.

First, Table 8.1 gives a summary of the respondents' views (in June 2004) of the timing and amount of different income items they had received since September 2003 (listing items where five or more of the respondents reported receiving them). Very few of the respondents found the *frequency* with which various payments came unpredictable: this response was given for only 12 items in total between all 82 respondents, three of these referring perhaps unsurprisingly to gifts. Given the regular time patterns

of income receipt for most items reported to the survey, this is unsurprising. What is more surprising, however, in the light of the variability of income reported to the survey is the pattern in the last two columns for amounts received. Between all 82 respondents, only 25 income items were reported as having 'not the same amount', as opposed to being 'approximately the same amount'. These included the pay of five respondents and of seven of their partners, eight tax credit items, and Housing Benefit for one case. Again, unsurprisingly three of the five recipients of gifts reported the amounts involved as variable.

Table 8.1 Respondents' views of particular income items (number of cases)

	Numbers receiving item	Of those receiving:			
		Frequency of payment		Amount received	
		Predictable	Unpredictable	Approximately same	Not the same
Respondent's pay from main job	58	55	1	50	5
Partner's pay from main job	38	34	4	31	7
Child Tax Credit	79	77	2	75	4
Working Tax Credit	64	61	-	56	4
Child Support	8	7	1	6	1
Child Benefit	78	77	-	76	-
Housing Benefit	14	13	1	13	1
Disability Living Allowance	6	6	-	6	-
Gifts	8	5	3	5	3

Base: 82 follow-up interviews after end of year. CTC, WTC and Child Benefit results combine items received by respondent and by partner.

Respondents were asked in particular about the variability of their tax credit receipts, and the predictability of intervals between payments. 72 respondents reported that they received a regular amount, 2 that it was 'mainly regular with a period of irregularity', and 5 that they changed from time to time. Nearly all of them (75) reported that they arrived at predictable intervals, and the rest (4) that they were 'mainly predictable'. None reported the intervals between payments as unpredictable. However, nine of the 82 reported that

they had experienced tax credits or social security payments stopping without them knowing in advance that this would happen.

Respondents were also asked whether, in the previous month they could have been able to predict their *total* household income in that month to within £50, and if not, whether this was a problem for them. When asked in the face-to-face survey part of the way through the year, which took place in December, they were asked about the

previous month (November). When asked in the final follow-up survey, in June 2004, by mistake the question had not been adjusted and still referred to November, leading to some confusion in the responses, with several commenting that they could not think that number of months ahead. Table 8.2 below therefore presents the responses from the face-to-face survey *during*, rather than after the end of, the year. This has the advantage that we can relate the responses to the variability of income during the year, 2003-04, surrounding this interview.

⁵⁴For reasons explained below, the data on the predictability of total income comes from the interviews carried out during the year (in December 2003).

Table 8.2 Predictability of total income in previous month by variability of total income in 2003-04

	All	Number of cases:			Average CV (%)
		Low CV	Medium CV	High CV	
Predictable (within £50)	75	24	29	22	15
Unpredictable	15	1	8	6	21
<i>of which:</i>					
A very serious problem	3	-	1	2	20
A serious problem	2	1	1	-	13
A bit of a problem	5	-	3	2	19
Not a problem at all	5	-	3	2	24

Base: 90 mid-year follow-up interviews and weekly income data.

Note: 'Low CV' is under 10 per cent; 'medium CV' between 10 and 20 per cent; and 'high CV' is over 20 per cent.

Again, at first sight these results may seem surprising in the light of the findings of the rest of the report. Only 15 of the 90 respondents to the mid-year survey for whom we also have complete income data reported that they could not have predicted their income the previous month to within £50. Of course, this was asking for a prediction relating to the *same* month – in effect, asking whether the amount received by the end of the month came as a surprise – so this is perhaps a rather strict test, referring only to expectations for one month and after it had started. None the less the number is not very high. Furthermore, when asked whether this unpredictability was a problem for them, only ten did so, the remaining five saying it was 'not a problem at all'.

As the table shows, those with greater measured variability in their income were more likely to report it as unpredictable. The coefficient of variation of total income over the 13 four-week periods averaged 21 per cent for the cases reporting unpredictability, compared to 15 per cent for those saying income that month had been predictable. All but three of the 15 'unpredictable' cases has CVs above the average for the sample as a whole, and only one had a CV below 10 per cent. There is by no means a direct relationship, however. Many – indeed, most – of those reporting what were measured as very variable incomes over the year as a whole had not found income unpredictable the month before the interview.

Looking at other characteristics of those reporting that their income had not been predictable, there is little to identify them as a particular group: they are a mix of owner-occupiers and tenants, of couples and lone parents, and of those who had and did not have particular changes in circumstances during the year. Their total incomes come from across the range of incomes for the sample cases as a whole, with a slightly higher average (£18,600) than that for the whole sample (£17,200). Nor is there any particular difference between those reporting that unpredictability was a problem from those saying it was not. The only noticeable difference between those reporting unpredictability and the sample cases as a whole, is that they all have two or more children: none of the 26 cases with one child said that they could not have predicted their income the previous month.

Some clues as to why what appears to be very variable income across the year as a whole does not lead to large numbers reporting a problem of unpredictable income for a particular month comes from the more detailed comments respondents gave on why they gave this response. First, some of those who said that income was unpredictable, but that this was not a problem gave rather stoical responses:

'You've still got to get food and pay the bills, so it's no good getting in a state about it.'

'If not enough comes in, I cut back. It cannot be a problem if not enough comes in – there's nothing you can do about it, you just have to manage it.'

Another of these respondents, a couple with two children and income for the year of less than £14,000 said that, 'I know we shall have enough, but don't know the exact figure'. Another, who said it was 'a bit of a problem' said that, 'You've got to do what you do. You just cope.'

Where variability was said to be a problem, the reasons given included: unreliable maintenance payments; a WTC payment which had been reduced to only £3.51 the previous month; the fact that a partner had ten shift changes in the previous 18 months so salary varied between £200 and £500 per week; and being able to cope the month a £200 bonus came in but not in others. For another case, the issue was more general – 'it's not easy to manage these days', and for another, 'It's just a job trying to keep track of everything. Nothing else.'

Several of the respondents referred to what was actually variability in their outgoings, rather than their income:

'For the basic everyday living we make sure we are covered, but find it difficult to budget for unforeseen circumstances. We are unable to budget for any pleasure activities – holidays, day trips out and car maintenance problems.'

'Due to birthdays and Christmas expenses.'

'I find the car a real worry. It's getting to the age where it needs work on and I haven't got extra income to maintain it – but I need it for my job.'

'It's difficult because it's close to son's birthday and Christmas – extra expenses.'

However, only one respondent gave details of a severe problem. At the December interview she had said, 'I know what is going in and what's going out. December extras are budgeted on overdraft and paid off through January, February and March.' But by June 2004 this plan appeared to have gone wrong and she was very upset, saying that she was 'getting to the point where I shall give up work as a result. I have told the tax people exactly what I'm earning and spoken on the phone but they still can't seem to understand what I tell them.' The respondent reported receiving multiple different tax credit awards.⁵⁵

A further clue that the issue here is budgeting and what happens when it goes wrong comes from the comments of those saying that their income had been predictable the previous month. For some of them, it was simply that they knew ahead what income would be that month. Others said that it was only a problem when something like the washing machine went wrong:

'If any domestic appliance were to break down or my car (which I need for work), I would be in real trouble.'

Many talked about only spending within their means, and not counting on extra amounts. For instance, if 'a boat came in' (literally), one respondent's partner would get overtime, but that was not taken into account when spending. Several others reported detailed calculation of their finances. One used Excel spreadsheets and did accounts daily. Others recorded in a diary – some daily – what went in and out. One respondent said that the income tracking survey itself had helped budgeting.

It is the detailed and short-term nature of this group's budgeting that may explain how they cope with incomes that often vary from month to month. First, Table 8.3 shows that nearly all of them regard themselves as careful managers. When asked about how they managed their income and spending, only six described themselves as disorganised, as opposed to 76 who saw themselves as 'fairly' or 'very organised'.

Table 8.3 Respondents' views of own budgeting and money management

	Number of cases
Very organised	25
Fairly organised	51
Fairly disorganised	5
Very disorganised	1

Base: 82 follow-up interviews after end of year.

They were also asked about how far ahead they usually planned 'when thinking about your basic expenses (food, bills, rent etc)'. What is striking about Table 8.4 is just how short a time-scale most of the respondents said they planned. Only two did so more than a month ahead, just under a half planned month-by-month, and more than a third planned their basic spending a week or less ahead. Seven said that they did not plan at all.

Table 8.4 Planning ahead for basic expenses

	Number of cases
2-3 days	8
About a week	21
About 2 weeks	6
About a month	37
More than a month	2
Other	1
Don't plan at all	7

Base: 82 follow-up interviews after end of year.

⁵⁵ And indeed, the administrative records show that the award had already changed four times within the year by March 2004, despite the couple's income being 'stable' according to our classification. The changes in award appear to result from a new assessment of prospective income for 2003-04 made in August 2003, together with several changes in the assessment of which weeks during the year there would be eligible childcare costs.

This combination of careful but short-term planning helps explain how families of this kind cope with what can be large fluctuations in their incomes from month-to-month. As in some of the quotations above, many say that they try to live within their means, looking at income receipts over a fairly short period. Problems occur when there are unexpected extra expenses, and there is no margin to cover them. As Table 8.5 shows, half of the respondents reported that in the previous six months they had just enough with nothing left over for savings, and a quarter that their outgoings had exceeded their incomes. Fewer than a fifth had managed comfortably with enough left over for savings.⁵⁶

Table 8.5 Respondents’ views comparing outgoings and income over past six months

	Number of cases
Comfortably with enough left over for savings	14
Just enough with nothing left over for savings	47
Outgoings exceed income	21

Base: 82 follow-up interviews after end of year.

In other words, income variability from month-to-month is something these families simply have to cope with by tailoring spending patterns to match it.

Unexpected spending demands therefore often loom larger than income variability itself when asked whether unpredictable income is a problem. As a corollary, when trying to understand the overall distribution of income, at least for this group with low to moderate incomes, it is the incomes they receive over a short period, such as a month or the four-week periods as analysed above that may matter for what they can spend, rather than income averaged out over a longer period, such as the whole year.⁵⁷

Summary

- As well as checking details of circumstances and income receipts, face-to-face interviews in December 2003 and June 2004 asked respondents about their own experiences of income variability.
- Few respondents reported irregular timing of income items in June 2004. Rather more reported that the amounts of particular items were variable, but still only reported this for 25 income items across 82 respondents.
- When asked in December 2003 whether they could have predicted in November the amount of total income they would receive that month to within £50, only 15 out of 90 respondents said that they could not have done so. Only ten of these said that this was a problem for them.

- The 15 cases reporting unpredictable income in November 2003 did tend to have more variable income across the year as a whole than the average for the sample as a whole. However, many with highly variable income across the year did not report unpredictable income for that month.
- In commenting on their reasons for responses, many said that they just had to cope with whatever income turned out to be. Some did point to variability in items such as pay or child support, but others talked about the problems caused by unpredictable spending items.
- Respondents appeared to be coping through careful budgeting – nearly all of them described themselves as ‘fairly’ or ‘very’ organised in managing their finances, sometimes on a daily basis. In planning ahead for basic expenses hardly any did so more than a month ahead, and a third planned a week or less ahead.
- It appears that this group manages by tailoring spending to match variable incomes, often with little margin for error. By implication, incomes measured over relatively short periods, such as a month or four weeks, may matter considerably for their living standards at that time, rather than income averaged over longer periods, such as a year.

⁵⁶Interestingly, those likely to say that they had managed comfortably over the previous six months (first half of 2004) were as likely to have had below- as above-average incomes for our sample cases in 2003-04.

⁵⁷In later work we hope to explore responses to the face-to-face interviews to examine how the families report that they cope with shortfalls in their budgets, such as through borrowing or delaying payments of bills.

9 Conclusions

Setting out to uncover the patterns of variation followed by family incomes over a complete year was an ambitious and difficult exercise, but one which turned out to be successful. This report discusses the incomes received in thirteen successive four-week periods by 93 families in the financial year 2003-04 (substantially more than our original target of 60 complete annual records). Before considering the findings it is important to be clear about the limitations and strengths of the data collected:

- Although we analyse 4,800 weeks of income data, they come from only 93 families, drawn from a particular segment of the population. This sample is, of course, not large enough to draw precise conclusions about the relative importance of different income patterns across the population as a whole. However, the data do reveal the way in which these income patterns can be very variable (for low- to middle-income families with children) in a way that has not been visible before. They are strongly suggestive that there is more short-term income variability for this kind of family than might previously have been expected.
- With an exercise as intensive as this, it is possible that lapses in reporting can create artificial changes in income between periods. We explain in the report how we attempted to avoid this. A comparison between the total gross incomes and tax credit receipts reported through the year match administrative data supplied by HMRC very well. While the findings here may partly reflect lapses in reporting of particular data items in a few cases, the matching exercise suggests that the pattern of income variation observed is for the most part a genuine one. Similarly, the differences we describe between families in different circumstances and affected by particular events in the year suggest that these patterns are not the result of random reporting error.

Nor does the degree of variation we measure appear to be driven by the most unusual periods of income for each family.

- The results of the exercise could be biased if particular types of family had been more likely to drop out during the year than others. The number completing full weekly income records across the whole year was only just over half of those who initially agreed to take part (albeit a lower rate of attrition than we originally expected). There is, however, little evidence of bias in the types of family that completed the course by comparison with those originally approached, in terms either of their characteristics or of their income variability in the first part of the year.
- The sample was from families of a particular kind: those that had previously received Working Families Tax Credit, so all had children, and nearly all still had at least one earner at the start of 2003-04, but with relatively low incomes. There were rather fewer lone parents, rather more two-earner couples, and rather more with relatively high incomes amongst the final sample than amongst former WFTC recipients as a whole, weighting the sample a little towards the groups tending to have lower variability in their incomes than others. Their total incomes for the year put them in a range of low- to middle-incomes from roughly the second to the sixth tenth of the overall household income distribution. The ranges of their incomes and tax credit entitlements in 2003-04 were typical of families with children receiving the new tax credits in excess of the 'family element' of Child Tax Credit.

In later work, there are several aspects of the data collected that we intend to analyse in greater depth than has been possible so far. Those include: the impact of a focus on 'usual' income over the most recent period of receipt for a particular item, rather than receipts in a

fixed period; the potential effect of a more aggressive approach to imputing income (using more information from the income diaries where available and from the administrative data) in periods when it might normally have been expected, but where we had no positive confirmation that the record should be corrected; and addition of income from Housing and Council Tax Benefits.

The findings here suggest that this approach to collecting data can be successful, despite its great challenges, and that the results of such an exercise can be surprising. There may be other groups of particular interest for whom it would be worthwhile carrying out a similar survey. For instance, the patterns of incomes for those who had no earner at the start of 2003-04 (despite their earlier WFTC receipt) were particularly interesting and variable, but we had few cases of this kind to examine. Understanding the income patterns of a larger group that experienced movement into work and off out-of-work benefits might also be illuminating.

In this report we have focussed on three questions in particular. First, how representative is income over a relatively short period of that received over the whole year? The short answer is that it is not necessarily very representative. Only 40 per cent of the 1,200 observations of four-weekly income across the sample were within a range of plus or minus 5 per cent of the family's annual average, and only 61 per cent were within plus or minus 10 per cent of it. When incomes are compared between the sample cases, income inequality is lower if receipts are aggregated over a 12-week period than over a four-week period (although there is no further reduction in inequality widening the window to a year).

This finding may have implications for the interpretation of income distribution statistics drawn from household surveys: some families' circumstances will, for instance, look more favourable if aggregated over a whole year, rather than just over a few weeks. However,

there are two caveats to this. First, such household surveys generally ask about 'usual' income receipts of different kinds over the most recent period they were paid in, and this adjustment may remove some of the variability we report (although we suspect only a minority of it, and it is not entirely clear how people with very erratic incomes respond when asked for their 'usual' income). Second, the results of face-to-face interviews with the families during and after the end of the exercise suggest that they cope with income variability by careful budgeting over periods that are seldom longer than a month, with little margin for error. In this case, their incomes over the shorter periods may have more significance to them than those over a whole year.

Second, we examined patterns of income mobility at a finer grain level than had been done before. Those patterns involve considerably greater volatility of income within the year (for this particular kind of working family) than many might have expected. A prior expectation might have been that at least a significant minority would receive incomes that varied little across the year, or perhaps had a single step up or down in income. However, this was not what we found. For instance, only seven of the 93 cases had incomes in the 13 periods that varied within a range of plus or minus 10 per cent of the case's annual average. A quarter of the families had at least four periods with incomes outside a range of 85 to 115 per cent of their annual average. Generally speaking, those families with the greatest volatility of income were those with lower incomes (total net incomes for the year below £15,000). A higher proportion of lone parents and tenants also had more variable income. However, high degrees of variation affected some cases from all of the family types we looked at. Some of the families had patterns of income receipt that were very variable indeed.

The patterns of income variation within the year that we observe may also have implications for the measurement of income mobility over longer periods. Where comparisons are, for instance, between what are effectively snap-shots of income a year or so apart, part of the change measured may reflect what are actually the effects of shorter-term variations – 'wobble' – during the year, rather than a longer term change in circumstances (although a part of this effect may again be removed where surveys collect data on 'normal' incomes).

Not all the 'variability' measured in the way we do was undesirable: for a small number of the families, it represented a significant improvement in their circumstances over the year. For the great majority, however, the variation was not around any clear trend. It was therefore interesting to investigate the extent to which state transfers smoothed the families' net incomes by comparison with those they obtained from the market. Here we found that – as one would expect – both social security benefits and tax credits reduced inequality *between* the total net incomes of the 93 cases, and did so to the same degree. However, while both social security benefits and tax credits reduced the variability of individual families' incomes within the year, benefits did so to greater extent than tax credits, even though the amounts of benefits involved were less than half the amount on average than that of tax credits. In nearly a third of cases income was more variable after including tax credits than before doing so. Social security benefits had a large effect in offsetting the variations in income associated with changes in the families' labour market position over the year. Tax credits contributed to this as well, but to a somewhat smaller extent. These differences reflect the design of the two kinds of transfer. Some social security benefits are based on circumstances over

short periods with benefits adjusted immediately, and pound for pound. Tax credits are generally intended to reflect the position over the year as a whole, with their payments adjusted to achieve this for the year as a whole, not in any particular week or month.

The year we examined was 2003-04, the first year of the 'new tax credits', and there were particular problems associated with their payment over the first few weeks of the new system. While, as former WFTC recipients, the families generally had tax credit assessments made before or at the start of the year, many of our families had low or even zero receipts of tax credits in the first one or two months of the year, followed by a catch-up payment. Tax credit receipts did become more stable after the first twenty weeks of the year, but even then they were not constant. The administrative records confirm that the tax credit assessments of half of the families were revised during the year, often several times (and often changed again when a final assessment was made after the end of the year). Some of these changes reflected the special circumstances of 2003-04, when initial awards were based on income two years before, leading to potentially larger than normal adjustments when actual incomes were reported. On the other hand, tax credit payments in 2003-04 were not affected by what can be the large adjustments correcting for under- or over-payments in the previous year that will occur in subsequent years.

The degree of variation in income both within the year and between years found for many of the families in the sample illustrate a dilemma facing those administering systems such as tax credits. Such systems can be run on a 'rough justice' basis of fixing payments for a while on the basis of *past* income, as in the former WFTC, or as in equivalent systems in countries such as Canada.

Alternatively payments can be adjusted to reflect *current* incomes, as is done for social security benefits over short periods (such as a week) or for the new tax credits over a year (with adjustments within the year that attempt to end up with correct payments for the year as a whole). The findings here cut both ways. On the one hand, the degree of variation we show occurring within the year suggests that families' circumstances can change very rapidly, and that the justice involved in basing tax credits on past incomes would indeed be rough, and payments might not match up to their current circumstances. On the other hand, this degree of variation in incomes makes administration of a system intended to adjust for it during the year very difficult.

The recently announced reforms to the tax credit system from April 2006 are intended to limit sudden downward adjustments of the kind affecting some families that were part of this survey, while preserving the ability to make adjustments that respond to deteriorating circumstances.

It might be argued that it is achieving the correct position over the year as whole by its end that matters – which is what the new tax credit and older PAYE systems are designed to do – rather than income smoothing within the year. However, our interviews suggest that families with incomes at these levels budget on a much shorter-term basis than over the whole of a tax year – over a month or less – so such adjustments may come too late for them.

Given the generosity of the new tax credit system, making up more than a quarter of the sample families' total net incomes, the ways in which credits are paid obviously have major effects on their income flows through the year, and their design has to be carefully considered and monitored in the light of findings of the kind reported here.

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