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Unstable Pay

New estimates of earnings volatility in the UK

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Executive Summary

When it comes to wages, conversation often revolves around how much people earn. But earnings are rarely static: they fluctuate due to variations in hours worked, bonuses, voluntary job changes, and redundancies. This volatility matters, because unpredictable earnings can mean financial stress, difficulty planning for the future, and increased reliance on credit or social support. So understanding earnings volatility is crucial for building fairer labour markets, effective social policies, and financial security in an uncertain world. This report uses a newly available dataset – payroll data held by HM Revenue and Customs on over 250,000 working-age people covering April 2014 to March 2019 – to look at monthly and weekly volatility in employee pre-tax earnings. It is one of a very few UK studies to look at high-frequency earnings volatility on a large scale, and the first do so on a sample that is representative of the population of employees in the UK.

Existing indicators suggest that the labour market is becoming less volatile – but also less dynamic – over time

When it comes to employment, it is well known that moves in and out of work, and moves between jobs, are lower than they were three decades ago. This trend has been viewed positively from the point of view of security for an individual worker (for example, the proportion of jobs ending with an involuntary end (rather than a resignation) at the end of the 2010s was half the level of the late 1990s), but it comes with the downside of a lack of dynamism (for example, the proportion of workers changing both jobs and sectors was 35 per cent lower in 2019 than in 2000). In terms of how much people work, there is mixed evidence on whether uncertainty over hours worked is growing: zero-hours contracts are apparently being used more than in the mid-2000s, but the proportion of workers who say that they have any sort of variation in hours has gone down over the same period.

Our new estimates of earnings volatility between one year and the next are in line with the latter. There has been a clear fall since the early 1990s in measures of volatility of employment earnings that are calculated from samples including people who move into or out of work. But if we focus on those in work continuously, then there has been essentially no change in year-on-year earnings volatility for the past 25 years.

Monthly earnings volatility is greatest for the young, the low paid, and those on temporary contracts, but some well-paid workers have volatile earnings by virtue of end-of-year bonuses

Volatility is lower when calculated for earnings changes between two consecutive months than volatility calculated from monthly earnings a year apart, because fewer

things can happen to pay in a shorter period of time. But there is still a large amount of month-to-month change. Among those employed in consecutive months, almost three-in-ten workers (29 per cent) saw their earnings change by up to 10 per cent; another one-in-eight (13 per cent) saw changes of up to 25 per cent; and a further 15 per cent saw changes of more than 25 per cent. By contrast, only four-in-ten (43 per cent) workers saw effectively no change in monthly earnings. (These facts relate to pre-tax earnings, and 'per cent' here refers to the 'arc percentage change', a variation on the standard definition of 'percentage' that we explain in the main text; one of its virtues being that it allows us to calculate changes from £0.) Among those in employment for two consecutive months, the average month-to-month change in earnings stands at 15 per cent, similar in magnitude to an average household's monthly spend on food and clothing.

Some earnings volatility will be due to pay rises. In particular, the importance of one-off bonuses is reflected in the seasonal pattern of volatility, which peaks in March and April: the average change in earnings from the previous month is 17 per cent in March and 18 per cent in April, compared to 15 per cent in other months; and 10 per cent of employees have earnings in March that are at least a quarter higher than in February). For employees in the Finance and Insurance sector, earnings in March average 37 per cent higher than February, in line with other data that suggests that more than half (55 per cent) of total remuneration in the sector in March reflected bonuses.

Individuals' experiences of volatility can also be summarised by looking at patterns of changes in monthly earnings experienced over a year. Even among people consistently employed, only one-in-four (26 per cent, or 5.0 million) experience 'stable' pay – defined as having monthly earnings within 10 per cent of their average monthly wage in all months of the year (this and other definitions in this paragraph refers to the normal concept of a percentage). At the other extreme, around one-in-seven (14 per cent, or 2.7 million) employees experience 'erratic' earnings across the year – defined as having four or more months in a year where their earnings are at least 25 per cent higher or lower than their average monthly wage. Volatility on this measure was highest for the youngest workers, with one-in-four (24 per cent) consistently employed 20-24-year-olds having erratic pay in a year, more than twice the rate for those aged 40 and over (10 per cent).

Erratic earnings are experienced by roughly one-in-four employees in the hospitality (27 per cent) and arts and recreation (23 per cent) industries, and roughly one-in-seven employees in the retail (16 per cent), banking (16 per cent) and health and social care (14 per cent) sectors. Other than banking, this list is similar to the sectors that make the greatest use of zero-hours contracts: pubs and restaurants; accommodation; entertainment and recreation; and social care. By contrast, only 5 per cent of consistently employed employees in public administration experienced erratic pay, and those working in education were the most likely to have stable pay (on our classification above).

There is a U-shaped pattern to the prevalence of erratic pay across the earnings distribution: erratic pay is most common among the lowest earners, with three-in-ten employees (30 per cent) in the bottom decile of annual earnings experiencing erratic pay, as well as 18 per cent of employees in the top 10 per cent, compared with 14 per cent among all workers. Erratic pay is also more common among those with temporary contracts and those working part time (as recorded in April of that financial year).

Groups with the highest earnings volatility – such as workers aged 20-24, workers on temporary contracts or with multiple jobs – only comprise a minority of the overall workforce, which means their volatility doesn't nudge the overall average up too much. Temporary workers comprise 6 per cent of employees, multi-jobbers 7 per cent, and workers aged 20-24 make up just 13 per cent.

Those paid each week can see earnings fluctuate at an even higher frequency

Across the workforce, 12 per cent of employees (3.3 million) are paid each week. But this experience is concentrated in the lower-paying parts of the economy: close to half of workers in food processing and textiles are paid weekly (51 and 49 per cent). Weekly payslips are also more common than average among workers on temporary contracts (21 per cent), workers in the smallest businesses (18 per cent of workers in businesses with fewer than 50 workers are paid weekly), and workers on low hourly pay (21 per cent of workers in the bottom hourly pay quintile are paid weekly). Among those who are paid in consecutive weeks, the average week-on-week change in earnings is 19 per cent – larger than the average percentage change in monthly pay among all workers – even though the period of time is smaller (as with the analysis of month-on-month changes, this is an arc percentage change). For someone on the median weekly pay among workers paid weekly, this equates to a change of £84 a week on a weekly paycheque of £400. And 7 per cent of employees working in two consecutive weeks see their earnings fall by at least 25 per cent, something that is much more common in December and March.

Both the Government and employers can do more to reduce the problems caused by fluctuating earnings

This report shows that average changes in earnings on a month-to-month basis are substantial. But erratic earnings won't pose problems for all workers. For example, erratic earnings might not matter much if those earnings are the minority of a household's income – perhaps because there is another worker in the family with higher (and more stable) earnings, or because other sources of income can help smooth out the volatility. For other workers – such as students or carers – volatile earnings may be the side effect

of something positive: of being able to work flexibly and take shifts that fit around other parts of their lives. But what stands out is the way that volatility is higher for the low paid, and more common among those with fewer rights in the labour market, groups whom we might suspect are the least able to cope, or in a weak position to bargain for stability. And that suggests several areas where earnings volatility should be taken seriously by policy makers or other organisations.

First, the ongoing DWP review of Universal Credit needs to consider how it can better provide recipient families with stable incomes. It is well known that the monthly assessment cycle of UC copes badly when workers have a weekly or (especially) a four-weekly payroll cycle. Other studies have also shown that, even disregarding this weekly-monthly mismatch, the fact that UC is (in effect) always paid a month in arrears worsens income volatility. Our new work shows just how volatile earnings can be among those with low hourly or weekly pay. The fact that the social security system may amplify volatility for those who can least afford it is a major design flaw.

Second, although our dataset does not identify who has a zero-hours contract, it is striking that sectors where workers experience the greatest volatility are those that make the greatest use of zero-hours contracts: pubs and restaurants; accommodation; entertainment and recreation; and social care. This suggests that the provisions in the Employment Rights Bill to give workers a right to a contract with guaranteed hours, and a right to reasonable notice of changes in shifts or working time, will help reduce volatility in earnings.

Third, the problem of volatile earnings is diminished if workers have savings to act as a financial buffer, but too many do not: in 2018-20, one-in-three (30 per cent) working-age adults lived in families with savings of less than £1,000. Previous Resolution Foundation work has recommended that auto-enrolment be extended to allow employees to accumulate a highly liquid 'sidecar' savings account with no restrictions on its use, capped at £1,000. This could help with many things, including fluctuations in earnings.

Finally, employers can also take steps to reduce their workers' earnings volatility. This should include paying workers at the frequency that most suits them, and allowing workers to spread bonuses or payments in arrears across months. Employers and organisations like trade unions could also do more to support and promote technical solutions to the problem of earnings volatility, including earned wage access tools or shift-tracking apps.

Section 1

Introduction

When it comes to wages, conversation often revolves around how much people earn – and rightly so, given that average real wages in the UK are just £12 a week higher than they were before the financial crisis.[1] But a given individual's earnings are rarely static, fluctuating due to variations in hours worked, bonuses, voluntary job changes, and redundancies. This volatility matters: unpredictable earnings can mean financial stress, difficulty planning for the future, and increased reliance on credit or social support. So understanding earnings volatility is crucial for building fairer labour markets, effective social policies, and financial security in an uncertain world.

This report analyses earnings volatility using a newly available dataset that contains information on payslips provided by employers to HMRC. We provide rigorous, quantitative evidence on the extent of volatility in pre-tax employee earnings over short periods (that is, monthly or weekly), and how this varies between different groups of workers. This means we are one of few studies for any country, not only the UK, to look at so-called high-frequency earnings volatility on a large scale – we have data on over 250,000 working-age people, each observed for up to five years – and the first do so on what is in effect a random sample, meaning that most of our results are applicable to the whole population of employees in the UK.[2]

Volatility is related to, but not the same as, income risk or insecurity

We use the word 'volatility' throughout this report to refer to fluctuations over time in the incomes or earnings of a set of individuals. Our work is primarily descriptive, and we are not trying to argue that volatility is always bad, or always of policy concern: instead, the picture is more mixed.

Standard economic theory suggests that individuals and families are risk averse. So if earnings volatility (which is relatively easy to measure) is a signal of earnings risk (which is much harder to measure), then more volatility would tend to be a bad thing. But volatility is not a perfect proxy for risk. Some changes in earnings may be anticipated or deliberately chosen (and so do not represent 'risk' or 'uncertainty'), and families can

1 Resolution Foundation, Labour market blows hot and cold as real wages rise but employment falls, February 2025.
2 Annex B summarises past work on earnings volatility in the US and the UK, showing how the literature has used different types of data and focused on different aspects of volatility.

mitigate adverse changes by borrowing and saving, changing their labour supply, or be helped by the tax and benefits system. Clearly, upside risks to income are also far less problematic than downside risks, and people have different abilities to adapt to risk: compare a worker in the financial sector unsure at the start of the year of the size of their end-of-year bonus to a cleaner on a zero-hours contract who is unsure how much work they will have next week.[3]

But even if earnings change in perfectly predictable ways (in which case volatility does not reflect 'risk'), a variable flow of income rather than a stable one can still cause issues for family budgets.[4] This argument is particularly relevant for low-income families, who are more likely than those on higher incomes to be liquidity constrained. Volatility can also lead to other problems that impact low-income households more than others, including the psychological, cognitive, and emotional costs of managing on an unstable income, and reducing the ability to save or make longer-term financial investments in, say, pensions or housing.[5]

Our concept of volatility is also different from 'insecurity'. There are different ways of thinking about economic insecurity, but a recent essay published by the Joseph Rowntree Foundation (JRF) provides an excellent place to start. It argues that economic insecurity is something that, all else equal, we would like less of, and that we should understand economic insecurity to be wider than just financial insecurity, encompassing insecurity in working arrangements, housing, family situation and health too.

> *[Economic] insecurity is associated with fear, stress and anxiety. It shrinks horizons, narrows possibility, limits agency and corrodes hope.*[6]

This is clearly a much broader concept than volatility in earnings, and as with risk, volatility is at best an imperfect proxy for insecurity. But although the concepts are different, it seems reasonable to assume that, for some, and especially those with few resources or safety nets, increased volatility of earnings can lead to more economic insecurity.

3 Indeed, the 2017 Skills and Employment Survey established that 1.7 million employees (7 per cent of the total) were 'very anxious' about unexpected changes to their hours of work, more than double the 900,000 workers on a zero-hours contract in 2017. Source: Analysis of UK Skills and Employment Survey; ONS, EMP17: People in employment on zero-hours contracts, February 2025.

4 As Shorrocks has put it: "Greater variability of incomes about the same average level is disliked by individuals who prefer a stable flow. So, to the extent that mobility leads to more pronounced fluctuations and more uncertainty, it is not regarded as socially desirable." See: A F Shorrocks, The Measurement of Mobility, Econometrica 46(5), September 1978.

5 A Angsten Clark & S Otulana, Fluctuation Nation: Lifting the lid on the millions of people managing a volatile income, Nest Insight, November 2024.

6 G Cooke, Economic security: A foundation for dignity, opportunity and hope in an age of uncertainty, Joseph Rowntree Foundation, July 2023. See also: T Clark & A Wenham, Anxiety nation? Economic insecurity and mental distress in 2020s Britain, Joseph Rowntree Foundation, November 2022.

Until now, a lack of data has made it hard to assess within-year earnings volatility in the UK

As we discuss in Section 2, the UK's problem with hours insecurity has been well known for many years (and is clearly on the Government's agenda, with the Employment Reform Bill including plans to help workers on zero-hours contracts to move onto contracts with regular hours). But our understanding of the broader problem of volatility in earnings, particularly at high frequencies, remains limited. This is mainly a data problem. The UK's main household surveys collect information on earnings at an annual frequency (including the UK Household Longitudinal Study, the Annual Survey of Hours and Earnings, and the Labour Force Survey, which is quarterly but collects earnings from a given individual at two points roughly a year apart). This has allowed researchers to examine how workers' earnings vary on a year-to-year basis – and we provide an update to this line of work in Section 2 – but does not allow us to look at how earnings change from month to month, or even from week to week.

The main exception is a past Resolution Foundation study that examined volatility in monthly income and take-home pay using proprietary data from a high street bank. It found that:

> *Pay fluctuations are the norm for the majority of employees. Only 9 per cent of employees who remained with the same employer throughout 2016-17 had no months in which take-home pay changed by a notable amount (greater than five per cent, either up or down).*[7]

It also found that volatility was greatest for those at the bottom and the top of the earnings distribution, and lowest for those in the middle.

That sort of study has not been repeated for the UK, and the few UK studies which have looked at high-frequency changes in earnings or incomes have tended to take a qualitative approach and so be on a far smaller scale.[8] As a result, this project is one of very few in the UK to measure earnings volatility at a high frequency using a large dataset, and the first to do so with what is in effect a representative sample of UK employees. We are able to do this thanks to a new dataset of HM Revenue and Customs (HMRC) Pay As You Earn (PAYE) information, covering the period April 2014 to March 2019, which has been prepared by researchers at the Wage and Employment Dynamics (WED) project.[9] This gives us monthly, or in some cases weekly, information on the pre-tax

7 D Tomlinson, Irregular payments: Assessing the breadth and depth of month to month earnings volatility, Resolution Foundation, October 2018.
8 See, for example: A Angsten Clark & S Otulana, Fluctuation Nation: Lifting the lid on the millions of people managing a volatile income, Nest Insight, November 2024; R Griffiths & M Wood, Coping and hoping: Navigating the ups and downs of monthly assessment in Universal Credit, University of Bath Institute for Policy Research, April 2024.
9 More information about the Wage and Employment Dynamics project is available at: www.wagedynamics.com.

pay received by a roughly 1 per cent sample of employees in the UK, for up to 60 months. (Other features of this dataset are set out in Annex A and summarised in Box 2 later in this report.)

The rest of this report is organised as follows:

- Section 2 discusses what we know about key aspects of volatility in the UK labour market, including providing updated estimates of earnings volatility from an annual perspective.
- Section 3 uses the new HMRC data to provide new estimates of monthly earnings volatility, and patterns of earnings changes within years.
- Section 4 zooms in further, and uses the HMRC data to explore weekly earnings volatility for workers who are paid weekly.
- Section 5 concludes by discussing some policy implications of these findings.

Annex A provides more detail on the source of our data and key aspects of the data cleaning, and Annex B summarises past work on earnings volatility in the UK and US.

Section 2

The UK labour market is more stable than it used to be when it comes to jobs, but some forms of potentially unstable or insecure employment are on the rise

Our new findings on high-frequency earnings volatility contribute to our wider knowledge about volatility and dynamism in the UK labour market, and so in this section we summarise the existing evidence on these topics.

When it comes to employment, it is well known that moves in and out of work, and moves between jobs, are all lower than they were three decades ago. This trend is a positive one from the point of view of security for individual workers but, less positively, can be seen to reflect the lack of dynamism across the economy as a whole (for example, becoming less able to accommodate the growth of productive firms and sectors). On the 'intensive margin' – that is, changes to workers' hours rather than moves in and out of work – there is mixed evidence on whether uncertainty over hours worked is growing. Zero-hours contracts appear to be more common than they were in the mid-2000s, but the proportion of workers who say that they have any sort of variation in hours has fallen.

New estimates of earnings volatility from an annual perspective are in line with these facts. There has been a clear fall since the early 1990s in measures of volatility of earned income calculated using samples including people who move into and out of employment. But if we focus on those in employment continuously (excluding the movers in and out), there has been essentially no change in annual earnings volatility for the past 25 years.

This report's findings on high-frequency earnings volatility contribute to our broader understanding of volatility and dynamism in the UK labour market. So, in this section, we summarise existing evidence on these topics to contextualise how our research fits into the wider evidence base.

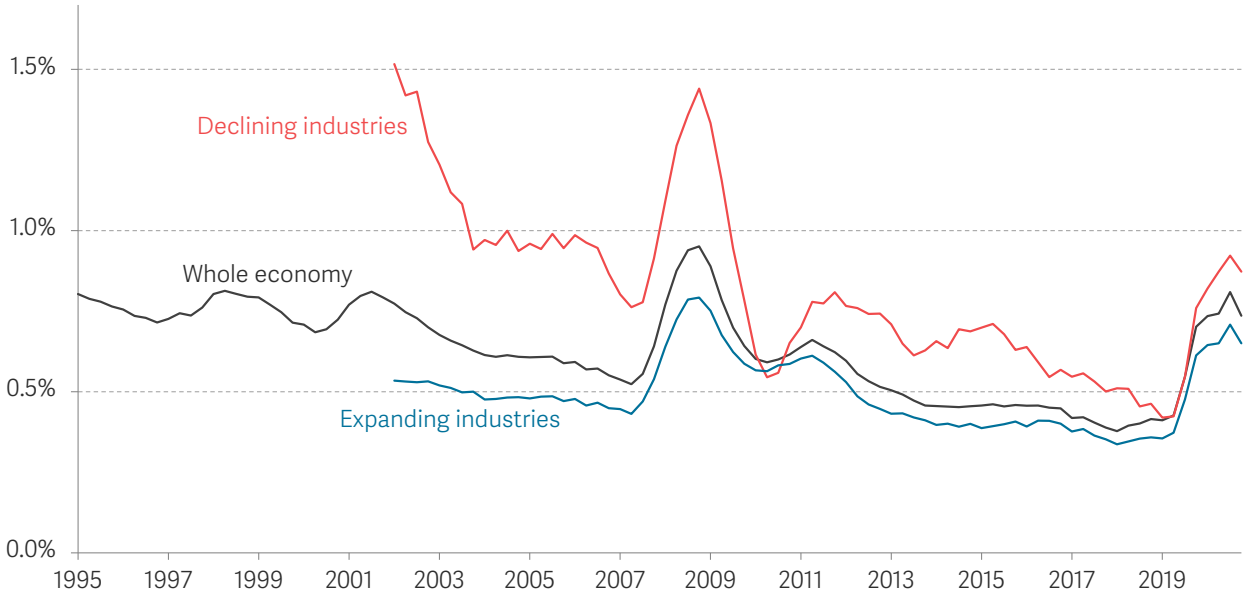
The UK labour market appears to be characterised by more stability than in past decades, at least in terms of jobs and employment

As we set out in the conclusions to the Economy 2030 Inquiry,[10] the UK labour market may not be as dynamic as policy makers would like to think.[11]

This lack of dynamism has both positive and negative aspects. On the positive side, the rate of involuntary job exits has been falling over time. Figure 1 shows that in the late 1990s, 0.8 per cent of workers had faced an involuntary job separation within the past three months; in the years immediately before the Covid-19 crisis, this had fallen by half to just 0.4 per cent (and this decline has happened just as much in industries that are declining as in those that are growing).[12] Similarly, unemployment and unemployment duration have been substantially lower in recent years than they were in the early 2010s.[13]

FIGURE 1: **The rate of involuntary job exits has been trending down, in particularly in shrinking industries**

Proportion of workers who have left a job involuntarily within the past three months: UK, 1995-2021



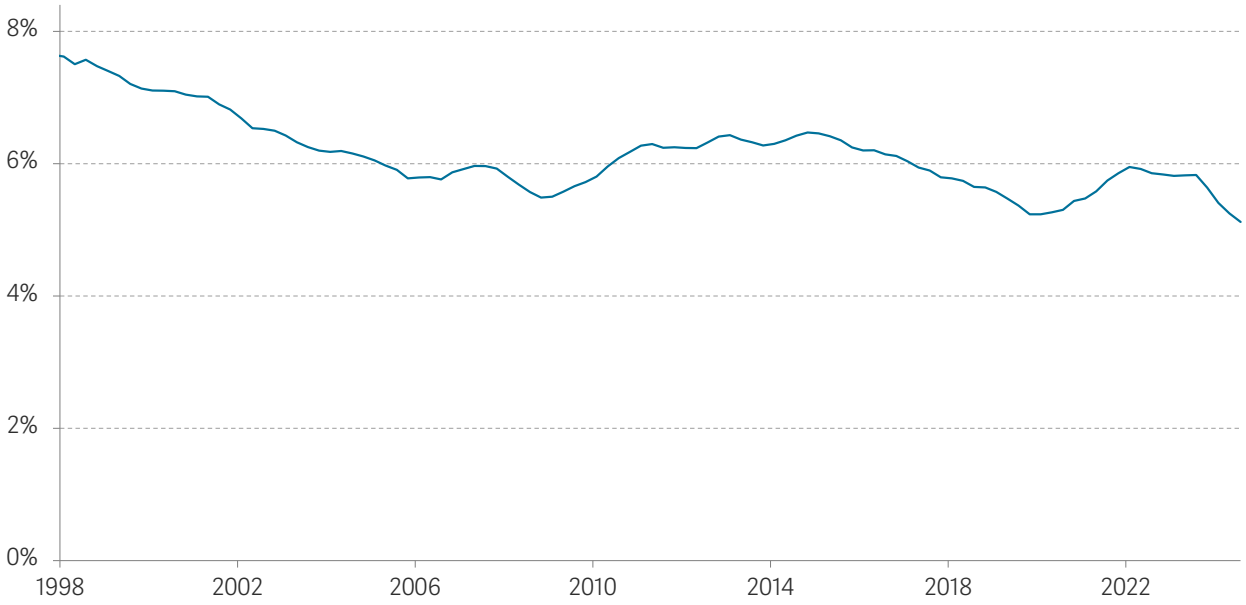
NOTES: The 60 SIC92 industry divisions are split into declining, stable, and expanding categories by taking their average quarterly change in employment shares over the years 1995 and 2003. The 20 divisions with the lowest percentage change (not in absolute terms) are declining, and the 20 with the highest positive percentage growth are expanding. Estimates are scaled by employment share by industry 'type' in the previous quarter.
SOURCE: Analysis of ONS, Two-Quarter Labour Force Survey.

10 Resolution Foundation & Centre for Economic Performance, LSE, Ending stagnation: A New Economic Strategy for Britain, Resolution Foundation, December 2023.
11 The next few paragraphs draw heavily from: N Cominetti et al., Changing jobs? Change in the UK labour market and the role of worker mobility, Resolution Foundation, January 2022.
12 Figure 1 first appeared in: N Cominetti et al., Changing jobs? Change in the UK labour market and the role of worker mobility, Resolution Foundation, January 2022.
13 ONS, UNEM01 SA: Unemployment by age and duration (seasonally adjusted), February 2025.

Employers are also making less use of temporary contracts than they used to. In 1998, almost 8 per cent of employee jobs in the UK were temporary, but this had fallen to 5 per cent by 2024 (see Figure 2).

FIGURE 2: **One contributor to lower churn is the declining use of temporary contracts**

Proportion of employees on a temporary contract: UK

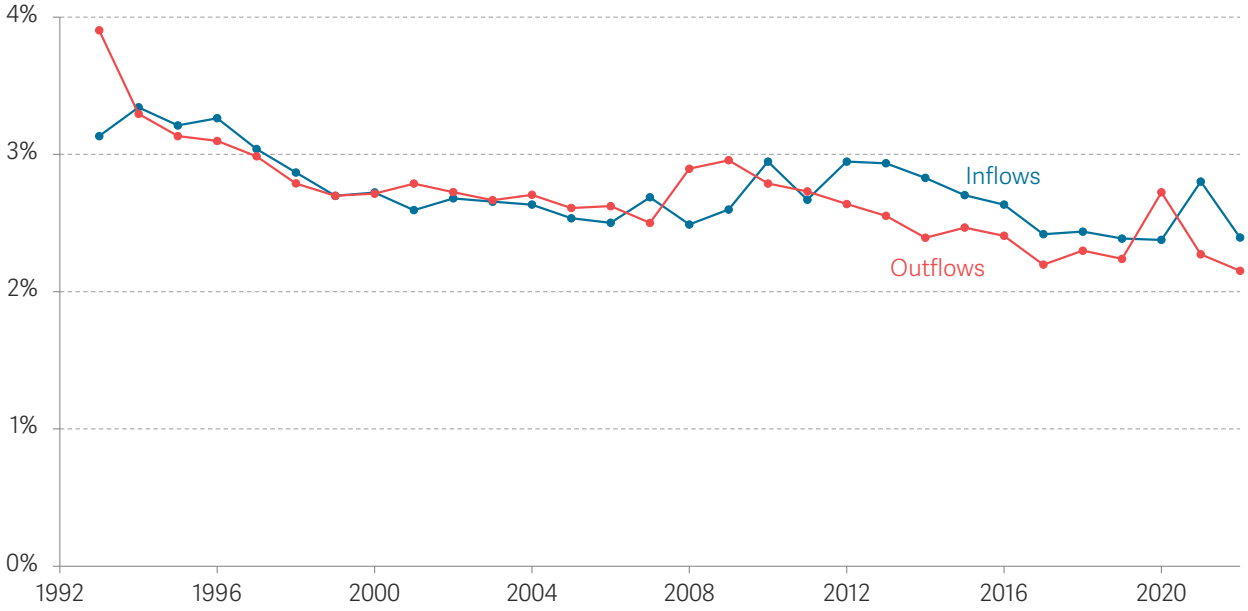


NOTES: Chart shows four-quarter trailing averages.
SOURCE: ONS, Labour market statistics.

These reductions in involuntary job exits translate into lower overall flows out of employment (combining voluntary and involuntary reasons) and also lower flows into employment. Figure 3 shows that quarterly flows into and out of employment in the most recent eight years of data (2015-2022) are about a fifth lower than in 1993-2000, even though the former period includes the rise in outflows, and subsequent uptick in inflows, that happened during the pandemic.

FIGURE 3: **One factor in falling 'labour market' volatility has been a fall in the rate of labour market churn over the past 25 years**

Quarterly inflows to and outflows from employment, as a proportion of total employment, 20-59-year-olds: UK



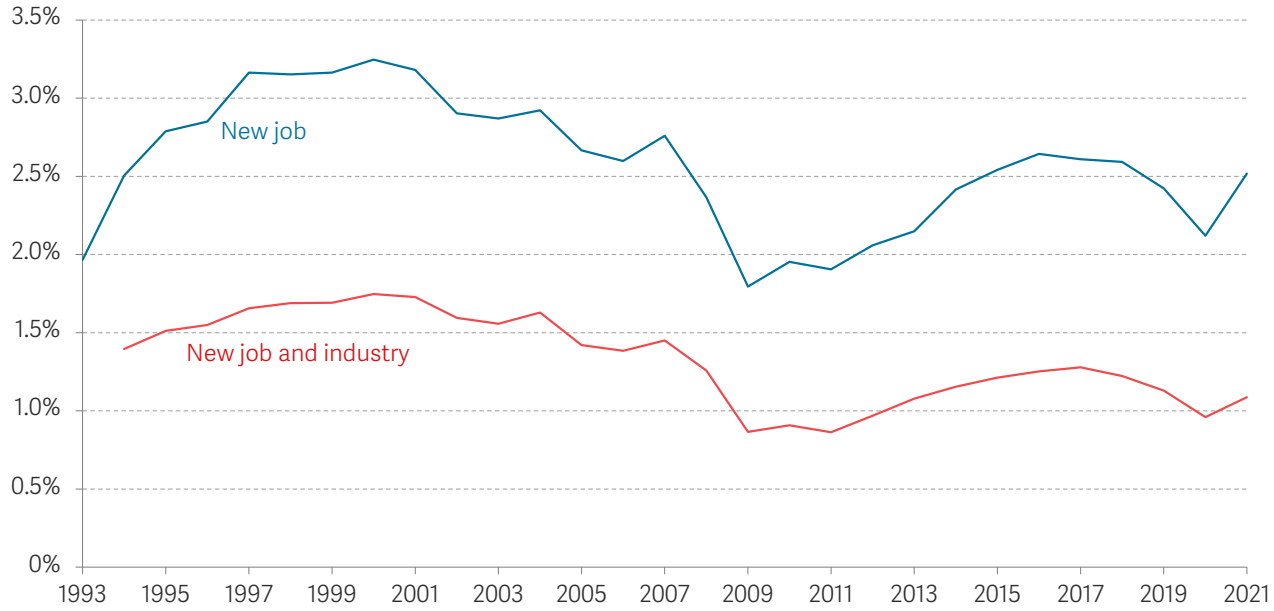
NOTES: Quarterly flow rates are averaged within calendar years.
SOURCE: Analysis of ONS, Two-Quarter Longitudinal Labour Force Survey.

Alongside the fall in moves into and out of employment, and partly as a result of the decline in the use of temporary contracts, job mobility (the proportion of workers changing jobs) is lower now than it was two decades ago. In 2019, the quarterly rate of job mobility was 2.4 per cent, 25 per cent lower than in 2000 (see Figure 4).[14]

14 Figure 4 first appeared in: N Cominetti et al., Changing jobs? Change in the UK labour market and the role of worker mobility, Resolution Foundation, January 2022.

FIGURE 4: **The rate at which workers move jobs, and in particular the rate at which workers move jobs between sectors, has slowed compared to 20 years ago**

Proportion of workers moving to a new job in each quarter: UK



NOTES: A job move is defined based on workers reporting that they have been in their current job for three months or fewer. Industry moves are defined at SIC section level. For further details, see the appendix of: N Cominetti et al., Changing jobs? Change in the UK labour market and the role of worker mobility, Resolution Foundation, January 2022.
SOURCE: Analysis of ONS, Two-Quarter Longitudinal Labour Force Survey.

Although these falls in the rate of involuntary job separations and the use of temporary contracts can generally be seen as a good thing, the fall in job mobility overall is arguably less desirable. One reason is that lower rates of worker job mobility might raise employers' bargaining power relative to workers (because they have less reason to worry about workers quitting), which in turn could hold back earnings growth.

Another reason for concern is that lower job mobility might make the economy less dynamic overall – for example, less able to accommodate the growth of productive firms and sectors. The overall slowdown in job mobility has been accompanied by a decline in sector mobility (i.e. the proportion of workers changing both jobs and sectors), which was 35 per cent lower in 2019 than in 2000. If the slowdown in sectoral mobility is because there has been less structural change in the UK economy recently, then we might not be too worried. But if it is due to workers or firms becoming less dynamic, in some sense, then that might be more cause for concern, especially if we think the pace of structural change that the labour market needs to adapt to will increase in future (driven by, say, technological changes).

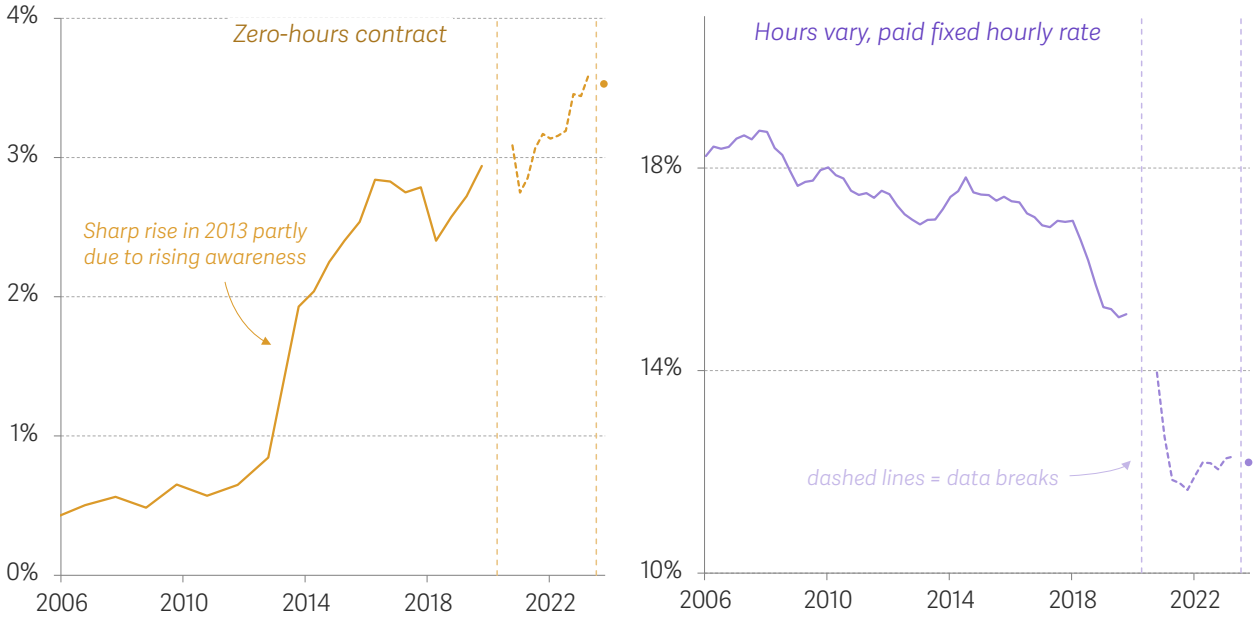
Data issues make it difficult to say whether instability or uncertainty over hours worked is getting worse or better

Overall, then, at the 'extensive margin' – whether someone's employment status changes, as opposed to changes in their hours or earnings – employment has become more secure or stable in recent decades. But this is not the only dimension that matters: the 'intensive margin' (changes in workers' hours and earnings) is also important.

Unfortunately, measurement challenges mean it is not possible to assess definitively whether work has become more or less secure in this respect. Rapid increases in estimates of workers on zero-hours contracts in the mid-2010s (see Figure 5) pointed to a sharply worsening problem,[15] but this was at least partly linked to survey respondents being more aware of zero-hours contracts.[16] Counting instead all the workers whose hours and pay vary (the right panel of Figure 5) points to a more significant problem, but one that seems to be declining (although not everyone in this group will face earnings risks as acute as those on zero-hours contracts who could in theory see their hours cut to zero).[17]

FIGURE 5: **Zero-hours contracts have been on the rise but, overall, the number of workers on variable hours and pay has been falling**

Proportion of employees on different forms of flexible contracts: UK



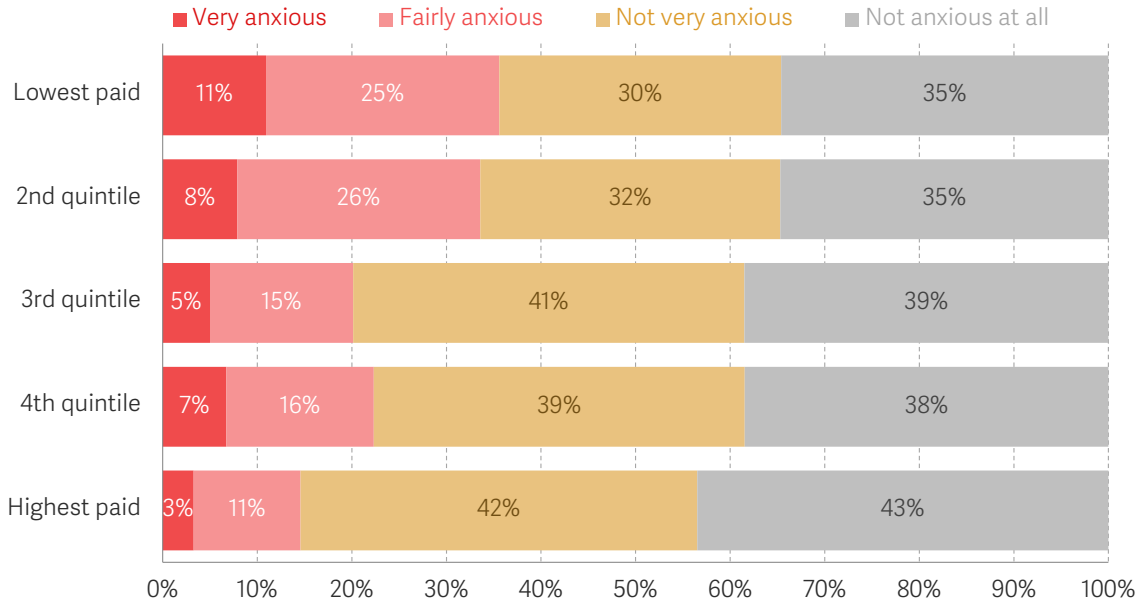
NOTES: Increased media coverage of zero-hours contracts in the latter half of 2013 may have affected awareness of the concept and therefore driven the increase in positive responses to this question. Data points have been smoothed using four-quarter backward-looking rolling averages, except for the final data point. Data breaks at the start of 2020 due to mass shift in the Labour Force Survey of people reclassifying from self-employment to employee jobs (affecting the base of our measures here) and in late 2023 due to ongoing Census 2021 reweighting of LFS data.
SOURCE: Analysis of ONS, Labour Force Survey.

15 See also: M Taylor, Good work: the Taylor review of modern working practices, Department for Business and Trade, July 2017.
16 See, for example: E Farina, C Green & D McVicar, Zero Hours Contracts and Their Growth, British Journal of Industrial Relations 58(3), November 2019.
17 A version of Figure 5 first appeared in: H Slaughter, Firm foundations: Understanding why employers use flexible contracts, Resolution Foundation, April 2024.

Although it may not be clear whether this problem is worsening, it is clear that it affects a large number of workers, and that the uncertainty over this aspect of work is bad for workers' well-being. In 2017, an estimated 1.7 million employees (7 per cent of the total) said they were 'very anxious' about unexpected changes to their hours of work (see Figure 6).[18] And there was a clear link between levels of pay and this sort of uncertainty, with the lowest-paid fifth of employees nearly four times as likely to say they were 'very anxious' as the highest-paid fifth (3 per cent versus 11 per cent).[19]

FIGURE 6: **Uncertainty in hours worked can be a source of anxiety**

Level of anxiety relating to 'unexpected changes to my hours of work' among 20-65-year-olds, by hourly pay quintile: UK, 2017



SOURCE: Analysis of UK Skills and Employment Survey.

Earnings volatility has been trending down since the 1990s

Having established what is already known about trends in the stability of both employment overall and hours worked within jobs, we now move to our first direct measures of earnings volatility. We start by doing this using an annual perspective (i.e. we measure how someone's earnings compare to their earnings 12 months previously), before going on to monthly changes in Section 3.[20]

18 This estimate was first produced in: A Felsted et al, Insecurity at Work in Britain: First Findings from the Skills and Employment Survey 2017, Wales Institute of Social and Economic Research and Data, October 2018. 1.7 million is more than double the 900,000 workers on zero-hours contracts in 2017, a reminder that hours insecurity extends beyond zero-hours contracts. Source: ONS, EMP17: People in employment on zero-hours contracts, February 2025.

19 Figure 6 was originally published in: N Cominetti, C McCurdy & H Slaughter, Low Pay Britain 2021, Resolution Foundation, June 2021.

20 There are three datasets for which this kind of analysis is possible: the ONS' Five-Quarter Longitudinal Labour Force Survey (the 5QLFS), the ONS' Annual Survey of Hours and Earnings (ASHE), and the British Household Panel Survey (BHPS), which was revamped and enlarged in 2008 to become the UK Household Longitudinal Study (UKHLS). In the case of the 5QLFS, individuals are surveyed every quarter for five quarters, with questions about earnings asked in the first and fifth waves, meaning that earnings can be compared with the same quarter a year ago. In the case of BHPS/UKHLS, households are surveyed once a year with approximately one year between interviews. ASHE is an annual survey of employers rather than workers, but workers should appear in the survey every year if they are working in an employee job (and their employer completes the survey).

Figure 7 presents our headline measures of annual earnings volatility: the mean of the absolute value of the arc percentage changes in earnings between years t and t-1 (in the top two panels), and the standard deviation of the arc percentage changes in earnings between years t and t-1 (in the bottom two panels). (See Box 1 for an explanation of arc percentage changes but note that, for small changes, an arc percentage change is very similar to a conventional percentage change).

The left panels measure volatility for the whole sample, including workers who were not working in one or both years being measured (this has been called 'labour market volatility' in some past research; it measures volatility in earnings including changes due to people moving into and out of employment), and the right panels include only people who were working in both the years used for the calculation ('earnings volatility').

BOX 1: **The arc percentage change**

The estimates of annual earnings volatility in this section come from examining changes in earnings from one period to the next: we call these 'period-pair' measures. For annual volatility, this means comparing an individual's earnings in a given month with their earnings in the same month the previous year.

We follow past research by expressing this 'change in earnings between periods' as an 'arc percentage' change, rather than a percentage change. The usual percentage change is, of course, calculated as the difference in earnings divided by earnings in the first period; the arc percentage change is calculated as the difference in earnings divided by the average value of earnings in the two periods. This has the advantage of being symmetrical. For example, if a worker sees monthly earnings change from £500 to £1,000 and then back to £500 in consecutive periods, then this would translate into arc percentage changes of +66.6 per cent and then -66.6 per cent. The percentage changes, on the other hand, would be +100 per cent and then -50 per cent. The arc percentage change also allows us to deal with changes from zero. Here, a change in earnings from £0 to £1,000 and then back to £0 would translate into arc percentage changes of +200 per cent and then -200 per cent (and note that the arc percentage change cannot be greater than +200 per cent or smaller than -200 per cent). The percentage changes would be calculated as undefined and then -100 per cent. If earnings remain at £0, then the convention is to say that the arc percentage change is 0 per cent.

Having calculated an arc percentage change for every individual, we then need a way to summarise the

information. Our two main period-pair volatility measures are 'the standard deviation across individuals of the arc percentage change', and 'the mean across individuals of the absolute arc percentage change'. By 'absolute' we mean the absolute value, i.e. the magnitude of the change but ignoring any minus sign.

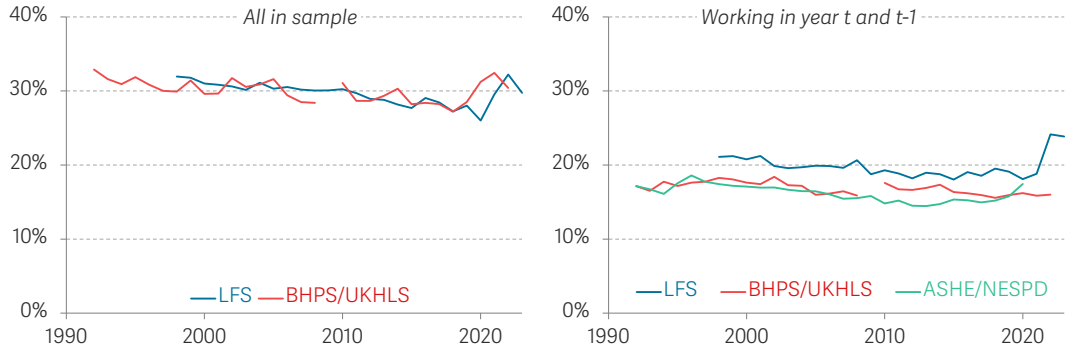
There are a number of takeaways from Figure 7. First, for the most part the different datasets produce similar estimates of volatility levels and trends, which is reassuring corroboration. Second, earnings volatility is substantially lower when the sample is restricted to those people working in both years (note the vertical scale in the top panel is half the scale of that in the bottom panel). Third, when measured using the mean of the absolute arc percentage change, there is a clear uptick in annual volatility in 2022 and 2023. This is the impact of the cost of living crisis: the chart measures volatility in inflation-adjusted earnings, so the uptick in those years reflects earnings being eroded by high inflation. Since the hike in inflation affected all employees, there is no corresponding upward tick in the standard deviation.[21]

Finally, Figure 7 also allows us to assess longer-term changes. When including movements in and out of employment (the left panels), there is a slight downward trend in annual volatility. In the LFS data, the standard deviation of the arc percentage change in individuals' earnings across 12-month periods was 54 per cent in 2023, compared to 65 per cent in 1998. This decline in overall labour market volatility (from an annual perspective) is fully consistent with the evidence earlier in this Section that people are moving around the labour market, and changing employment status, less frequently than they used to.

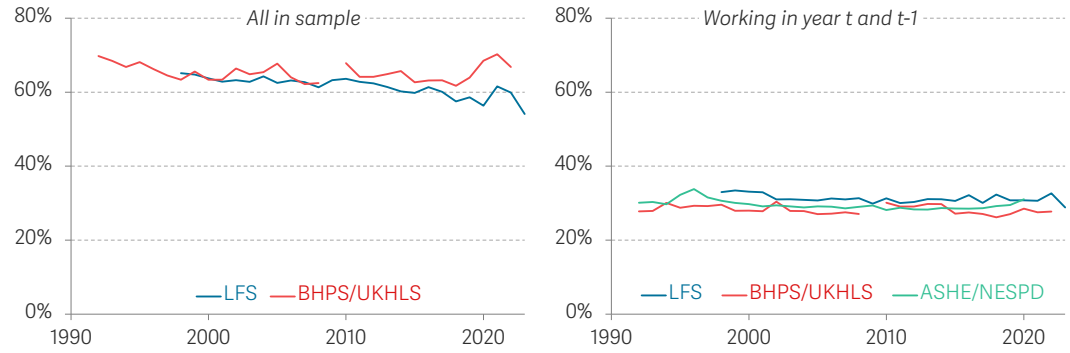
21 There is also no uptick in the mean absolute arc percentage change in those years when measured using nominal wage data.

FIGURE 7: **Measured at annual frequency, volatility in the real value of earnings has trended down over the past two decades, before spiking during the cost of living crisis**

Mean of absolute arc percentage annual change in real weekly earnings among 20-59-year-olds: UK



Standard deviation of arc percentage annual change in real weekly earnings among 20-59-year-olds: UK



NOTES: Latest data points are 2023 (LFS), 2022 (BHPS/UKHLS), 2020 (ASHE/NESPD). Earnings are adjusted for CPI inflation. ASHE/NESPD estimates for 'All in sample' not used as we can't assume that not appearing in ASHE in a given year means the sample member was not working in that year (whereas in BHPS/UKHLS we do know this, because the full sample is surveyed whether or not working).
SOURCE: Analysis of ISER, British Household Panel Survey; ISER, UK Household Longitudinal Study; ONS, Five-Quarter Longitudinal Labour Force Survey; ONS, Annual Survey of Hours and Earnings / New Earnings Survey Panel.

But when we look only at people working in the current and previous year (the right-hand panels), there has been little change in volatility: annual earnings volatility for these workers is essentially the same, on average, as it was 25 years ago, despite the sorts of changes in contract types discussed earlier in this section.

In the next two sections, we explore whether these results for earnings volatility at the annual level translate into volatility at the monthly or weekly level.

Section 3

Monthly volatility in earnings, and patterns of earnings within years

Having updated past UK estimates of the volatility in earnings across years, this Section turns to analysis of earnings volatility at a monthly level. Volatility is lower when comparing earnings changes between consecutive months than when comparing monthly earnings a year apart; this is because fewer things can happen to pay in a shorter period of time. But there is still a large amount of month-to-month change: among those working in both months, the average month-to-month change in earnings is 15 per cent, similar in magnitude to an average household's monthly spend on food and clothing.

Some of this volatility will be due to pay rises, and the importance of bonuses is reflected in the seasonal pattern of volatility, which peaks in March and April. One-in-ten (10 per cent) workers have earnings in March that are at least a quarter higher than in February, a larger share than any other month.

An individual's experience of volatility can also be summarised in terms of the pattern of changes to monthly earnings experienced over a year (i.e., over 12 months rather than only two). Even among people consistently employed, only one-in-four (26 per cent, or 5.0 million) experience 'stable' pay – which we define as having monthly earnings within 10 per cent of their average monthly wage in all months of the year. But around one-in-seven (2.7 million) employees experience 'erratic' earnings across the year – defined as having four or more months in a year where their earnings are at least 25 per cent higher or lower than average monthly wage. Volatility on this measure was highest for the youngest workers, those in certain sectors (hospitality, arts and recreation, retail, banking, and health and social care); other than banking, there is a close overlap to the sectors making the greatest use of zero-hours contracts (pubs and restaurants; accommodation; entertainment and recreation; and social care). By contrast, only 5 per cent of consistently employed employees in public administration experienced erratic pay, and those working in education are the most likely to have stable pay. Erratic pay is most common among the lowest earners, with three-in-ten employees (30 per cent) in the bottom decile of annual earnings experiencing erratic pay, as well as 18 per cent of employees in the top 10 per cent, compared with 14 per cent among all workers. Erratic pay is also more common among those with temporary contracts and those working part-time (as recorded in April of that financial year).

In this Section, we turn to an analysis of earnings volatility at a monthly level. We start by showing how workers' earnings change from one month to the next, and how such changes vary over the months within a year and for different workers. We then look at earnings trajectories over a year, and identify the workers who have 'erratic' earnings, marked by repeated large changes in earnings within the year. As outlined in Section 1, the analysis in this and Section 4 is based on HMRC payslip data for the tax years 2014-15 to 2018-19, supplemented by linking to the ONS' Annual Survey of Hours and Earnings (ASHE) dataset. See Box 2 for more details, and see Annex A for a detailed description of the choices made in assembling it.

BOX 2: **Key features of the new HMRC PAYE data**

Our research is based on the information that employers report to the tax authorities (HMRC) each time they pay their employees using the PAYE Real Time Information system.

This payslip data is available for a 1 per cent random sample of employees. Specifically, it is available for those employees who are in the target sample for the Annual Survey of Hours and Earnings (ASHE), which is based on the last two digits of an individual's National Insurance number. For these individuals, data provided by their employers and available in the ASHE dataset has been linked to their payslip data, as captured by HMRC. When making this match, we assume that details about a worker's characteristics (e.g., whether on a permanent or temporary contract) provided by an employer in April remain constant through the rest of the tax year.

Payslips are available from 6 April 2014 to 5 April 2019, i.e., covering the five tax years before the onset of the Covid-19 pandemic. We do not have any information about other sources of income (including self-employment earnings), and nor do we know anything about the individuals' family circumstances. All information is on gross (pre-tax) earnings from employment. We did not have access to an indicator that reliably identified employers, and so we do not investigate how much job changes contribute to our measures of earnings volatility. We also do not have a full measure of hours worked.

We limit our sample to people aged 20-59, and we look at earnings in real terms, deflated using the monthly Consumer Price Index including owner occupiers' housing costs (CPIH).

The main dataset is referred to as the 'HMRC PAYE dataset'. When we are using a version of this dataset linked to ASHE, we refer to this as 'HMRC-ASHE PAYE dataset'.

Most workers in most months experience stable earnings or only small changes in earnings – but a minority experience larger changes

Our look at monthly earnings volatility begins by examining month-pairs: we ask how large are changes in workers' earnings from one month to the next. This is shown in Figure 8, which, as in the previous Section, presents two measures of volatility: the standard deviation in the arc percentage change (the left panel), and the mean of the absolute arc percentage change (the right panel), both calculated only for people with positive earnings in both periods. (See Box 1 in Section 2 for an explanation of the arc percentage change).

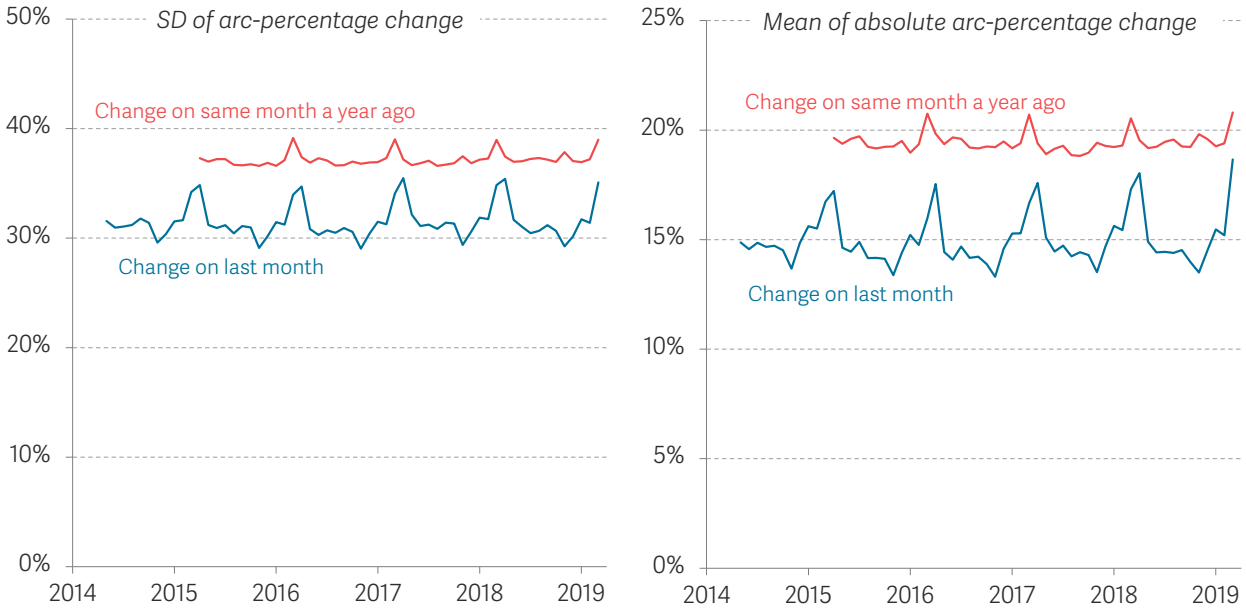
There are three key findings. First, there is a clear seasonal profile, with volatility highest in March and April, and lowest in November; we will come back to this later in this Section when discussing bonus payments.[22] Second, there is little trend in monthly earnings volatility over the five-year period, consistent with the lack of trend for annual earnings volatility for those in work in both periods shown in Figure 7. Third, by comparing Figure 7 and Figure 8 we can see that volatility is lower when comparing neighbouring months than when comparing earnings in months a year apart (because fewer things can happen to pay in a shorter period of time): the measures of volatility are 15 per cent (the standard deviation of changes) and 23 per cent (the mean of absolute changes) lower when comparing two consecutive months than between two months a year apart.[23]

22 Eagle-eyed readers will see the volatility is highest in the final data point, corresponding to March 2019. The last tax year in our data (2018-19) is one when the 365th day fell on a Friday, meaning that anyone paid on a weekly cycle on a Friday (which is the most common day to be paid, for those paid weekly) would have received 53 pay checks in that year, not 52, and our data processing puts this additional pay check into the final month of the tax year.

23 Figure 8 only includes people in the dataset who are working (have positive earnings) in both relevant periods. If we compare monthly and annual volatility measures for all individuals, then the difference is larger. This shouldn't be surprising: workers are more likely to have changed job, or moved into or out of work over the span of a year than they are over the span of a month.

FIGURE 8: **Changes in monthly earnings are smaller on a month-on-month basis than on a year-on-year basis**

Standard deviation (left panel) and mean (right panel) of the arc percentage change in real monthly earnings compared to the previous month, and to the same month in the previous year, among 20-59-year-olds working in both months: UK



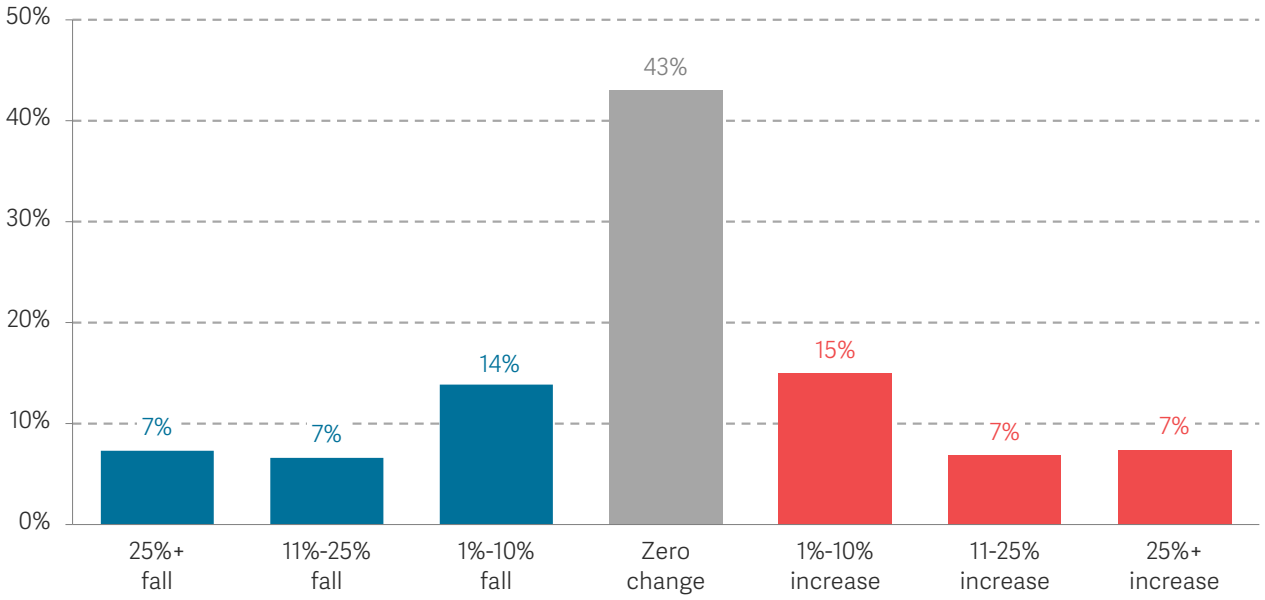
NOTES: Earnings are deflated using CPIH. See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC PAYE dataset.

Next, Figure 9 shows the full distribution of monthly earnings changes, rather than just the average or the standard deviation. Among employees who are working in the two consecutive months, the change in (the real value of) earnings on the previous month was close to zero (within 0.5 percentage points) in more than two-in-five (43 per cent) of all worker-months in the dataset. This is what we would expect to find, of course, for workers paid an annual salary, where cash monthly earnings will usually be the same, other than in those months when any uprating is implemented.[24]

24 As described in Box 2, we look at the real value of monthly earnings, so anyone with unchanged cash earnings will see a very slight change in their monthly earnings as we measure them. Inflation was very low over the period covered by our data, so this effect is very small.

FIGURE 9: **There is a big cluster of workers whose earnings change fairly little month-to-month, but a long tail of workers experiencing larger changes**

Distribution of the arc percentage change in real monthly earnings compared to the previous month among 20-59-year-olds working in both months: UK, 2014-15 to 2018-19



NOTES: Earnings are deflated using CPIH. Results are pooled across all the months in dataset. For this figure, counts are based on arc-percentage change rounded to the nearest percentage point, which means 'zero change' in fact relates to arc-percentage changes between -0.5% and 0.5%, and '1-10% change' in fact means changes between 0.5% and 10.5%, and equivalently for the other categories. See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC PAYE dataset.

Figure 9 also highlights that the majority of people do see earnings change month-to-month, and sometimes by a lot. This includes three-in-ten worker-months (29 per cent) where earnings changed positively or negatively by 1-10 arc per cent, one-in-eight (13 per cent) where earnings changed positively or negatively by 11-25 arc per cent, and a further 15 per cent where the absolute change was 25 arc per cent or greater.

It is worth putting these percentage figures in context. In the three months to November 2024, someone on average weekly earnings was paid £705 per week, which amounts to £3,062 per month. An absolute change in earnings of 15 per cent (which is the average change among workers with positive earnings in two consecutive months, as set out in Figure 8) equates to a change in gross monthly earnings of £497 for this worker; after tax, this would be a change in monthly earnings of £358. That is a significant amount of money: it's almost exactly what the average UK household spends on food (£284) and clothing (£74) combined (£359) in an average month.[25]

25 All figures are in 2024 prices. Spending figures are based on 2022-23 weekly data from the ONS Living Costs and Food Survey, uprated to 2024 prices using the item-specific CPI index for July 2024 and expressed on a per-month basis. By way of triangulation, food and clothing spend make up 16 per cent of total consumption for the average UK household.

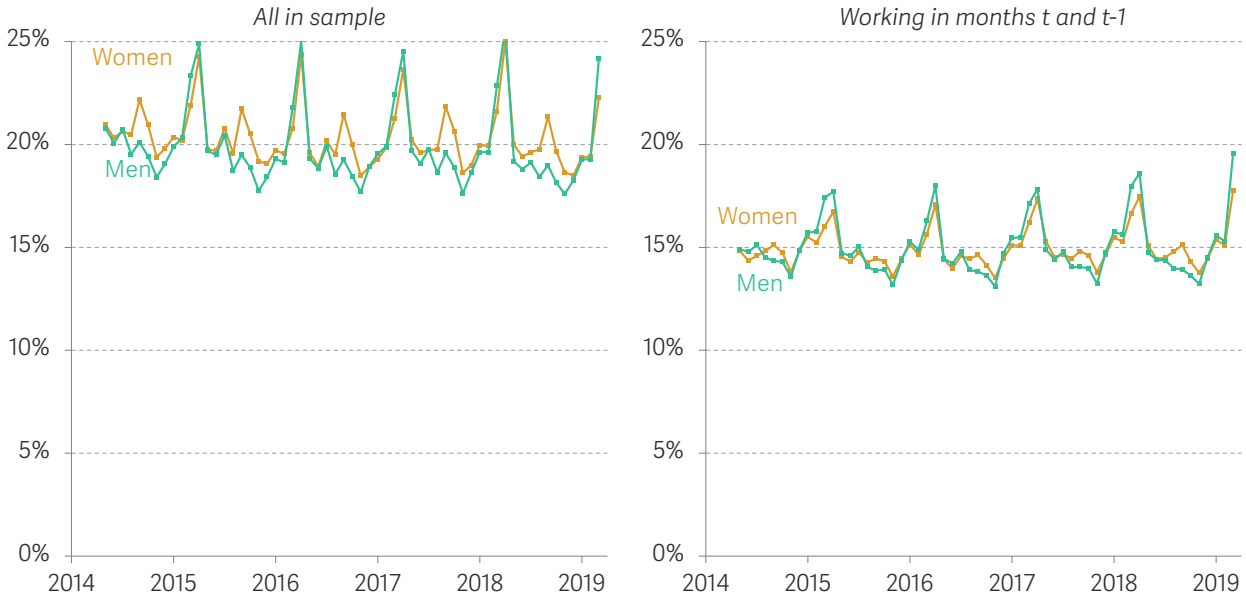
Young and low-paid workers experience much higher earnings volatility than older, higher-paid workers

We next look at how volatility in monthly earnings varies across different groups of workers.

First, we note that there is very little difference between the typical monthly change in earnings experienced by men and women. Among those who had earnings in the current and previous month, there is virtually no difference between monthly volatility in men's and women's earnings: across our sample period, the average arc percentage change between months was 14.9 per cent for men and 15.0 per cent for women (the right panel of Figure 10). There is a slightly larger, but still small, difference when we expand the sample to all individuals by including people who were not in employment in one or both of the months being measured (see the left panel of Figure 10). Here the average absolute arc-percent change in monthly pay across our sample period was 20.4 per cent for women, and 19.9 per cent for men, which will reflect that women are more likely than men to have months with no earnings.

FIGURE 10: **Men and women, on average, experience similar changes in monthly pay**

Average arc percentage change in real monthly earnings compared to the previous month among 20-59-year-olds, all employees (left panel) and those working both months (right panel): UK, 2014-15 to 2018-19

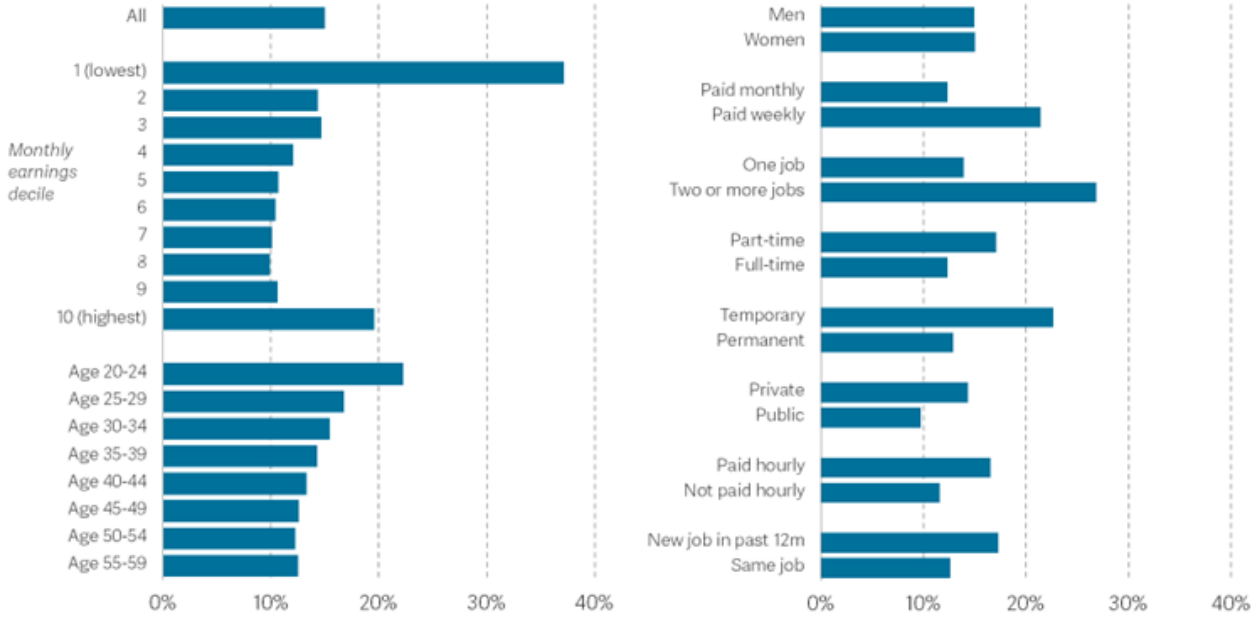


NOTES: Earnings are deflated using CPIH. See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC PAYE dataset.

There are much larger differences between workers when broken down by other characteristics. Figure 11, which plots the average arc percentage change in monthly earnings among those who were working in consecutive months, sets out several of these. It shows that the average change in monthly earnings is substantially higher for young workers, workers with multiple jobs and workers on temporary contracts. For example, the average absolute monthly change in earnings was 22 per cent for workers aged 20-24, compared to 13 per cent for workers aged 55 to 59. The average was 27 per cent for workers with multiple jobs, and 14 per cent for those with one job.[26] Volatility on this measure is higher for those whose employer is operating a weekly payroll system (which includes workers paid every fortnight or every four weeks) than those with a monthly payroll system.[27] Some of the groups with high levels of volatility are relatively small, which means their high volatility doesn't push the average up too much. For example, workers with multiple jobs only comprise 7 per cent of the PAYE dataset, and temporary workers 6 per cent.[28]

FIGURE 11: **Earnings volatility is highest for workers who are young, on low pay, doing multiple jobs or on a temporary contract**

Average arc percentage change in real monthly earnings compared to the previous month, among 20-59-year-olds working in both months: UK, 2014-15 to 2018-19



NOTES: Earnings are deflated using CPIH. The analysis by age and monthly earnings decile uses the full sample; other breakdowns are limited to the ASHE sample. See Annex 1 for more information. Results are pooled across all months in dataset. Monthly earnings deciles are calculated based on earnings in month t-1 (excluding zeroes). See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC PAYE dataset and HMRC-ASHE PAYE dataset.

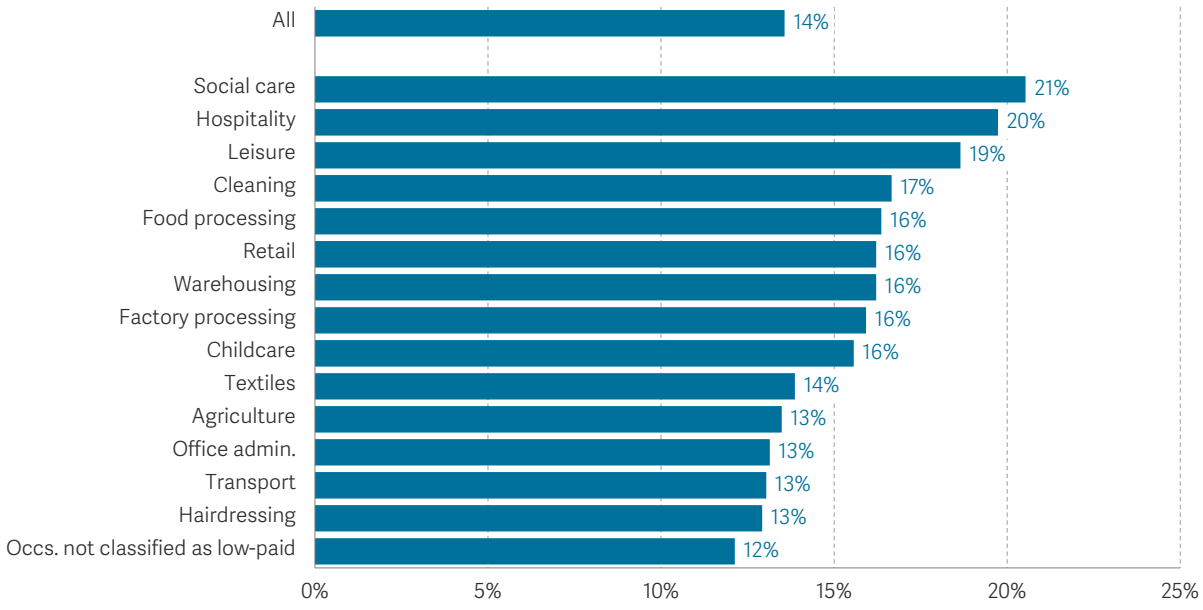
26 Some of these characteristics come from ASHE, and so they are correct as of April, and we then carry forward the information for the remainder of the tax year. See Annex A for more details.
27 As described in Annex A, part of this higher volatility for those on a weekly payroll is a by-product of how we have converted weekly payslips into monthly earnings; our processing means that someone paid the same each week is recorded, in our data, as potentially being paid different amounts in each month, depending on how many days are in the month.
28 These proportions are estimated for the whole 2014-15 to 2018-19 period. Share of workers with multiple jobs calculated using HMRC PAYE dataset; share of workers on temporary contracts estimated using ONS Labour Force Survey.

A breakdown by pay level shows, interestingly, that volatility is highest for the lowest-paid employees but the pattern is 'U-shaped': those in the highest-paid tenth also have above-average volatility. Some of this could be explained by mean reversion – the idea that if you're at the bottom (or top) of the earnings distribution you're more likely to move than down (or up) – but it still reflects genuine volatility in someone's paycheque). [29] However, another aspect for the highest earners is bonus payments, as we discuss later in this Section.

Consistent with Figure 11, Figure 12 shows that many low-paid industries have higher earnings volatility from month to month than high-paid sectors. Volatility is particularly high for those working in social care, hospitality, leisure, and cleaning. (Those employed in sectors like hairdressing, transport, office admin, and agriculture actually have below-average levels of volatility – although it should be noted that many workers in those sectors are self-employed, meaning our employee-only dataset may not be representative of those sectors as a whole.)

FIGURE 12: **Earnings volatility is higher in low-paid occupations than it is overall**

Average arc percentage change in real monthly earnings compared to the previous month, by low-paid occupation group, among 20-59-year-olds working in both months: UK, 2014-15 to 2018-19



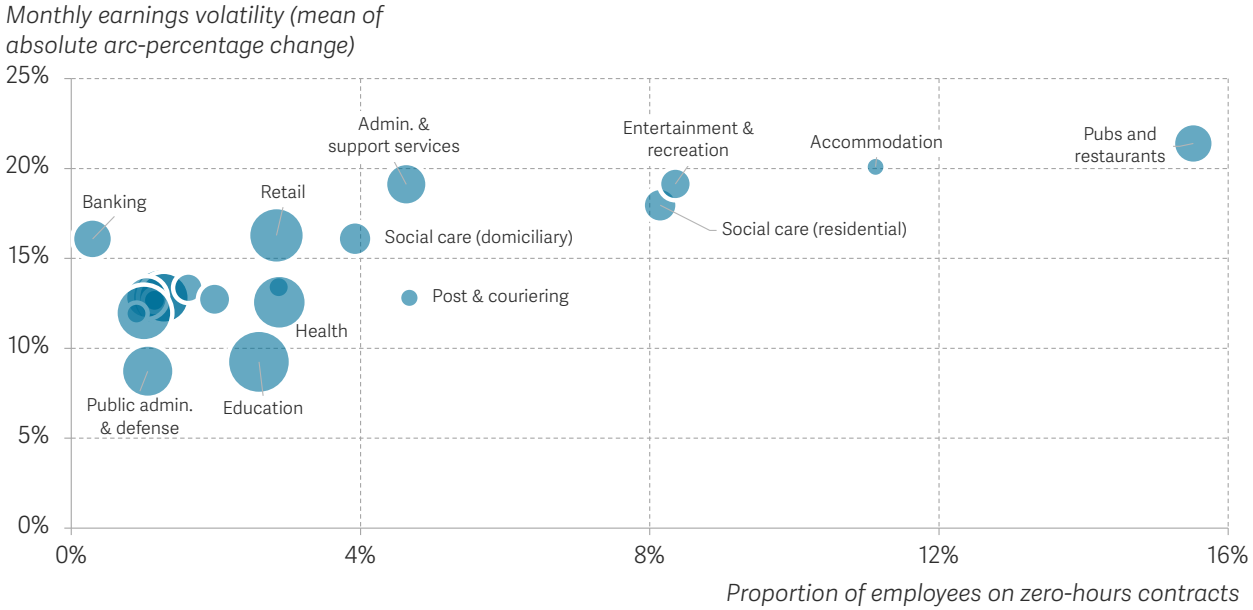
NOTES: Earnings are deflated using CPIH. Low-paid occupation groups are defined by the Low Pay Commission; see Appendix A3 in: LPC, Low Pay Commission Report 2024, February 2025. Results are pooled across all months in dataset. See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC-ASHE PAYE dataset.

29 'Mean reversion' would occur if we happened to measure someone's earnings in a month where they had unusually low (or high) earnings (and note that wet assign deciles on the basis of the first month), and then their earnings returned to normal in the following month, showing up as a large change. However, later in this Section we show that earnings are also most volatile for the lowest and highest earners when measuring earnings across the year as a whole, which suggests that mean reversion cannot be the only reason we observe higher volatility on a month-pairs basis for the lowest and highest earners.

Unfortunately, it is not possible to identify workers on zero-hours contracts in the HMRC payslip data or in the ASHE-linked version (the only information about contract type is whether someone has a temporary or permanent contract). This means that we can't say how much of the earnings volatility we identify is attributable to zero-hours contracts. However, it is notable that the sectors where workers experience the largest average monthly changes in earnings are also those which make the greatest use of zero-hours contracts: pubs and restaurants; accommodation; entertainment and recreation; and social care (see Figure 13).[30]

FIGURE 13: **Industries whose workers experience the highest volatility in earnings are those where employers make the greatest use of zero-hours contracts**

Proportion of employees on a zero-hours contract (2018-2023, horizontal axis) and average arc percentage change in real monthly earnings compared to the previous month among 20-59-year-olds in work in both the current and previous months (2014-2019, vertical axis), by industry: UK



NOTES: Industries not labelled are Manufacturing, Real estate, Professional services, Vehicle sales & repair, ICT, and 'Other' services. Size of bubble indicates the total employees in industry. Earnings are deflated using CPIH. See Box 1 for a description of the measures used. Earnings volatility data is pooled across all months in dataset and zero-hours contract data is pooled across all LFS quarters where the variables are available across 2018-2023.
SOURCE: Analysis of HMRC-ASHE PAYE dataset; ONS, Labour Force Survey.

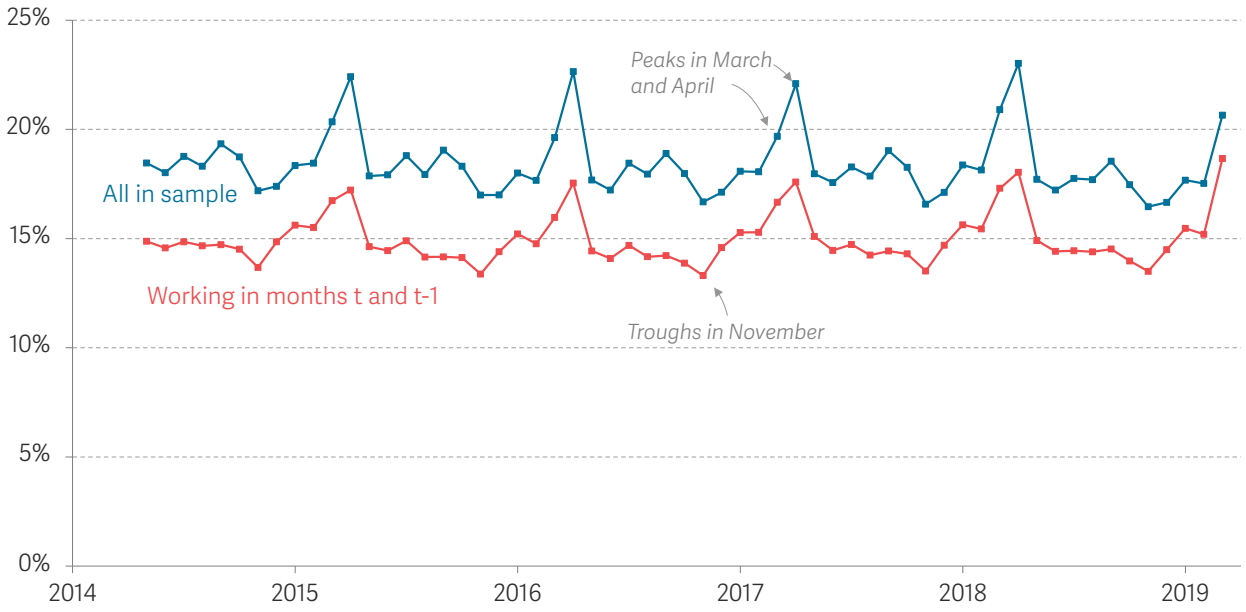
30 The previous figure uses the Low Pay Commission's classification of low-paid occupations. Here we revert to standard industry sections and divisions within the SIC 2007 classification.

On average, earnings are most volatile at the end of the financial year, probably because of bonus payments

Figure 8 showed that there is a distinct seasonal pattern to volatility, and we explore that again in Figure 14, which shows that month-on-month volatility is greatest in March and April (that is, the changes from February to March and from March to April). On average, among those working in consecutive months, the mean absolute arc percentage change from the previous month is 17 per cent in March and 18 per cent April, compared to 15 per cent in other months.[31]

FIGURE 14: **Monthly volatility tends to peak in March and April**

Average arc percentage change in real monthly earnings compared to the previous month, among 20-59-year-olds working in both months: UK, 2014-15 to 2018-19



NOTES: Earnings are deflated using CPIH. See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC PAYE dataset.

We can learn more by looking separately at whether higher volatility is due to large positive or large negative changes, and Figure 15 shows the seasonal pattern in whether people are seeing monthly rises or falls in earnings of 25 per cent or more. It shows that large positive changes are most likely in March (where 10 per cent of people have earnings in March at least a quarter higher than in February), then December, then April. The months in which people are most likely to see earnings fall by 25 per cent or

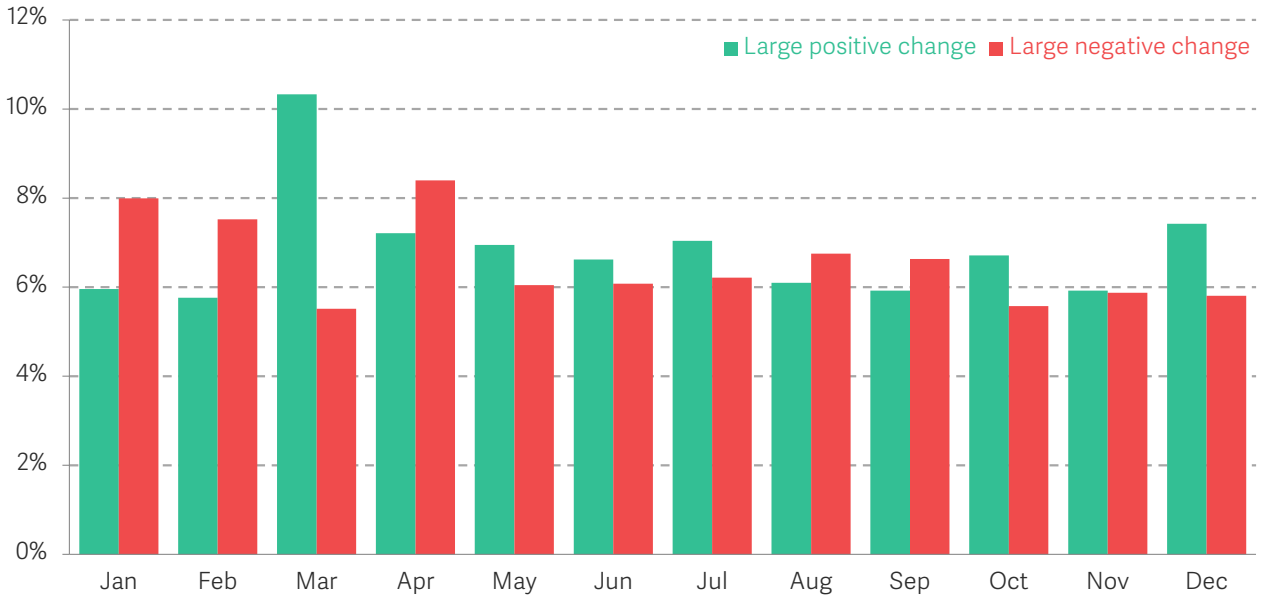
31 The average difference between March and April and other months in the year is similar – 21 per cent versus 18 per cent – when including month-pairs where people aren't working in one or both months.

more are April, January and August.[32]

Our dataset doesn't allow us to break down the change in total earnings into the changes by component sources, but it seems likely that some of this pattern is driven by bonus payments. In particular, a bonus paid in March would show up as a rise in March (where earnings would be higher than in February) and a fall in April (when earnings would be lower than in March). Similarly, a Christmas bonus, or additional shifts in December, would explain the pattern of rises in December and falls in January.

FIGURE 15: **Large positive changes are most common in March; large negative changes are most common in April**

Proportion of employees aged 20-59 experiencing an arc percentage change in real monthly earnings compared to the previous month of at least 25 per cent, by calendar month and direction of change: UK, 2014-15 to 2018-19



NOTES: Earnings are deflated using CPIH. Results are pooled across all months in dataset. See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC PAYE dataset.

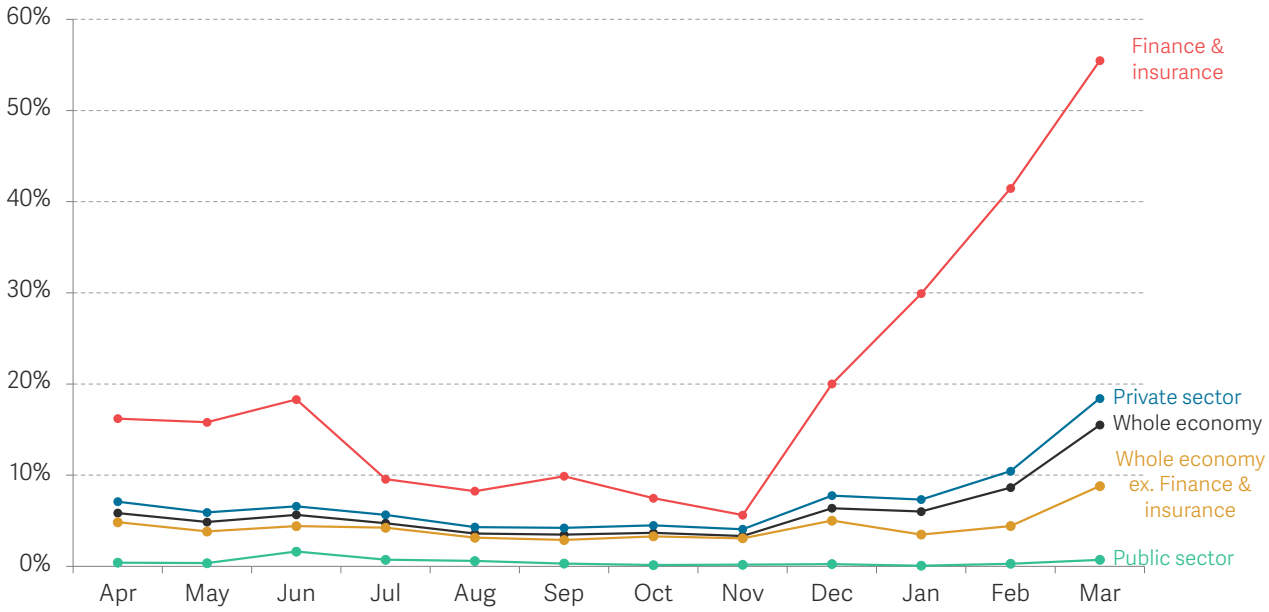
Indicative evidence of this bonus effect can be found in the ONS' Average Weekly Earnings dataset, which helpfully separates out bonuses. Figure 16 plots the share of total earnings that came from bonus payments in each calendar month across the same period as that covered by our PAYE data. Across the whole economy, bonus payments

32 The way we have calculated monthly pay for those whose employer has a weekly payroll system will introduce a seasonal pattern to volatility, as our calculations result in someone who is paid the same each week being calculated to have earnings that vary in each calendar month according to the number of days. This feature alone cannot cause a change of 25 per cent or more (the biggest changes are from January to February, and February to March, each of would show up as an arc percentage change in earnings of 10.1 percent, even for someone paid the same each week), but they could amplify any other changes in earnings to push someone over the 25 per cent threshold.

hovered around 5 per cent of total pay for most of the year, but were more important at the end of the financial year, starting in December and peaking at 15 per cent, on average, in March. Both the importance and seasonality of bonus payments are bigger in the private sector, and especially so in finance and insurance, where on average bonuses payments comprised more than half (55 per cent) of total pay in March over this period. Outside of this industry, bonus payments are less important, and on average they play almost no role in public sector pay.

FIGURE 16: **Bonuses contribute most to earnings in finance, and are concentrated at the end of the financial year**

Bonuses as a proportion of total pay, by calendar month: GB, April 2014 to March 2019

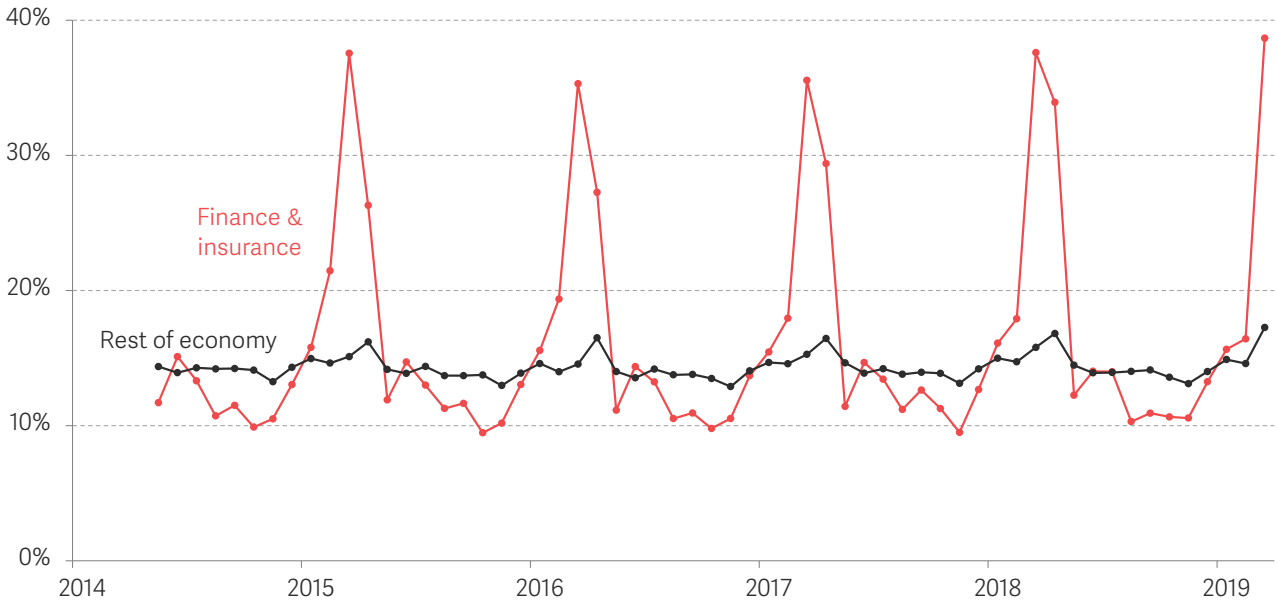


NOTES: Results are pooled across all years.
SOURCE: Analysis of ONS, Average Weekly Earnings.

The impact of bonuses on our measure of earnings volatility can be seen very clearly in the PAYE data if we zoom in on those workers most likely to receive a bonus: Figure 17 shows the seasonal pattern of volatility for employees in the finance and insurance sector compared to all other workers. The average arc percentage change in monthly earnings is particularly high in March and April, averaging 37 per cent in March.

FIGURE 17: **Monthly volatility follows a very seasonal pattern in the finance sector – probably linked to bonus payments**

Average arc percentage change in real monthly earnings compared to the previous month, finance and insurance versus the rest of economy: UK, 2014-15 to 2018-19



NOTES: Earnings are deflated using CPIH. See Box 1 for a description of the measures used.
SOURCE: Analysis of HMRC-ASHE PAYE data.

Repeated changes in earnings matter more than one-off changes, and some workers' earnings are erratic over a 12-month period

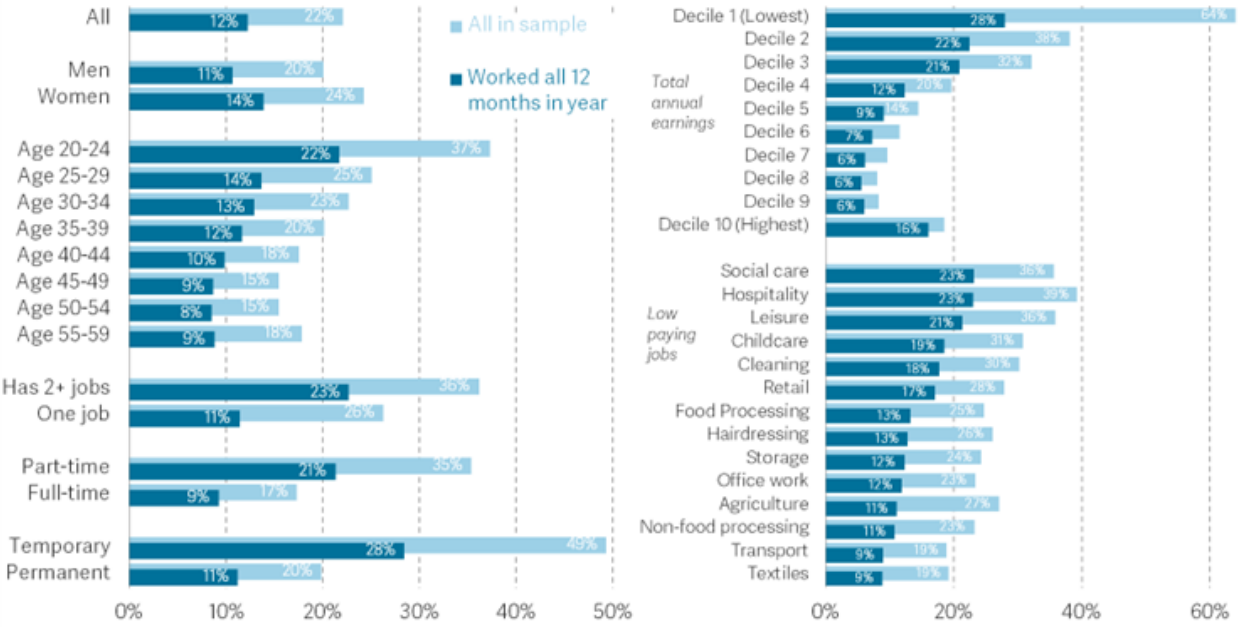
The analysis shown of month-pairs is a useful guide to the experience of earnings changes across the workforce at any given point in time, but it doesn't tell us much about the earnings volatility a person experiences over a longer period. For example, an average absolute change of 15 per cent across all worker-months could arise through all workers in all months seeing their pay rise or fall by 15 per cent. But it could also come about if half of workers saw absolute earnings changes of 30 per cent in all months and half saw no change in all months, or if all workers saw their pay change by 30 per cent in half of all months and by zero in the other months. In the remainder of this section, we look at changes in earnings over the course of a financial year.

Figure 18 offers a simple way of thinking about this: it plots the share of workers experiencing four or more months where their earnings deviate from their annual average by 25 per cent or more, and does so for both those who have earnings in every month of

the year and everyone in our sample.[33] Overall, 22 per cent of workers (6 million workers) experienced four or more months where earnings changed by 25 per cent or more from their annual average (this statistic includes the months where they received no earnings).[34]

FIGURE 18: **Even among those continuously employed, three-in-ten of the lowest paid face four or more months where pay is at least 25 per cent different from normal**

Proportion of workers experiencing four or more months in a financial year where their real earnings were at least 25 per cent higher or lower than their annual average earnings: UK, 2014-15 to 2018-19



NOTES: Earnings deflated using CPIH. 'Whole sample' consists of people who were in work in the April of a given financial year. Earnings deciles are based on total earnings across the financial year. Results are pooled across all years in the dataset.
SOURCE: Analysis of HMRC-ASHE PAYE dataset.

Volatility according to this measure was highest for the youngest workers in our sample (aged 20-24), workers in social care and hospitality, and workers on temporary contracts.[35] On average, almost half (49 per cent) of workers on temporary contracts (strictly speaking, those who were observed in the ASHE survey in April as having a temporary contract) went on to experience four or more months where pay was 25 per cent or more different from their own annual average within the following financial year. Only a minority (6 per cent) of all employees, amounting to 1.6 million workers, are on a temporary contract at a given

33 'Everyone in our sample' actually means 'everyone that we can match to the ASHE dataset in the relevant year', which means they must have worked in April at least. However, extending the sample in this way still gives a sense of what we referred to as 'labour market' volatility in the previous section – that is, volatility in earnings that reflects the impact of moving in and out of employment in addition to other changes in earnings.

34 Numbers of employees given in this paragraph are based on the proportions calculated in the payslip data, aggregated up to employee totals in the Labour Force Survey from financial years 2014-15 to 2018-19.

35 The strong relationship between volatility on this measure and decile of annual earnings in part reflects that the bottom deciles will contain an above-average number of people who had some months with no earnings. This is relevant because someone who had no earnings for six months and a fixed, positive value of earnings for the other six months would appear to have 12 months where their actual earnings was more than 25 per cent above or below the annual average.

point in time, but the high incidence of earnings changes among temporary workers means they comprise 13 per cent (800,000) of the total 'high volatility' group on this measure.

Figure 18 also shows the same measure including only those employees who worked in all 12 months of the financial year (the dark blue bars). Unsurprisingly, the incidence of multiple large month-on-month changes is lower when the sample is restricted to continuously-employed workers.[36] But the numbers are nonetheless still significant. On average, one-in-eight (12 per cent) workers with earnings in all 12 months of the financial year experienced four or more months where earnings were 25 per cent above or below their annual average.

An alternative approach is to classify the trajectories of workers' earnings within a financial year, and we do that below. We have used six categories: 'extremely stable', 'highly stable', 'stable with one or two small blips', 'stable with one or two large blips', 'three large blips' and 'highly erratic'.[37] Box 3 explains how we defined these categories and illustrates what these trajectories could look like (not using real data).

BOX 3: **Categorising within-year earnings trajectories**

In this section, we categorise individuals' earnings patterns within a financial year. The categories are defined as follows:[38]

- Extremely stable: May have up to two months where earnings are up to 10 per cent more or less than the financial-year average; earnings in all other months are within 5 per cent of the individual's financial-year average.
- Highly stable: All monthly earnings are within 10 per cent of the individual's financial-year average.
- Stable with one or two small 'blips': May have up to two months of small 'blips' where earnings are up to 25 per cent more or less than the financial-year average; remaining months are within 10 per cent of the individual's financial-year average.
- Stable with one or two large 'blips': May have up to two months of large 'blips' where earnings can be over

36 'Continuously employed' is a shorthand for workers who have positive earnings in each calendar month; some workers with positive earnings in each calendar month of a tax year could have had some weeks with no earnings but still record positive earnings in all 12 months.

37 This approach in general, and our classification in particular, is inspired by that in J Hills, R Smithies & A McKnight, Tracking Income: How working families' incomes vary through the year, Centre for Analysis of Social Exclusion Report 32, March 2006, but we do not follow their definitions exactly.

38 Individuals are put into the first category that applies. All of these percentage changes refer to the normal calculation of a percentage, not the arc percentage.

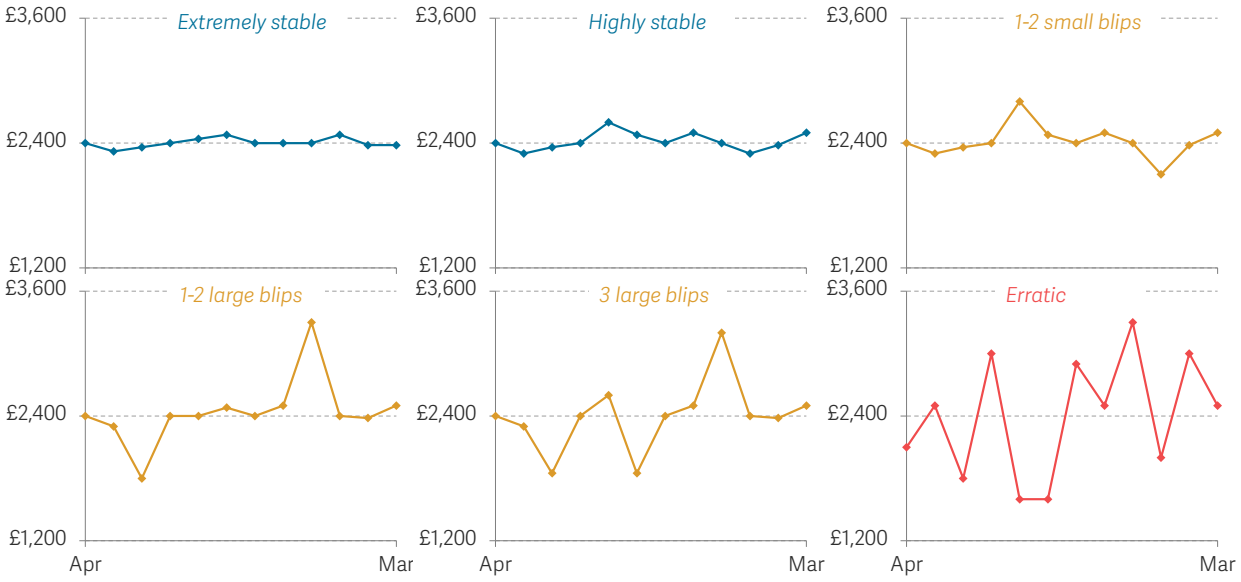
25 per cent more or less than the financial-year average; remaining months are within 10 per cent of the individual's financial-year average.

- Three large 'blips': At least three months where earnings are more than 10 per cent above or below the financial year average, but no more than three months where earnings are 25 per cent or more above or below the financial year average.
- Erratic: Not in any category above, i.e. there are four or more months where the deviation from the annual average is at least 25 per cent.

All these measures are based on workers' real earnings, deflated using CPIH. Figure 19 illustrates what these different types of earnings trajectories could look like.

FIGURE 19: **Workers' earnings trajectories can be very different**

Stylised examples of earnings to illustrate trajectory categories



NOTES: These are artificial series drawn for illustration and do not represent actual data.

Figure 20 shows the share of workers in each of these categories among those who were consistently employed (i.e. had earnings in all 12 months within a financial year).[39] Even among people consistently employed, just over one-in-four (26 per cent, or 5 million employees) experienced 'stable' pay – defined as having monthly earnings within 10 per cent of their average monthly wage in all months of the year. At the other extreme, around one-in-seven (14 per cent, or 2.7 million) employees experience 'erratic' earnings

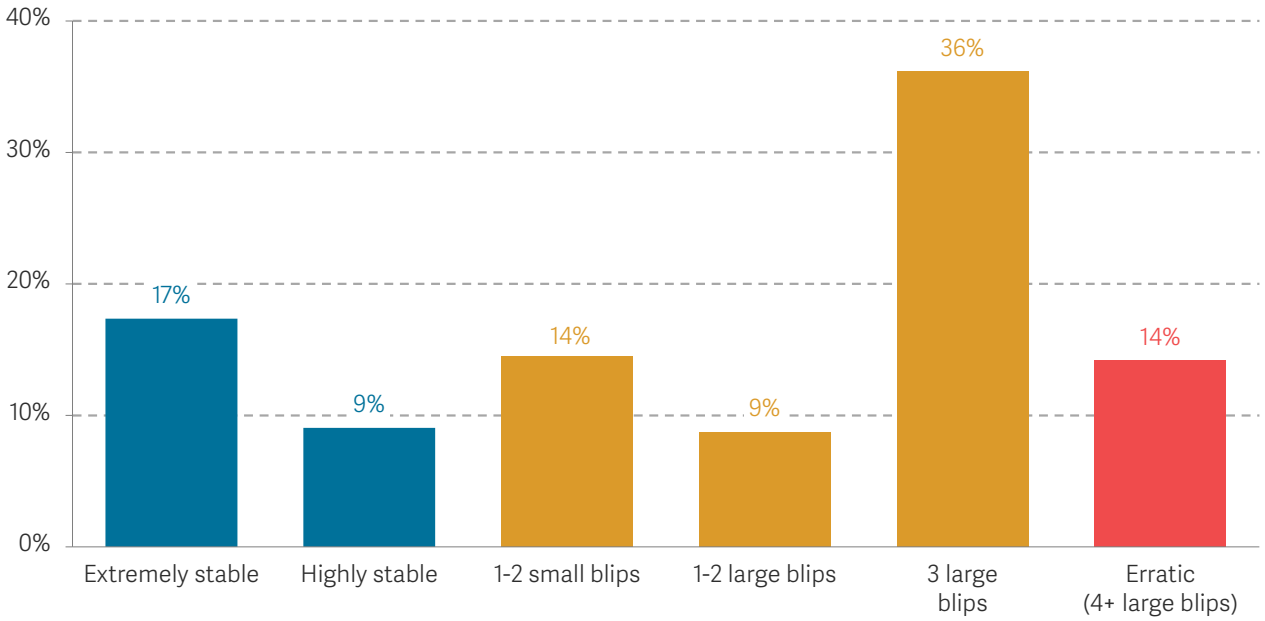
39 As noted in an earlier footnote, strictly speaking someone could have a weeks-long employment break but still have positive earnings in all months.

across the year – defined as having four or more months in a year where their earnings are at least 25 per cent different from their average monthly wage. The remaining workers fall into the three stable-with-blips categories, where the largest single category, at 36 per cent of workers, are those who have least three months of earnings that are at least 10 per cent more or less than the annual average, but no more than three months where earnings are more than 25 per cent different from the annual average.

FIGURE 20: **Only a minority of employees have 'extremely' or 'highly' stable earnings across the year**

Proportion of employees aged 20-59 and working all months in the year, by category of within-year earnings trajectory: UK, 2014-15 to 2018-19

NOTES: Results are pooled across financial years. See Box 3 for a description of the categories used here.



Analysis is based on real earnings, deflated using CPIH.
SOURCE: Analysis of HMRC PAYE dataset.

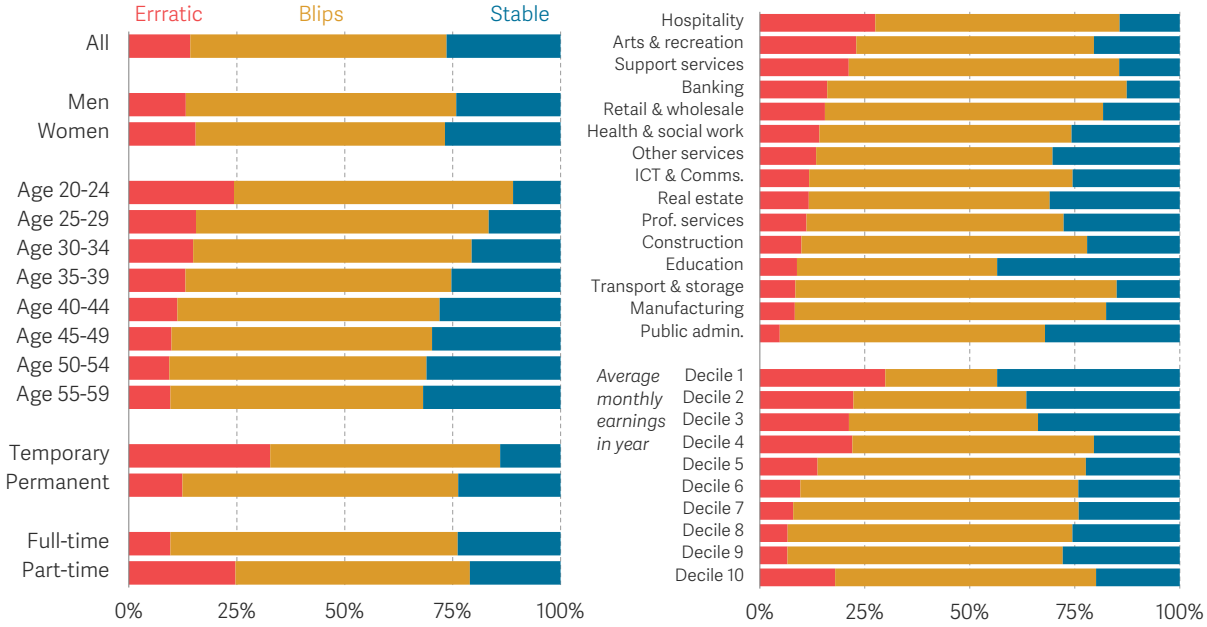
Unsurprisingly, there are large differences in the incidence of these earnings trajectories across different groups of workers, and we explore these in Figure 21, again conditioning on workers who had earnings in all 12 months in a financial year, and having combined the six categories into three: 'stable' (corresponding to the blue bars in Figure 20), 'stable with blips' (the orange bars) and 'erratic' (the red bar).

Some of the patterns are similar to those we observe when looking at the size of earnings changes between a pair of months. For example, younger people are more likely to have erratic pay: one-in-four (24 per cent) of those aged 20-24 have erratic pay in a year (even though we are focusing only who have some earnings in each month), more than twice the rate for those aged 40 and above (10 per cent). And there is a familiar pattern across

the earnings distribution, with the proportion with erratic pay declining as we move up the distribution of annual pay, except for those in the top tenth, who are nearly as likely to have erratic pay as those at the bottom tenth. Interestingly, the pattern for stable pay is not the simple opposite of this: stable pay is the most common in the bottom three deciles, and the least common in the top pay decile, but the relationship between the level of pay and the likelihood of having stable pay is not monotonic.[40]

FIGURE 21: **Erratic earnings across a year are more common for young workers, part-time workers, low-paid workers, workers on temporary contracts, and workers in hospitality**

Proportion of employees aged 20-59 and working all months in the year, by category of within-year earnings trajectory: UK, 2014-15 to 2018-19



NOTES: Results are pooled across financial years. 'Stable' here includes the 'Extremely stable' and 'highly stable' categories as defined in Box 3. 'Blips' includes categories involving 1-2 small or large blips. Figure uses the HMRC dataset without linking to ASHE for the 'All' bar and breakdowns by age, sex and earnings decile. Other breakdowns are from ASHE-linked dataset, which is a slightly smaller sample in which a larger share are designated as erratic. Analysis is based on real earnings, deflated using CPIH.
SOURCE: Analysis of HMRC PAYE dataset and HMRC-ASHE PAYE dataset.

Across sectors, erratic pay is most common in hospitality, arts and recreation, and support services, but then also in banking, which presumably represents bonuses or other ad hoc payments in the year (although note that someone with a constant monthly salary and a single annual bonus would show up as 'stable with blips'). Interestingly, workers in education are the most likely to have stable pay – which essentially means that they are receiving highly similar amounts in each month, and that payments for overtime or annual bonuses are rare. Stable pay is the least likely to be seen in those

40 Our concept of 'stable' pay is measured in relative terms, so there is nothing that means that low-paid people are mechanically more likely to be classified as stable pay.

working in banking, again suggesting the importance of bonuses in that sector. Finally, erratic pay is also particularly common among those with temporary contracts and those working part time (as recorded in April of that financial year).

As noted earlier, some groups with the most erratic earnings patterns comprise a relatively small share of the overall workforce – 20-24-year olds represent 13 per cent of all workers in the HMRC PAYE dataset, and workers on temporary contracts (as observed in April of the financial year) 6 per cent. These high-volatility groups are also somewhat overlapping; in our sample period workers aged 20-24 comprise 1-in-5 employees on a temporary contract, for example.[41] But these overlaps are only partial. And a regression analysis shows that each of the 'high-volatility' characteristics we identify (such being young, being in temporary work, being in a low-paying sector, and having multiple jobs) has an independent positive association with higher earnings volatility, even when other characteristics are controlled for.

This Section has provided the first evidence on the scale of monthly earnings volatility across a very large representative sample of UK workers, showing that average changes in earnings from month to month are substantial, and that they vary across workers in ways that are broadly consistent across the different ways in which we have measured volatility. In the next Section, we focus on a subset of workers where earnings can fluctuate at even higher frequencies: those paid weekly.

41 Estimated using pooled ONS Labour Force Survey quarterly datasets from April-June 2014 to January-March 2019.

Section 4

Weekly volatility in earnings

The statistics in the previous Section were all based on our estimate of people's monthly earnings – but 12 per cent of workers are paid each week, and so can experience volatility at an even higher frequency.

Being paid weekly is concentrated in the lower-paying parts of the economy: for example, close to half of workers in food processing and textiles industries are paid weekly. Weekly payslips are also more common than average among workers on temporary contracts, workers in the smallest businesses, and workers on low hourly pay.

Among those who are paid in consecutive weeks, the average week-on-week change in earnings is 19 per cent, larger than the average arc percentage change in monthly pay among all workers, even though the interval of time is shorter. For someone on the median weekly pay among workers paid weekly, this equates to a change of £84 a week on a weekly paycheque of £400. And 7 per cent of workers working in two subsequent weeks see their earnings fall by at least 25 per cent, something that is much more common in December and March.

In the previous Section, we used the HMRC PAYE dataset to create a measure of a worker's earnings in each month, regardless of the whether the worker's employer was operating a weekly or monthly payroll system. But in doing so, we effectively 'ironed out' any variation in earnings that happens on a week-to-week level. In this Section, we briefly explore earnings volatility measured at a weekly level, for the subset of workers who are paid on a weekly basis.[42]

Across the economy as a whole, only a small minority of workers are paid weekly – but it is more common in some lower-paying jobs

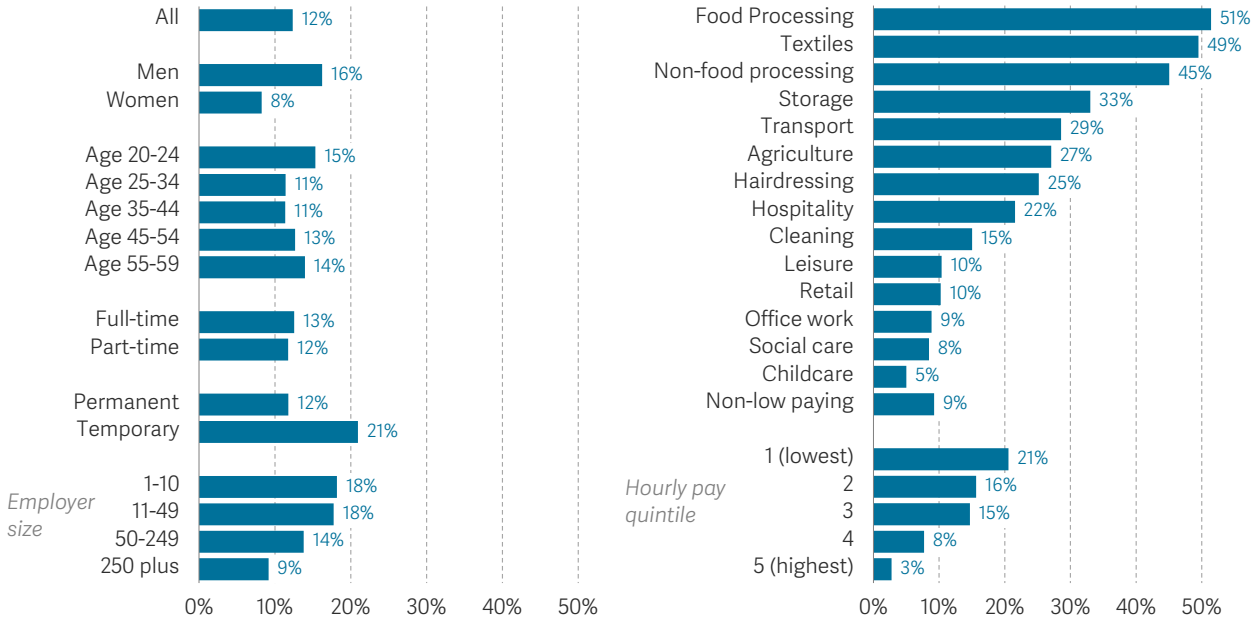
Over the course of 2014-19, only 12 per cent of workers received a weekly payslip. This still amounts to 3.3 million employees, but this is much less common than workers who are paid at lower frequencies, such as monthly.

42 Here, we mean those actually paid each week, which is a subset of those employer runs a weekly payroll, because that includes those paid fortnightly or four-weekly. In the previous Section, references to weekly paid (e.g. Figure 11) meant those with a weekly payroll.

But weekly pay is more common than this economy-wide average among the lower-paying parts of the economy. For example, as Figure 22 shows, close to half of workers in food processing and textiles are paid weekly (51 and 49 per cent, respectively), and in several other low-paying jobs the incidence is above a quarter. Other groups of workers where weekly payslips are more common than average include workers on temporary contracts (21 per cent), workers in the smallest businesses (18 per cent of workers in businesses with fewer than 50 workers are paid weekly), and workers on low hourly pay (21 per cent of workers in the bottom hourly pay quintile are paid weekly). Interestingly, men are twice as likely to be paid weekly than women, reflecting the gender mix of some of these sectors.

FIGURE 22: **Only a minority of workers are paid weekly, but it is closer to the norm in lower-paying occupations**

Proportion of workers paid weekly: UK, 2014-15 to 2018-19



NOTES: Results pooled across all periods in dataset.
SOURCE: Analysis of HMRC PAYE data linked to ASHE.

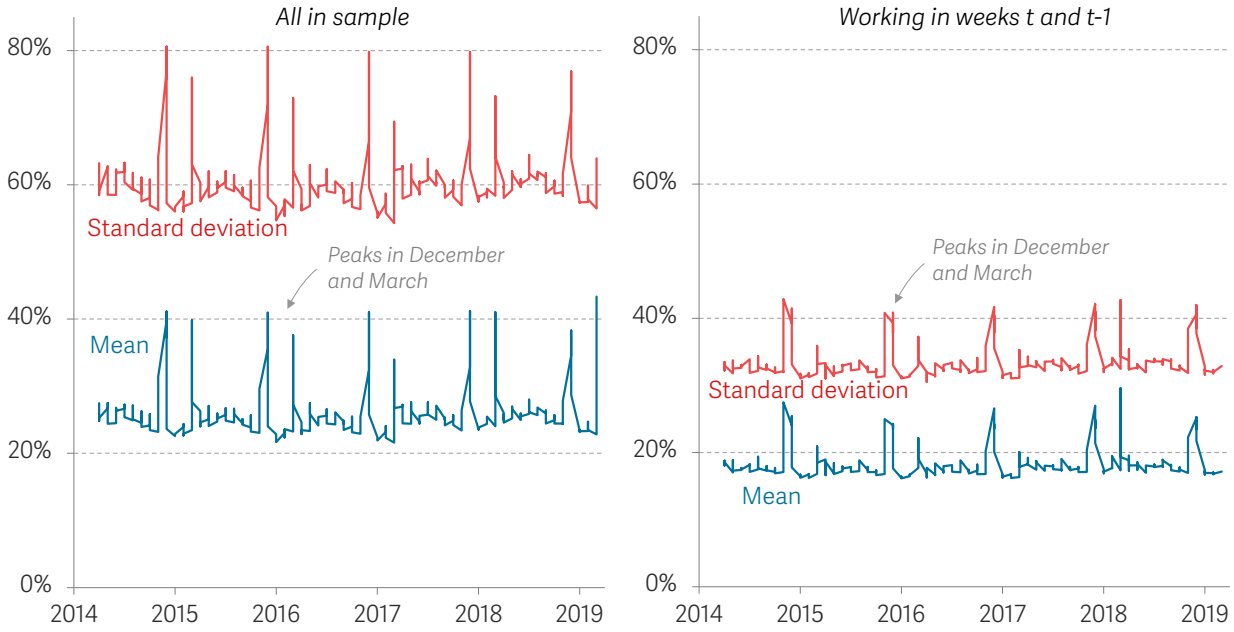
For those who are paid weekly, pay rises or falls by 19 per cent in an average week

Figure 23 plots four measures of weekly pay volatility. These are same as the measures used in the previous Section to measure monthly volatility: the standard deviation of the arc percentage change, and the mean of the absolute arc percentage change in real earnings. The chart shows these measures separately for the whole sample (in the left panel), and only for workers who were paid in adjacent weeks (in the right panel).[43]

43 When comparing these to the estimates of monthly volatility (such as in Figure 13), recall that the samples are different: here we are only looking at workers who are paid weekly.

FIGURE 23: **Weekly earnings volatility peaks in December and March**

Standard deviation and mean of the arc percentage change in real weekly earnings compared to the previous week, among all 20-59-year-olds (left panel) and those working in both weeks (right panel): UK



NOTES: Earnings deflated using CPIH. See Box 1 for a description of the measures used. Dataset here limited to workers paid via a weekly payslip in weeks t or t-1. 'All in sample' additionally includes workers not paid in either week t or t-1 but paid via a weekly payslip at some point in the financial year.
SOURCE: Analysis of HMRC PAYE data.

Over the sample period, for those who are paid in two adjacent weeks, weekly pay rises or falls by an average of 19 per cent compared to the previous week. This represents substantial volatility: it is larger than the average arc percentage change in monthly pay among all workers even though the interval of time is shorter.[44]

For someone on the median weekly pay of workers paid weekly (in 2019), a 19 per cent arc percentage change equated to earnings rising or falling by £84 per week on a weekly paycheque of £400. This was more than the basic weekly element within Universal Credit in that year (equivalent to £74 per week).[45] If we include all workers who are paid weekly, including those who might have received no pay in one or both of the weeks (but who were paid weekly at another point in the financial year), the average change in pay between weeks rises to 26 per cent.

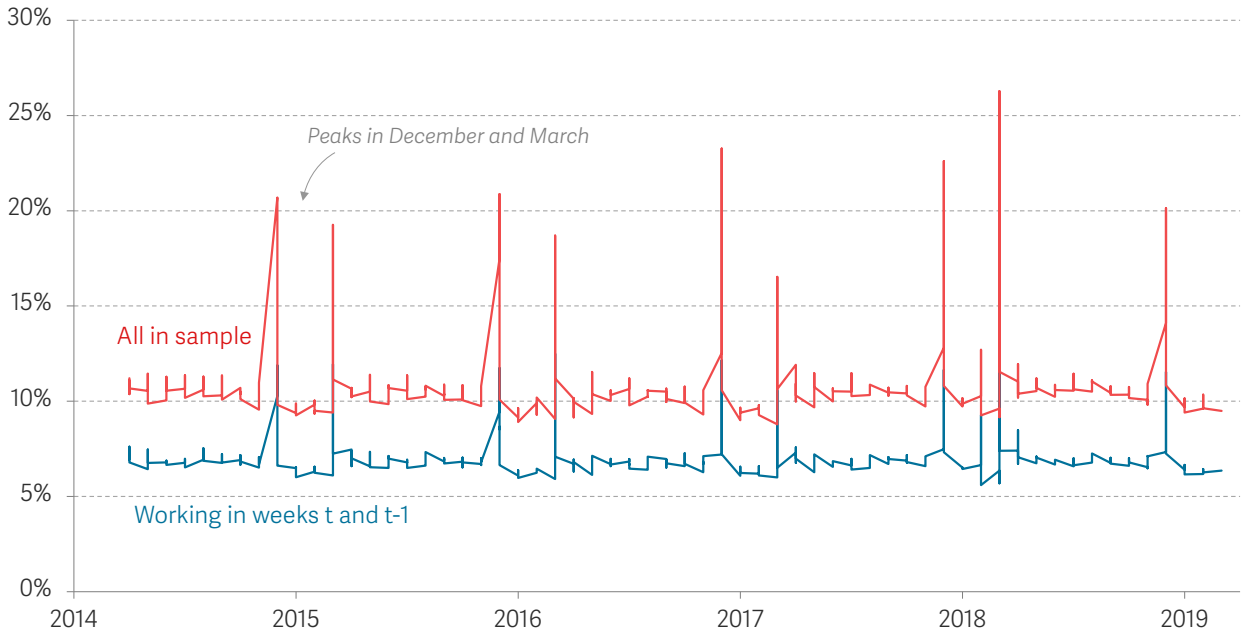
As in the previous Section, it is also useful to look at the tails of the distribution. Figure 24 plots the share of weekly-paid workers who saw their earnings fall by 25 per cent or more on the previous week. It shows that 7 per cent of workers who had some pay in

44 Consistent with this, Figure 11 showed that the average change in monthly earnings was larger for those paid under a weekly payroll than those paid under a monthly payroll.
45 In 2019 the basic element within Universal Credit was £317.82/month.

two subsequent weeks saw their earnings fall by at least 25 per cent (this share rises to 11 per cent if we include those who had zero pay in the second week). And there are pronounced seasonal patterns, with the number of large changes peaking in December and March.[46]

FIGURE 24: **In any given week, even excluding those whose pay falls to zero, around 7 per cent of weekly-paid workers experience a pay fall of at least 25 per cent**

Proportion of employees aged 20-59 experiencing a fall in real weekly earnings compared to the previous week of at least 25 arc per cent: UK



NOTES: Earnings deflated using CPIH. See Box 1 for a description of the measures used. Dataset here limited to workers paid via a weekly payslip run in weeks t or t-1. 'All in sample' additionally includes workers not paid in either week t or t-1 but paid via a weekly payslip run meaning at some point in financial year.
SOURCE: Analysis of HMRC PAYE dataset

Earnings volatility of this magnitude and frequency is likely to pose challenges to workers, particularly given the likelihood that those on low pay are likely to have low levels of financial resilience generally. In the next Section, we discuss what policy makers are, and could be, doing to address earnings volatility.

46 The data does not allow us to check whether the December peak is due to the non-working period around Christmas and New Year, or whether it is a fall back in earnings after a Christmas bonus or pre-Christmas overtime.

Section 5

Policy implications

Average changes in earnings on a month-to-month basis are substantial. This won't pose problems for all workers, but volatility is higher for low earners, and more common among those with fewer rights in the labour market, groups who we might suspect are the least able to cope, and those who are in a weak position to bargain for stability.

There is more that can be done to improve pay and income stability for workers, including making Universal Credit more compatible with volatile pay; paying better sick pay; boosting financial resilience among low-income workers; and encouraging employers to smooth out volatile pay for their employees. High levels of wage instability among younger and low-paid workers in certain sectors also underlines the urgency of the Government's prioritisation of strong employment rights, particularly when it comes to giving zero-hours contract workers more control and notice over their shift patterns.

This report has provided the first evidence on the scale of earnings volatility across a very large representative sample of UK workers, based on high-quality administrative data that records every payslip issued by employers. We have shown that average changes in earnings from month to month are substantial and, at 15 per cent (among those working in both months), are similar in magnitude to what a typical household spends on food and clothing each month.

Of course, this volatility won't pose problems for all workers. For example, erratic earnings might not matter as much if those earnings comprise the minority of a household's income – perhaps because there is a second earner with higher earnings, or perhaps because the individual has other sources of income that can help smooth out the volatility (such as income from self-employment, benefits, or investments). There may also be some workers – such as students, for example – for whom volatile earnings are the side-effect of something positive – of being able to work flexibly and take shifts which fit around other parts of their lives.

But what stands out from the analysis is the way that the volatility varies across different groups of workers, with groups including the young, low earners, those on temporary contracts, and workers in certain low-paying sectors like hospitality and social care being

more likely than others to experience both large month-on-month changes, and 'erratic' or 'highly erratic' earnings patterns over a year.

In this report, we do not attempt to set out detailed policy prescriptions to address the extent of volatility. Instead, we highlight three areas where this new evidence on the scale of earnings volatility needs to be taken on by policy makers.

The monthly nature of Universal Credit works poorly for those on weekly payroll, and paying it in arrears can amplify volatility in families' disposable income

This report is not able to directly investigate the volatility experienced by families receiving Universal Credit (UC), because our data does not tell us who receives UC, and nor do we know the earnings of the entire family: we have information on earnings only for a sample of employees.[47] But our data does allow us to emphasise two points that other researchers have stressed when discussing income volatility among UC recipients who are in work: the choice of a single month as the assessment period, and the fact that payments change each month and are paid in arrears.

First, UC was hardwired from the start to operate on a monthly basis, in that the assessment period is a month, and claimants' entitlement is recalculated each month. It is widely known that the monthly assessment period causes issues for people whose employer operates a weekly payroll: workers paid each week have four months in the year in which they receive five pay packets, rather than four; those paid fortnightly have two months in the year in which they receive three pay packets, rather than two; and those paid four-weekly have one month in the year with two pay packets, rather than one. For such people, even those receiving the same weekly pay will have a pattern of monthly pay that varies throughout the year. The HMRC data shows that 23 per cent of workers have an employer operating a weekly payroll system, and this will be skewed towards lower-paid workers, who will be more likely than others to be entitled to UC.

Second, other studies of income volatility have shown how UC actually worsens income volatility: in other words, for families receiving UC, their total income including UC is more volatile (on a month-to-month basis) than their total income excluding UC.[48] A key contribution of this paper is to show how much more volatile earnings are among those with low hourly or weekly pay. The fact that the social security system amplifies volatility for those who can least afford it is a major design flaw.

47 R Griffiths & M Wood, Coping and hoping: Navigating the ups and downs of monthly assessment in Universal Credit, University of Bath Institute for Policy Research, April 2024.
48 R Griffiths & M Wood, Coping and hoping: Navigating the ups and downs of monthly assessment in Universal Credit, University of Bath Institute for Policy Research, April 2024.

However, solving this problem without introducing new issues is difficult. The former Tax Credit system made the same payment to an eligible family throughout the year, which led to almost no volatility in payments. But there was an annual reckoning-up with the possibility of overpayments being clawed back. This meant that people could not be certain that the money HMRC was paying them would not need to be paid back, and led to the issue of overpayment debts which is still causing issues for families now. Compared to the quasi-annual system of Tax Credits, UC's shorter assessment period allows for a far greater responsiveness to changes in circumstances, as illustrated during the Covid-19 crisis, when additional government support could be provided to UC recipients as soon as their earnings fell or they lost their job.[49]

So reform here is difficult, and should be managed carefully to avoid introducing new problems. But the ongoing Department for Work and Pensions (DWP) review of UC should think hard about how to make changes to UC so that it provides more income security to its recipients.

Giving workers on zero-hours contracts a right to a contract with regular hours will reduce earnings volatility

Another key group challenged by earnings volatility is people for whom volatile earnings stem from unpredictable shift patterns. Workers who do not know until the last minute when they'll be working, and don't know how much they'll earn next week, can face anxiety and struggle to manage their household's finances.

For these reasons, the Government is right to seek to tackle the insecurity that comes from unpredictable and volatile working hours, and measures focusing on improving workers' experiences of zero-hours contracts are likely to be well-targeted as measures to reduce earnings volatility. The Government has two main measures in this space in its Employment Rights Bill, which is currently progressing through Parliament:[50]

Giving workers on zero- and 'low'-hours contracts a right to a contract with guaranteed hours, if they regularly work more than the number of hours in their contract; and

Giving workers a right to reasonable notice of changes in shifts or working time, and compensation when shifts are curtailed or cancelled at short notice.

These measures sound straightforward in principle, but there are a number of details (to be decided in regulations after the Bill passes) which will determine how they work

49 The system operated under Family Credit in the 1990s and Working Families' Tax Credit in the early 2000s was one where the assessment period was either six weeks or three months (depending on pay frequency), and then payments were fixed for six months. This gave claimants complete certainty over their payments from the government, but meant that they might have had to wait for six months before getting additional entitlement if their circumstances changed.

50 UK Parliament, Employment Rights Bill (as amended in Public Bill Committee), January 2025.

in practice. Among others, these include where the threshold for 'low' hours is set (which will decide which workers are eligible for the entitlement), at what level the compensation for cancelled shifts is set, and what counts as a reasonable notice period. There is also a question about the reference period to be used: in its accompanying text the Government says it will use a 12-week reference period,[51] but business groups are arguing that this will create problems for businesses in industries facing seasonal peaks (such as over the Christmas period, in the case of retail and hospitality).[52]

Like many of the Government's employment reforms, these proposals give rise to a trade-off between making work more secure for workers and raising costs for businesses.[53] At the Resolution Foundation, we have argued that because the UK is starting from a position of very low labour market regulation compared to other countries, the Government should err on the side of making work more secure.[54]

Improving the level of Statutory Sick Pay would also mean fewer sharp falls in earnings

Another area of the Government's employment reforms which will affect earnings volatility is the changes being made to Statutory Sick Pay (SSP). The Government is extending coverage of SSP to low earners (currently roughly 1 million workers earning below £123 per week, who are disproportionately in lower-income households, aren't eligible for SSP at all) and removing the three 'waiting days' during which workers aren't eligible for SSP, which is only paid on the fourth day of sickness absence.[55] These are welcome changes, and will make earnings less volatile, especially for the lowest-paid workers.

But the impact of these reforms on earnings volatility will be limited given the low level at which SSP is paid. At £116.75 per week, SSP offers a good level of earnings protection for low-paid workers on low hours, but offers very little protection for average earners, or even for someone earning the minimum wage, if they are working full time.[56] For most workers reliant on SSP (i.e. those whose employers don't offer 'occupational' sick pay above SSP), sickness absences will continue to create significant earnings volatility even once the Government's reforms are in place. This is an area where the Government should have been more ambitious.

51 Department for Business and Trade, Next steps to make work pay, October 2024.
52 See, for example: Hansard, Employment Rights Bill (Second sitting), November 2024.
53 There may be some examples where the trade-off can be eased, and the impact on business reduced in a way that doesn't detract from the ambition of the reforms. For example, in the case of workers' right to a contract with guaranteed hours, businesses could be required to make the 'offer' at the same time to all their workers, rather than on a separate occasion when each worker reaches the end of a reference period.
54 N Cominetti, Low Pay Britain 2024, Resolution Foundation, September 2024.
55 N Cominetti & H Slaughter, Labour Market Outlook Q4 2024: Reforming the UK's Statutory Sick Pay system, Resolution Foundation, December 2024.
56 See Section 3 in: N Cominetti, Low Pay Britain 2024, Resolution Foundation, September 2024.

Increased financial resilience would allow workers to cope better with volatility

It is intuitive that volatile earnings would be less problematic if workers had savings to act as a financial buffer, but too many do not: in 2018-20, one-in-three (30 per cent) working-age adults lived in a family with savings of less than £1,000. We have previously recommended that auto-enrolment be extended to allow employees to accumulate a highly-liquid 'sidecar' savings account with no restrictions on its use, capped at £1,000, and the results in this report on the scale of earnings fluctuations only add weight to that argument.[57]

Employers can help workers reduce their earnings volatility

Finally, the onus to reduce earnings volatility does not have to fall on policy makers alone.

There are various practical steps that employers can take to reduce pay volatility among their staff. One is to pay workers at the frequency that most suits them: for workers on Universal Credit, for example, being paid monthly rather than weekly might be more convenient, since even stable weekly payments can show up as volatile earnings when assessed at the monthly level (since not all months have the same number of weeks). This could be done either on a worker-by-worker basis, or by polling employees and going with the majority option. Employers should also be careful when it comes to awarding bonuses, or payments in arrears. If paid as one-off lump sums, these can again lead to workers' benefit payments falling in the following month. Workers might prefer these payments to be smoothed across months instead.

There are also technical solutions to the problem of earnings volatility. These include tools which allow workers to smooth payments within a month (referred to as 'earned wage access'). In theory these can offer the benefit of higher-frequency payments, meaning a more-regular cash flow, without the downside of the PAYE system recording varying payments from month to month. provides a summary of some of these 'Workertech' tools.

57 M Broome, I Mulheirn & S Pittaway, Precautionary Tales: Tackling the problem of low saving among UK households, Resolution Foundation, February 2024.

BOX 3: **Workertech**

Workers could also benefit from the ability to manage volatility of earnings more directly through better technology tools for workers and employers ('Workertech').

One approach is to give workers greater options to navigate a volatile earnings landscape. An example is by helping workers to identify employers that perform better on offering enough hours, or whether shifts change at short notice, as the worker ratings at Breakroom offer.[58] The Living Hours pledge supported by the Living Wage Foundation offers another useful signal in this area.[59] Shift tracking applications, such as that offered by WAC, can also help workers to identify and claim unpaid wages, which can be very complex when shifts vary week-to-week and even day-to-day.[60]

Employers can offer support directly to their workers, via 'earned wage access', which can reduce the impact of shifting from weekly to monthly pay and smooth earnings. This is an offer that Wagestream has demonstrated improves financial well-being.[61] Other software tools can help employers to better plan shift patterns in a way that meets worker needs and improves their job satisfaction and well-being. When better tools are used alongside a change in approach and the involvement of workers, recent pilots by Timewise have demonstrated promising results in sectors such as construction, retail and healthcare.[62]

58 For further details, see: www.breakroom.cc.
59 For further details, see: www.livingwage.org.uk/living-hours.
60 For further details, see: wac.rocks.
61 Wagestream, Mind Over Money: Financial Wellbeing & Mental Health Insights, February 2025.
62 Timewise, Ending the two-tier workforce, January 2025.

Annex A: Datasets and measures of earnings

The earnings data

Our research is based on the data that UK employers must report to the tax authorities (HM Revenue and Customs, HMRC) each time they pay their employees using the Pay As You Earn (PAYE) Real Time Information system. The term PAYE refers to employers' keeping back the employee's liabilities for income taxation and National Insurance contributions from their pay packets, and passing them on directly to HMRC.

The earnings data we use covers a 1 per cent random sample of the employees in the PAYE system who are in the target sample for the Annual Survey of Hours and Employment (ASHE). The selection of employees each year for ASHE is random, based on the last two digits of an individual's National Insurance number (which remains the same each year).

The earnings information is derived from all the payslips submitted to HMRC between 6 April 2014 and 5 April 2019, and so covers the five financial years (FYs) prior to the onset of the Covid-19 pandemic. It covers gross (pre-tax) earnings. At the time our work was finalised, we did not have access to an indicator that reliably identified employers, and so we could not investigate how much job changes contribute to our measures of earnings volatility. There is also no measure of hours worked. We do not have information about earnings from self-employment.

Because employees are paid at different frequencies, we need to choose a common time period over which to calculate earnings so that we can examine volatility among all employees. We rule out aggregation to the annual level because we wish to look at sub-annual earnings changes. Given how the worlds of employment, cash transfers from the Government and household bills work in the UK, a monthly reference period is the natural option. And monthly (or bi-monthly or some other monthly type) is the most common pay frequency in our main analysis sample, accounting for around 72 per cent of all person-month observations.

Employees paid monthly or some other monthly type (e.g. bi-monthly) are the easiest to deal with. Among this group, the principal adjustments are to those not paid every month but less frequently: their pay is converted to a monthly amount pro rata. For example, for those paid bi-monthly, monthly pay for each month within a two-month period is calculated as half the bi-monthly amount.[63]

63 There is more information in the documentation produced by the WED team, available at: www.wagedynamics.com/hmrc/. In particular, see: WED, Creating the PAYE Panel, July 2024.

Most of the consistency adjustments focus on the employees whose employer operates a weekly payroll system. For this group, there are several steps. First, we 'daily-ise' each person's earnings: we take the total earnings over the relevant pay period (one week or one fortnight, for example) and calculate the daily average pay within that period (dividing by 7 or 14 respectively). Second, for each person, we sum their 'daily-ised' earnings over the days comprising each calendar month over the five FYs for which we have data. There is a third adjustment because years contain 365 or 366 days and so there are one or two extra days 'left over' from the second step (52 × 7 days per week = 364 days). For the weekly paid, the leftover pay was allocated to week 52 of each FY; for the fortnightly paid, it was spread over weeks 51 and 52; and so on.[64]

In Section 4, we focus on weekly earnings volatility, rather than monthly, to get a very high frequency perspective on volatility. For this analysis we consider only workers who are actually paid each week (i.e. we do not include those paid bi-weekly, for example, or with a monthly payroll system). The three consistency-adjustment steps described above are not implemented in this case.

The final step in the derivation of all our earnings variables is to convert nominal amounts into real terms. To convert to earnings to March 2019 values, we use the monthly Consumer Price Index including owner occupiers' housing costs (CPIH).[65] There are some grounds for using nominal rather than real earnings when taking a high-frequency look at earnings changes, but we note that inflation was particularly low during the period we consider: the average monthly change in the CPIH between April 2014 and March 2019 was 0.12 per cent (less if Januarys are excluded), and was never more than 0.5 per cent. As a result, the distributions of real earnings changes are very similar to distributions of nominal earnings changes. The most perceptible difference is that the fraction of individuals with exactly zero change in monthly earnings is lower for real earnings than for nominal earnings (22.2 per cent rather than 43.2 per cent; and 4.2% compared with 31.4% if focusing on those working two consecutive months). Otherwise, differences in the distributions are negligible: for example, among all workers, the median arc percentage change is 0.000 for both real earnings and nominal earnings changes (-0.002 and 0.000 among those working two consecutive months). The corresponding mean changes are 0.003 and 0.004 (0.002 and 0.004). The standard deviation of the arc percentage changes is the same for both real and nominal earnings, 0.46.

64 For further details of our monthly earnings variable derivations, and discussion of potential alternatives, see Appendix A of: M Brewer, N Cominetti & S P Jenkins, What do we know about income and earnings volatility?, Review of Income and Wealth, forthcoming; WED, WED HMRC PAYE & SA data: Quick guide for users, June 2024. The ONS uses a broadly similar approach in its handling of the PAYE earnings data; see: ONS, Monthly earnings and employment estimates from Pay As You Earn Real Time Information (PAYE RTI) data: methods, July 2022.

65 Most previous studies of earnings volatility have used real earnings. One exception, which uses nominal earnings, is: D Tomlinson, Irregular payments: Assessing the breadth and depth of month to month earnings volatility, Resolution Foundation, October 2018.

The HMRC and Linked-ASHE analysis files

The PAYE earnings data described so far is the basis of what we call the HMRC file. It contains information on each individual's pay, age and sex, how many jobs they had, and how frequently they were paid. In addition, we have a second file created by linking the HMRC data to individuals in the Annual Survey of Hours and Earnings (ASHE) – what we call the HMRC-ASHE PAYE dataset.

ASHE collects data from employers about the characteristics of employees and their jobs, with most measures referring to the April of the ASHE survey year. ASHE includes information on employees' occupation and industry, whether they are paid a fixed hourly rate or working on a temporary contract, and whether they are in the public or private sector. We roll forward the characteristics from each April's ASHE over the rest of the financial year, though we acknowledge that some characteristics may change over the course of the year (and we cannot observe these changes).

A limitation of the Linked-ASHE data is that the linkage rate to HMRC data is well short of 100 per cent, mostly due to ASHE only achieving around two-thirds of its sampling target, and mismatch is non-random.[66] Our comparisons of the HMRC and the Linked-ASHE files indicate that the latter leads to lower estimates of volatility. For example, for our analysis samples (see below) and pooling the data for all 60 months, the average absolute arc percentage change in real earnings according to the HMRC file is 0.150 for those working in months t–1 and t, and labour market volatility is 0.184, whereas the corresponding estimates from the HMRC-ASHE PAYE dataset are 0.136 and 0.174 respectively. Looking at the full distribution of arc percentage changes among those working in months t–1 and t, the main differences between the HMRC and Linked-ASHE distributions stem from large increases rather than large decreases: the top tenth of changes refers to those with an arc percentage change of 19.9 per cent or more in the Linked-ASHE file, and 21.9 per cent or more in the HMRC file.

The lower volatility estimates from the Linked-ASHE file arise in part because workers with lower attachment to employment are less likely to be successfully linked. For example, in the HMRC file, those working in months t–1 and t contribute 76.5 per cent of the person-month observations, whereas in the Linked ASHE file the corresponding fraction is 92.9 per cent. Reassuringly, however, we find broadly similar volatility differentials across characteristics present in both the HMRC and Linked-ASHE files (age, sex, number of jobs, pay frequency type), and so we expect that volatility breakdowns by characteristics only present in the Linked-ASHE file should also be reliable.

66 WED, WED HMRC PAYE & SA data: Quick guide for users, June 2024.

Sample selection criteria

We restrict our analysis to individuals aged 20-59 so as to exclude young school-leavers and workers close to retirement.[67] We also drop a small number of individuals whose records of within-year earnings are (highly) irreconcilable with an internal check variable that cumulates earnings (in these cases, all months of the relevant FY are dropped from the analysis sample).

The resulting HMRC file contains data for an unbalanced panel of around 294,500 employees, of whom 74 per cent are present for all 60 months. There are about 15.9 million person-month observations of which 12.1 million refer to individuals working in the current and previous month. The Linked-ASHE file, also an unbalanced panel, contains around 210,000 workers, 17 per cent of whom are present for all 60 months. It contains around 7.1 million person-month observations of which about 6.6 million refer to individuals working in the current and previous month.

67 Similar sample selection criteria have been applied in previous research; see Annex B for citations of the key work.

Annex B: Past studies of earnings and labour market volatility in the US and UK

Most of what we know about earnings volatility comes from research about the US, which burgeoned in the 1990s and 2000s with the increasing availability of household panel survey data.[68] Rising earnings volatility was said to be increasing the precarity and income risks facing US households. Research by Peter Gottschalk and Robert Moffitt found that earnings volatility doubled between the early 1970s and the end of the 1980s, and then stayed at the higher level thereafter, and showed how rising volatility of men's earnings in particular contributed to rising volatility of household incomes.[69]

Data on earnings volatility in the UK became available much later, with the advent of the British Household Panel Survey (BHPS) in 1991. A 2011 book showed that earnings volatility (measured at annual frequency) for British men stayed at roughly the same level from the early 1990s through to the mid-2000s, and that the level was much lower than the level in the US.[70]

Subsequent research on both sides of the Atlantic has been wider in scope – looking at women as well as men, and accounting for volatility arising from job entry and exit (which is often referred to as 'labour market volatility') as well as from volatility in earnings per se. Papers in the early 2010s found that earnings volatility for both men and women was roughly constant in both the US and the UK between the early 1990s and the late 2000s (i.e. that the rise of the 1970s and 1980s came to an end), but was consistently higher in the US (nearly 50 per cent higher, according to the volatility metric used). Labour market volatility, which includes the volatility arising from moving in and out of work, is also higher in the US than the UK, but fell over this period in the UK, but not in the US, and is a bit higher for men than for women in both countries. We provide more up-to-date evidence about labour market volatility and earnings volatility based on panel surveys in Section 2.

More recent studies have started to make use of administrative data. This has the advantage of larger sample sizes, and the data may suffer less from non-response bias and measurement error. On the other hand, administrative data often lacks information about workers' characteristics, including their household context, and information provided by employers can also be inaccurate. One recent US study used administrative

68 This Annex draws on: M Brewer, N Cominetti & S P Jenkins, What do we know about income and earnings volatility?, Review of Income and Wealth, forthcoming.
69 P Gottschalk & R Moffitt, The growth of earnings instability in the U.S. labor market, Brookings Papers on Economic Activity 1994(2), 1994; P Gottschalk & R Moffitt, The rising instability of U.S. earnings, Journal of Economic Perspectives 23(4), 2009.
70 S P Jenkins, Changing Fortunes: Income Mobility and Poverty Dynamics in Britain, *Oxford University Press, July 2011.*

data to show that male earnings volatility had remained stable since the 1980s.[71] Another study used more recent administrative data and identified falling volatility in the US since the 2010s.[72]

Despite these advances, only a very few studies have looked at earnings volatility at higher frequencies than year-to-year. In the UK, the Resolution Foundation undertook a pioneering study that examined volatility in monthly income and take-home pay using proprietary data from a high street bank. This found that volatility was widespread, but greatest for those at the bottom and the top of the earnings distribution, and least for those in the middle.[73] A recent study from the US used millions of records from a payroll processing firm to study monthly earnings volatility between 2010 and 2023.[74] The main finding is that "workers face substantial earnings fluctuations from month to month … earnings changes are ubiquitous. In almost three-quarters of months, the change in pay is at least 17%". They also show that the principal source of the volatility is pay items other than base pay. Their takeaway is that "high-frequency labor market shocks are an important source of risk and fragility which has been masked by past studies of annual earnings".

Finally, there have been important small-sample studies of earnings and income volatility which incorporate qualitative analysis of volatility experiences.[75] Most recently, there have been two in-depth but small-sample studies of earnings and income volatility in the UK, one focused on UC recipients, and one on a broader cross-section of families.[76]

71 R Moffitt et al., Reconciling Trends in U.S. Male Earnings Volatility: Results from Survey and Administrative Data, Journal of Business & Economic Statistics 41(1), September 2022.
72 R Blundell et al., Interpreting Cohort Profiles of Lifecycle Earnings Volatility, Journal of Labor Economics 43(1), January 2025.
73 D Tomlinson, Irregular payments: Assessing the breadth and depth of month to month earnings volatility, Resolution Foundation, October 2018.
74 P Ganong et al., Earnings Instability, University of Chicago Working Paper, March 2024.
75 Pioneering examples of these studies include: J Hills, R Smithies & A McKnight, Tracking Income: How working families' incomes vary through the year, Centre for Analysis of Social Exclusion Report 32, March 2006; J Morduch & R Schneider, The Financial Diaries: How American Families Cope in a World of Uncertainty, Princeton University Press, March 2017.
76 A Angsten Clark & S Otulana, Fluctuation Nation: Lifting the lid on the millions of people managing a volatile income, Nest Insight, November 2024; R Griffiths & M Wood, Coping and hoping: Navigating the ups and downs of monthly assessment in Universal Credit, University of Bath Institute for Policy Research, April 2024.

Annex C: Data citations

- Labour Force Survey (series page here):
  - Office for National Statistics. (2024). Labour Force Survey. [data series]. 11th Release. UK Data Service. SN: 2000026, DOI: http://doi.org/10.5255/UKDA-Series-2000026
- Skills and Employment Survey (study page here)
  - Felstead, A., Gallie, D., Green, F., Henseke, G. (2019). Skills and Employment Survey, 2017. [data collection]. UK Data Service. SN: 8581, DOI: http://doi.org/10.5255/UKDA-SN-8581-1
- Understanding Society (series page here):
  - University of Essex, Institute for Social and Economic Research. (2024). Understanding Society. [data series]. 12th Release. UK Data Service. SN: 2000053, DOI: http://doi.org/10.5255/UKDA-Series-2000053

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