

The measurement of apprentice pay

Final report to the Low Pay Commission

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February 2015

Executive summary

Overview

This report considers the measurement of apprentice pay, both the accuracy of that measurement and what can be said about compliance with the National Minimum Wage. In summary, there are substantial problems with accurately identifying apprentice pay; however, it is possible to identify some consistent areas of concern. Of these, the most important is non-compliance amongst those in the second year or above of their apprenticeship.

Data sources

The report analyses and evaluates the 2011 and 2012 Apprentice Pay Surveys (APS). Whilst these provide a great variety of information about apprentices, the surveys had some significant shortcomings. Inaccuracy in the data leads to higher observed non-compliance, and the APS suffers from a tendency found in other surveys of employees, that respondents tend to round numerical data up or down to convenient values. This was particularly problematic for the 2012 APS, and was exacerbated by poor timing of the data collection; analysis of the 2012 APS data should therefore be treated with caution. The 2011 data does not suffer to the same extent.

There are also concerns in the APS about how respondents report hours, particularly time spent training, and to the wording of some of the other questions. These issues were raised at the time of the Interim Report, and remedies have been incorporated in the redesign of the APS for 2014. The 2014 APS was not available in time to be analysed for this report.

This report also makes use of the 2013 and 2014 Annual Survey of Hours and Earnings apprentice data. This employer survey has a smaller sample than the APS and fewer variables on the characteristics of apprentices, but the pay data is generally believed to be more accurate than employee surveys. The 2013 ASHE data were treated as experimental and so were not subject to the same checks as regular ONS data

The measurement of non-compliance

The table below summarises observed levels of non-compliance:

Relevant NMW	Non-compliance rate			
	APS2011	APS2012	ASHE 2013	ASHE 2014
Apprentice Rate (16-18 or 1 st year)	11.2%	16.5%	6.2%	6.1%
Youth Development Rate (19-20, 2 nd year+)	46.9%	54.7%	10.9%	13.0%
Adult NMW (21+, 2 nd year+)	27.0%	35.5%	5.0%	7.0%
Overall	19.8%	29.4%	7.0%	7.7%

Notes: 2nd year+ = in the second year or more of a multi-year apprenticeship; APS 2011 & 2012 weighted, ASHE 2013 & 2014 unweighted; no adjustment for rounding error in ASHE.

All surveys show the same feature: that non-compliance peaks amongst those aged 19-20 in the later years of their apprenticeship, with adults studying beyond the first year the next most likely to be paid below the relevant NMW. However, there are substantial differences in scale. The difference between the APS in 2011 and 2012 is probably due to data problems. The difference between APS

2011 and ASHE is of more concern. Rounding by employees may lead to APS overestimating non-compliance but this does not seem a sufficient explanation.

All surveys suffer from concerns over the measurement of hours. Non-compliance is substantially lower amongst those who are paid hourly wage rates, in all surveys. For other employees, determining hourly wage rates requires several calculations. The association of higher rates of non-compliance with more time spent training (on- and off-the-job) suggests that the number of training hours is another potential source of error. While the APS asks detailed information on hours of work and training, some of the questions are ambiguous – some apprentices claim to be doing no training at all. ASHE is accurate on paid-for hours on site, but has no information on training time; there is a suspicion that off-the-job training is not included in reported hours, so ASHE may be underestimating non-compliance. Finally, ASHE appears to be particularly susceptible to very small rounding errors as a consequence of the wage calculations; making reasonable adjustments reduces the non-compliance rate in ASHE by about one percentage point overall, but reduces the non-compliance rates for those on the Apprentice Rate (AR) by about 3 percentage points.

Resolving these conflicts is made more difficult by the differences in timing. The 2011 APS may be recording artificially high non-compliance as it reflects the bedding-in of the Apprentice Rate. The 2014 APS, collected between July and September, allowing sufficient time for the AR to bed in, indicates a similar pattern to the 2011 and 2012 APS, but some percentage points lower.

Given the uncertainties over data and timing issues, the authors conclude that the APS data be seen as an upper bound on non-compliance, and ASHE as a lower bound. Further precision requires joint analysis of the 2014 APS and 2014 ASHE, which is the first time two datasets have been collected for the same pay period.

Findings of the report point to high non-compliance in childcare and hairdressing apprenticeships, which have been primarily undertaken by females. These findings are consistent with the literature around gender pay differences in apprenticeships.

Causes of non-compliance

Despite problems in counting non-compliance, one consistent result, seen in the above table, is that compliance increases significantly when apprentices move beyond the first year of study. This does not appear to be due to employers continuing to pay the Apprentice Rate beyond the first year, at least not in significant numbers. This is a puzzling finding, and no good explanation has come to light so far. One difficulty in analysing this is that the numbers of observations available for analysis can fall rapidly.

The second consistent source of non-compliance is amongst apprentices who are not paid a set hourly wage rate. As noted above, this may be due to problems of reporting. However, it may also be genuinely due to employers' failure to calculate an accurate wage rate. The data cannot distinguish between reporting error and real non-compliance, and so this may require a qualitative study to resolve.

Other than these two effects, very little consistently predicts non-compliance. Early analysis suggested that 'bad jobs' (precarious employment, long hours etcetera) might be linked to non-

compliance, but the evidence for this is slim. Nor is there much evidence that an ‘awareness’ of the AR is linked to compliance.

One reason for the lack of significant quantitative findings may be the limited numbers for breaking data down further. However, as both the APS and ASHE data seem to be giving consistent results across years, pooling the data may be a productive and statistically valid way to provide more detailed analysis.

Recommendations to LPC

This report recommends, in order of priority, that the LPC

- Concentrate non-compliance campaigns on those aged over 18 and entering their second year (or above) of an apprenticeship, particularly those aged 19-20
- Decide whether to adjust for rounding in the ASHE data in formal estimates of non-compliance
- Analyse jointly the microdata from the 2014 APS and ASHE to try to reduce the difference between non-compliance estimates
- Pool waves of the APS and ASHE data to create sufficient large datasets for framework-level analysis
- Follow up on apprentices who appear to have no training hours.
- Quantify ‘awareness’ of the NMW amongst apprentices.
- Add a measure of paid-for training hours to ASHE for triangulation purposes

Finally, some of the issues raised are more amenable to qualitative research (for example, whether employers and employees understand the role of training hours).

Acknowledgements and disclaimer

We are grateful to Don Webber at UWE, LPC staff (particularly Tim Butcher, Helen Connolly and Yi Zhang) and workshop participants for their comments on earlier reports and presentations. The views expressed in this project are those of the authors and do not necessarily reflect the views of LPC, ONS or any other organisation. All statistical data presented here are the calculations of the authors. Errors and omissions are the responsibility of the authors.

APS data was supplied to the authors by BIS. ASHE data was accessed through the VML. This work contains statistical data from ONS which is Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

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1. Background: Apprentices in the UK

This section provides an overview of UK apprenticeships, as well as background information regarding apprentice pay and the issues associated with researching this area. State intervention in apprenticeship pay is discussed, with particular reference to the Apprentice Rate following recommendations by the Low Pay Commission in 2010. This section examines the extant literature debating whether or not the Apprentice Rate (AR) is being applied.

Finally, the section concludes by examining four sectors representing technical and service sector apprenticeships, in order to highlight significant differences in UK apprenticeships, such as gender balance, age, working hours and training. These pertinent differences will be revisited in the empirical sections of this report.

1.1 Overview of Apprenticeships

Apprenticeships combine practical paid work experience and on- and off-the-job training which culminates in a nationally recognised qualification. As employees, apprentices earn as they learn and gain practical skills in the workplace (SFA, 2013). Responsibility for public funding of apprenticeships in England is shared between the Department for Business, Innovation and Skills (BIS), which funds adult apprenticeships, and the Department for Education (DfE), which funds apprenticeships for 16-18 year olds; elsewhere, funding is the responsibility of the devolved administrations.

Apprenticeships are organised around industry-specific ‘frameworks’ which specify the length and content of the apprenticeship for that industry. Variations between the content and delivery of apprenticeships, frameworks, employer input and apprentice figures may be partly explained by differences in the institutional characteristics of educational systems and labour markets (see, for example, Ashton et al, 2000; Hall and Soskice, 2001; Rainbird, 1993; Steedman, 2010; Toner, 2008).

The face of apprenticeships has changed in recent years. Privatisation of former public sectors, such as construction, reduced the capacity for the employment of apprenticeships and there has been a shift within the content and delivery of apprenticeships as these are no longer regulated by employer institutions and trade unions. Training has, instead, become more employer-led (Toner, 2008). The extent to which employers have influence on the content and process of apprenticeships varies; what differs, however, is whether or not employers wish to be involved in the design and delivery (Colahan et al, 2014). This is in line with wider debates amongst all stakeholders around the extent to which there needs to be a better fit between the content of apprenticeships and the requirements of business (Colahan, 2014). Moreover, there have been discussions around the inclusion of numeracy and literary skills within apprenticeships; in particular the extent to which all apprentices should be required to achieve a minimum of level 2 NVQ in English and mathematics (Colahan et al, 2014; Richard, 2012). This is especially of interest when reflecting on the educational levels of service sector apprentices, discussed in section 1.4.

In the 1990s, the UK Government reformed the apprenticeship system in response to wider concerns about skills shortages, including the introduction of Modern Apprenticeships in 1995 and the Adult Learning Inspectorate (formerly the Training Standards Council) in 1998 (NPA, 2013). Apprenticeships were rebranded in 2004 with frameworks redefined in 2005 to provide updated

guidance for Sector Skills Councils (NPA, 2013). In 2009 the National Apprenticeship Service (NAS), was introduced in order to encourage more employers to offer apprenticeships (NPA, 2013).

On 1st August 2011, the Specification of Apprenticeship Standards for England (SASE) was introduced in order to set out the minimum requirements for the number of guided learning hours (GLH) that form part of an Apprenticeship and Advanced Apprenticeship. Apprenticeships should, therefore, include a minimum of 280 GLH per year of which 100 must be delivered away from the workplace (Higton, 2013).

The number of apprenticeships in the UK has increased steadily since 2008, with 868,700 funded apprentices registered in the 2012/13 academic year, an increase of 7.7 per cent on the year (SFA, 2103). Higton and Colahan (2013) suggest that a rise in the costs of higher education and the impact of the recession have led to a resurgence of interest in apprenticeships amongst young people. Sectors tend to be gender-dominated, with females choosing apprenticeships in tertiary sectors, including hairdressing and childcare, and males taking up apprenticeships in industrial sectors, for example, mechanical engineering and construction. This has led to a marked gap in pay for male and female apprentices (Fuller et al, 2005). Similarly, there are differences across sectors in the age of apprentices. The regulation of sectors, for example, within particularly child-care and early years, has limited opportunities for younger apprentices as employers are reluctant to take on under-18s. Hairdressing tends to be youth-dominated because training lasts six months and, as Drucker et al (2002) argue, the AR could deter older applicants.

Age is a much debated issue; the Richard Review of Apprenticeships (Richard, 2012), for example, highlights discussion amongst stakeholders as to whether apprenticeships should be open to all ages, or whether they should be restricted to give priority to young people. Nevertheless, the APS (2011) indicated that 70% of apprentices worked at the organisation before beginning their apprenticeship, suggesting that the majority of apprentices would be slightly older than the school-leaving age.

1.2 The Apprentice Rate

The National Minimum Wage (NMW) was introduced in the UK in 1999, with age-related minimum wages set every October since 2000. Employees on formal apprenticeships were exempt from the NMW legislation; instead many of the apprenticeship 'frameworks' had industry-wide, but not statutory, agreements on weekly wages for apprentices at different stages of their training.

In 2010 the UK Government accepted recommendations from the Low Pay Commission (LPC) to introduce the Apprentice Rate (AR). The AR was introduced in October 2010, resulting in an overall increase in apprenticeship wages (Behling and Speckesser, 2013). The AR applies to those aged eighteen or under, or those over eighteen and in the first year of apprenticeship. Table 1 shows the NMW rates since the introduction of the AR. The final column of Table 1 also shows the datasets which contain data allowing apprentice pay to be analysed for each minimum wage period, namely the Apprentice Pay Survey (APS) and the Annual Survey of Hours and Earnings (ASHE).

Table 1 National Minimum Wage rates 2010-2013

Rate from...	21 and over	18 to 20	Under 18	Apprentice Rate (AR)*	Data available
October 2010	£5.93	£4.92	£3.64	£2.50	APS2011
October 2011	£6.08	£4.98	£3.68	£2.60	
October 2012	£6.19	£4.98	£3.68	£2.65	APS2012, ASHE2013
October 2013	£6.31	£5.03	£3.72	£2.68	APS2014 ASHE2014

*applies to those under 19 or in year 1 apprenticeship; otherwise NMW applies

The recommendation to introduce an apprentice rate was supported by quantitative and qualitative research commissioned and carried out by the LPC. To study the impact of the AR, a survey of employers of apprentices was carried out (see Higton, 2013, for a detailed analysis), and in 2011 the Department for Business, Innovation and Skills (BIS) began collecting quantitative data from apprentices via its Apprentice Pay Survey (APS). Previous studies (Higton and Colahan, 2013; Behling and Speckesser, 2013) have highlighted extremely high rates of non-compliance amongst apprentices. The authors were commissioned by the LPC to analyse the APS, particularly but not exclusively with respect to compliance with the AR.

1.3 Is the AR being applied?

Apprenticeship pay is calculated in a number of ways. Apprentices may receive their total pay either from their employer or from a training allowance; alternatively, pay can be a combination of training allowance and employer pay (Higton, 2013). Research on apprentice pay reveals a number of issues including a concentration of low pay in certain sectors, rises in unpaid overtime and gender pay gaps (see, for example, Fuller et al, 2005).

Of more concern is the finding from studies carried out in 2011 and 2012 (Higton, 2013) that show a continued increase in the number earning below the minimum wage. Research on apprenticeship pay has been affected by the fact that there seems to be a tradition of misreporting pay and hours for apprentices, either by the employer or the apprentices themselves.

Higton and Colahan (2013) noted that some employers may be paying apprentices the incorrect amount due to error or ignorance of the legislation. Higton (2013) suggests that recent policy interventions may have resulted in mistakes; for example, changes to the GLH through the Specification of Apprenticeship Standards for England (SASE) in 2011 may have impacted upon the calculation of paid training hours. The findings themselves may also be misleading: changes to the AR rates in October 2012 may also have skewed the data on pay, collected towards the end of that year in APS 2012, where employers and apprentices may have miscalculated based on 2011 pay rates (Higton, 2013). These issues are analysed in detail in the following sections of this report.

1.4 Examples of apprenticeships

Higton (2013) indicates that apprenticeship frameworks shape apprentice pay and working conditions. Apprentices enrolled on schemes with a focus on technical and/or practical manual skills such as engineering and construction, for example, experienced better working conditions than apprentices on frameworks focused on the service sector and/or transferable skills such as customer service and business administration (Higton, 2013).

This section provides a comparative overview of the variations in apprenticeships in two industrial sectors – engineering and electro-technical - and two service sectors – hairdressing and child-care - to highlight differences between the gender and age of apprentices, pay, working hours and training that are typical across the sectors where apprenticeships are offered.

Hairdressing

The literature shows that hairdressing has consistently been the lowest paid sector. Apprentices in hairdressing are predominantly young women (Steedman 2008); hence this has contributed to the existence of a gender pay gap amongst apprentices (Ullman and Deakin 2005).

Ullman and Deakin (2005) reported that hairdressing apprentices were earning around two fifths of the skilled adult wage and, in 2012, 69 per cent were paid below the minimum wage, which was an increase of 21 percentage points since 2011 (Higton, 2013). This indicates that pay levels in this sector are seeing a rapid level of decline. Steedman (2008) argued that there is lower demand for apprenticeships but indicated an existence of anecdotal evidence suggesting that applicants for hairdressing apprenticeships tend to be poorly qualified. This is backed up by Drucker et al (2002) who point to a decline in the calibre of applicants.

One important characteristic of this sector is that trainees receive tips. Almost a decade ago, Ullman and Deakin (2005) found that 75% of apprentices received tips averaging around £13 per week as part of their pay. Higton (2013) suggests that although, in general, apprentices are currently receiving fewer tips than in previous years, a large majority of hairdressing apprentices continue to be tipped (see our analysis below). Thus, although hairdressing continues to be the lowest paid sector, tips greatly add to apprentices' take home pay (Ullman and Deakin 2005).

The introduction of the National Minimum Wage improved pay throughout the sector, especially for junior employees (Drucker et al, 2002). Drucker et al (2002) suggest that the National Minimum Wage is used by many salons to set the minimum level for commission rates. Nonetheless, Higton (2013) warns that, contrary to the National Minimum Wage legislation in 2009, the sector runs the risk of using tips to top up apprentices' wages. What is interesting is that, compared to other sectors, apprentices in hairdressing demonstrated the highest awareness of the Apprentice Rate (Higton, 2013), suggesting that whilst these young women are aware that they are amongst the lowest paid workers in the UK, they continue to enter the profession.

Overtime work in this sector tends to be unpaid (Higton, 2013). Drucker et al (2002) found that most young people in this sector take second jobs to support themselves. This might explain why hairdressing apprentices have less time to engage in training. Apprentices in hairdressing also receive less off-the-job training than those in engineering and construction occupations. Ullman and Deakin (2005) reported that hairdressing apprentices received five hours off-the-job training per

week. Drucker et al (2002) found that salons which had achieved Investors in People status were more likely to be better at supporting their employees. This might impact on apprentice experiences of pay and training.

Engineering

Apprentices in the engineering sector are predominantly male. Apprenticeships appear to attract candidates because of the prospect of secure employment and higher wages in later life (Steedman, 2008). There are many applicants for apprentice places, which increases competition and attracts higher calibre young people and, as a result, most applicants are well-qualified (Steedman, 2008).

This is a well-paid sector for apprentices. Pay levels for apprentices in electro-technical and engineering occupations are comparable to a young person working full-time with no training in an unskilled occupation (Steedman, 2008). Net pay averages appear significantly greater because of the high proportion of trainees doing an Advanced Apprenticeship (Higton, 2013).

The sector offers good training opportunities; apprentices in the engineering sector received ten hours of off-the-job training where the economy-wide average was five and a half hours per week (Higton, 2013). As with the electro-technical sector discussed below, training is more likely to be included in wage calculations where the transfer of high skills is part of the apprenticeship. Positive findings for apprenticeships in this sector correlate with wider literature on skills and remuneration within the sector (see for example, Appelbaum, 2000; Zenger, 1994).

Electro-technical

This sector resembles the engineering sector in terms of gender and calibre of applicants and training (Steedman, 2008) and includes the highest earning apprentices at £160 per week (Higton, 2013).

Apprentices in the electro-technical sector receive a high proportion of training compared to other sectors. They spend only a third of their time working and the rest of the time is spent in on-the-job and off-the-job training (Ullman and Deakin, 2005). This would suggest that training is included in the calculations for employment hours.

Children's Care, Learning and Development

Childcare, learning and development apprenticeships cover a range of skills and careers and could lead to employment as a care worker, youth community worker, nursery nurse or teaching assistant. Apprentices in this sector are similar to those in hairdressing in terms of being predominantly female with low qualifications at the time of application for the apprenticeship (Steedman, 2008). There are also similarities between the two sectors with regards to pay and training offered. As discussed previously, frameworks influence pay and conditions and childcare is typically seen as low-skilled, part-time and low-paid. There is lower demand for apprenticeships and Steedman (2008) points to anecdotal evidence suggesting that applicants for childcare apprenticeships tend to be poorly qualified. Having said this, Higton and Colahan (2013) reported that recession has led to an increase in women entering the labour market, creating a higher demand for child-care provision.

Apprentices in early years' work are more likely to have previously worked for their employer prior to commencing the apprenticeship, yet, do not report any difference to pay received (Ullman and

Deakin 2005). Ullman and Deakin (2005) explain their finding by suggesting that apprentices fail to see a connection between job and apprenticeship.

With 43 per cent of apprentices earning less than the minimum wage (Higton, 2013; see also below), apprentices in childcare were also one of the groups most likely to report that they received no pay (Ullman and Deakin 2005; Higton, 2013). Higton (2013), nonetheless, did not report that this figure had changed significantly since 2011 and was 7 per cent. Overtime work in this sector tends to be unpaid (Higton, 2013).

Apprentices in childcare receive less off-the-job training than other occupations, even hairdressing. Ullman and Deakin (2005) reported that childcare apprentices received only four hours off-the-job training per week. Colahan’s (2014) study found evidence of employer dissatisfaction with education providers of childcare apprentice training, suggesting that the small amount of training which apprentices receive, is of poor quality.

2. Data sources

2.1 The Apprentice Pay Survey (APS)

The APS has been conducted in 2011, 2012, and 2014. A version was also run in 2007 but as it is substantially different in content and coverage, it is not considered part of the ongoing APS. At the time of writing the 2014 microdata was not available, so this report uses the 2011 and 2012 data.

Table 2 describes coverage of the 2011 and 2012 APS.

Table 2 APS sample details

	2011	2012
Data collection period	June 1 st – July 31 st 2011	October 15 th – December 23 rd 2012
Coverage	UK	England, Wales NI
Post-processing sample size	6140 (England) 2041 (Scotland) 1997 (Wales) 842 (NI)	6507 (England) 1817 (Wales) 640 (NI)
Response rate	51.9% GB 7.9% NI	45.2% (England) 47.2% (Wales) 5.9% (NI)
Relevant wage rate for data period		
AR	£2.50	£2.65
16-17	£3.64	£3.68
18-20 (YDR ¹)	£4.92	£4.98
Adult NMW	£5.93	£6.19

NI data are collected by a postal questionnaire sent out to all apprentices in the country; hence the lower response rates. For the rest of the UK, data were collected via telephone interviews with the Individual Learning Records (ILRs) providing the sampling frame.

¹ YDR is the Youth Development Rate.

Note that the timing of the 2012 survey causes a problem for measuring compliance with the NMW. It is quite feasible that apprentices may be reporting earnings lower than the legal minimum because of lags in updating wages. Fry and Ritchie (2013) demonstrated that compliance increases through the NMW year, reaching a plateau of compliance around spring.

This study focuses on the respondents who provide pay data. Excluding NI (because of sampling concerns), this gives 8710 (86%) and 5575 (67%) respondents for 2011 and 2012 APS respectively. The Interim Report (Drew, Ritchie and Veliziotis, 2014) concentrated on England because of the homogeneous educational support framework. However, as the analysis showed little difference between countries (see below), all data except NI was pooled.

Hourly wage rates are those calculated by the APS team (see Higton, 2013). For those who are not hourly paid, a wage rate is calculated by dividing the reported pay (weekly, monthly or yearly) by total hours (on-the-job plus off-the-job training). Reported pay is generally gross earnings; some net earnings are reported but these are rare and do not affect the main findings.

The 2011 and 2012 APS cannot be triangulated directly by other surveys. The Labour Force Survey identifies apprentices and length of time with the current employer, but few observations have pay data, and it does not identify whether the apprentice is in the first or later year of study. The Annual Survey of Hours and Earnings did collect pay data for these periods, but did not identify apprenticeships.

2.2 The Annual Survey of Hours and Earnings (ASHE)

In 2013 ASHE was redesigned to collect data on apprentices; specifically

- Whether an employee was on a formal apprenticeship.
- If so, when the apprenticeship started.

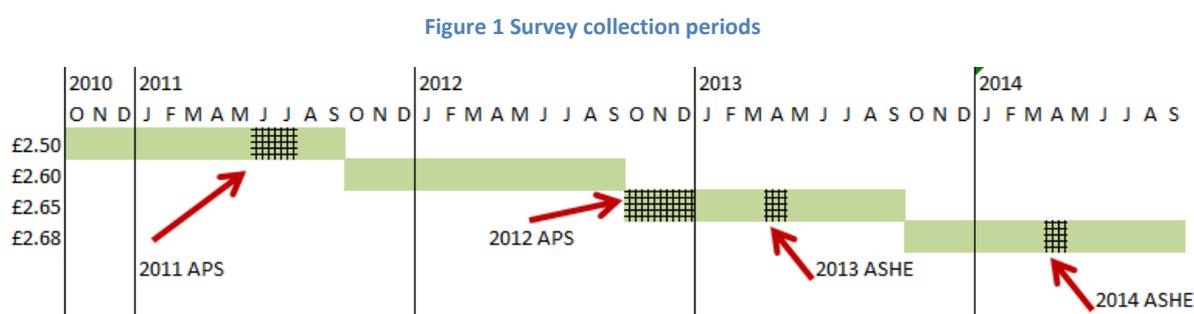
The latter piece of information is necessary to identify whether an apprentice is in the first or later year of study, and hence which NMW applies. Unfortunately, ASHE does not collect information on training hours; only 'paid-for' hours are included in the returns for employers, and, as will be shown below, there is some concern over whether employers omit off-the-job training from pay calculations. Moreover, ASHE only identifies around 1500 apprentices, far fewer than APS. Nevertheless, ASHE is generally seen as the 'gold standard' for wage calculations, whereas employee-provided information is more subject to measurement error (Fry and Ritchie, 2013), and so despite the smaller numbers it can provide a useful counterpoint to APS data.

The 2013 ASHE apprentice data is formally classified by ONS as 'experimental'; that is, a data collection where the primary aim is to assess the quality of information being collected and its suitability for publication as a National Statistic. As a result, not all the checks carried out on the regular ASHE dataset were applied (for example, if an employer reports a wage below the NMW, the employer would normally be contacted to confirm the accuracy of the survey data). For 2014, ONS has now confirmed that the data meets quality standards. ONS does not publish minimum wage statistics from ASHE; this is done by the LPC who have access to the ASHE microdata. The first official results on compliance using ASHE data are due to be published in Spring 2015.

The figures presented below are the authors' calculations, drawn from the same dataset but without making the statistical adjustments necessary to produce official statistics (for example, the figures below are not weighted to population values unless stated). This is because the analysis below is concerned with the quality of the data rather than providing population estimates, which are beyond the scope of this report. Hence, figures for non-compliance (for example) below may differ from those published by the Low Pay Commission.

2.3 Data and timing

It is important to note that the three surveys were carried out at different parts of the year; see Figure 1.



The 2011 APS and 2013 and 2014 ASHE data were collected when the relevant minimum wage rates had been in place for at least six months; in contrast, the 2012 APS data were collected when the NMW had just changed. As all surveys ask for information on the respondent's last pay period, it is conceivable that the previous year's NMW could have been legitimately paid to the respondent.

2.4 The 2014 APS

The summary results from the 2014 APS were published in late December 2014. Because of the substantial changes in survey design, and the lack of access to microdata, it has not been possible to incorporate a detailed analysis into this report. Reference will be made to headline results from the 2014 survey, but direct comparisons should be treated with caution.

2.5 Code

The Stata code used to analyse the 2011 and 2012 APS and 2013/2014 ASHE is available from the authors or the LPC.

3. Measuring compliance: an overview

Non-compliance is defined as the hourly rate calculated by the APS team being below the legal minimum for each apprentice based on age and year of apprenticeship. Table 3 reports the extent of this non-compliance according to the 2012 APS; see Higton (2013, figure 2.8) or Annex Table A2 in this report for a breakdown by framework.

Table 3 Non-compliance in the APS 2012 (England)

	% of apprentices earning below their legal minimum
Full sample (N=5,570)	29.4%
Not hourly paid (N=3,790)	33.5%
Hourly paid (N=1,780)	20.7%

Note: Weighted data

It can be seen that there is almost 13 percentage points difference in non-compliance between individuals that report an hourly pay and individuals that do not. Since non-compliance is calculated by a derived hourly rate for apprentices that report a weekly, monthly or yearly wage, this is a first indicator of either measurement problems or error on the part of employers. Even so, the 21% rate that is observed for hourly paid workers is still substantial and a reason for practical concern.

Non-compliance may arise from two sources:

- genuine non-compliance by employers
- measurement problems in data collection

Genuine non-compliance is a source of policy concern. Non-compliance may arise because employers do not know the appropriate NMW for the employee's age and time on the job; Higton (2013, p34) suggested this as a potential problem, citing the high number of non-compliant wages paid to apprentices aged 19 or over and past their first year. Non-compliance may also occur because employers do not correctly calculate the NMW from the wage/hours combination; many apprentices are paid a weekly or monthly wage, rather than an hourly rate. Both of these would suggest an information need amongst employers. In addition, non-compliance may occur because employers actively try to avoid paying minimum wages; in the early years of the NMW non-compliance rates were substantially higher (see past LPC reports). Finally, as noted above, non-compliance may arise as a result of delayed wage rises.

Measurement error in employee data collection has been well documented, in particular the preference for respondents to round continuous variables up or down (Fry and Ritchie, 2013; Ritchie et al, 2014; LPC, 2014). The most likely source of error is in the wage reported by the employee; however, the survey questions relating to hours are ambiguous, which may lead to an incorrect derived wage rate being calculated.

In the Interim Report for this project (Drew et al, 2014) analysed the relationship between compliance and a range of relevant covariates (basic demographics, age and year of course, and various contract and job characteristics) through multivariate analysis, using the 2012 APS. Three different model specifications were analysed (see Annex Table A1, columns 4-6 for the results)²:

- full sample, without controls for the apprenticeship framework
- full sample, including controls for the apprenticeship framework
- hourly paid apprentices only, including controls for the apprenticeship framework

² Note that in the multivariate analysis the sample size falls to 5,225 observations due to missing information in some of the variables used. See Annex Tables A1 and A2.

The first two specifications check the importance of the apprenticeship framework in explaining part of the findings. The third specification results from the assumption that hourly paid workers are less likely to be affected by measurement error arising from the need to calculate an hourly wage rate; hence, non-compliance should be a cleaner finding. The findings can be summarised here:

1. Inclusion of the framework in the model is important since this explains an apparent gender effect in the first specification. The increased likelihood of non-compliance amongst females is largely the result of the over-representation of women in the two major “non-complying” industries: hairdressing and children’s care. Similarly, the importance of receiving tips is substantially affected by the inclusion of framework dummies. Tipping by customers is prevalent in the hairdressing sector, where around 87% of apprentices claim that they receive tips (see Annex Table A2).
2. The interaction of age with year of apprenticeship produces some interesting results. Apprentices in the first year of their training are legally only entitled to the AR (£2.65 per hour in 2012), irrespective of age. The results indicate that, for apprentices in their first year, non-compliance is significantly higher among younger people (i.e. 16-18 years old), *ceteris paribus*. On the other hand, for apprentices in their second year or above, non-compliance increases with age, pointing to a higher probability of non-compliance when higher minimum rates have to be paid. Some of these differences in probabilities are substantial: for example, compared with a person aged 16-18 in his/her first year (legal minimum 2.65), a person over 21 years of age in his/her second year of apprenticeship or above (legal minimum 6.19) has an almost 24 percentage points higher probability of earning below his/her legal minimum (see specification (5) in Annex Table A1).
3. Whether working or not with the same employer before taking up the apprenticeship also matters for the extent of non-compliance. The probability of non-compliance decreases with tenure with the same employer, while it is highest among persons that started working with their employer for the purposes of the apprenticeship course.
4. Working hours and off-the-job training are positively related to non-compliance. These two variables are used for the calculation of hourly pay and, thus, non-compliance, for the persons in the sample that do not report an hourly pay. Over-reporting in these two variables relative to earnings can lead to a downward bias in estimated hourly pay. The results point to such a mechanism. This is strengthened by another important finding: when the estimating sample is restricted to those reporting an hourly pay, the two hours variables’ coefficients (and marginal effects) collapse to zero (see specification (6) in Annex Table A1).
5. The hourly pay variable in the first two specifications shows that people that report an hourly pay rate are less likely to receive a wage that is below the legal minimum. Moreover, having a contract or a permanent job is negatively related to non-compliance.
6. The “awareness” and “holding a second job” variables lose significance and decline substantially in importance once the sample is restricted to hourly paid apprentices only.

In summary, there appear to be a number of “real” factors that affect compliance, but there are strong indications that some of the non-compliance observed may be due to statistical issues with the data. The next section reviews these statistical factors in detail, before we return to the other elements of non-compliance.

4. Identifying genuine non-compliance

4.1 Rationale for studying measurement errors

The first suspicion that measurement issues partly explain non-compliance arises from the very different compliance rates reported in the APS and ASHE:

Table 4 Overall non-compliance rates

Eligible NMW	Non-compliance			
	APS2011	APS2012	ASHE 2013	ASHE 2014
AR (16-18 or first year)	11.2%	16.5%	6.2%	6.1%
YDR (19-20, second year)	46.9%	54.7%	10.9%	13.0%
Adult (21+, second year)	27.0%	35.5%	5.0%	7.0%
Overall	19.8%	29.4%	7.0%	7.7%

Source: authors' calculations; APS 2011 & 2012 weighted, ASHE 2013 & 2014 unweighted. No adjustment made for rounding in ASHE.

While the pattern of non-compliance is similar, the scale of non-compliance in the APS is much higher. Although the number of apprentices identified in ASHE is considerably smaller, it is generally seen to be the more reliable survey, and so this is a cause for concern. The two APS estimates are more similar to each other in scale than to the ASHE estimates. The distribution of wages in the APS also has some similarity with that observed in the Labour Force Survey, another survey using employee responses as the primary source.

In the tables below, APS data is unweighted, as it is the survey responses rather than population estimates that are of interest. In addition, ASHE is adjusted for 'rounding error'. Actual wages within a penny of one of the minimum wages are included as being at that wage; for example, in 2013, 3% of those on the AR are receiving the YDR $\pm 1p$. The reason for this is that the ASHE data is subject to rounding effects; see section 4.5 below. The effect of this is to reduce the numbers on the AR being paid unlawful wages by about three percentage points, halving the non-compliance rate for this group.

Table 5 below details where the non-compliance is occurring.

Table 5 Non-compliance in responses, by relevant minimum wage rate

Relevant NMW	Wage being paid					Non-compliance	Number
	Other, below	AR	YDR	Adult NMW	Other, above		
APS 2011							
AR	11%	4%	1%	2%	83%	11%	6,435
YDR	36%	1%	1%	0%	61%	37%	922
Adult	24%	0%	*	2%	74%	24%	1353
APS 2012							
AR	18%	2%	1%	2%	78%	18%	4,299
YDR	47%	*	2%	*	50%	47%	567
Adult	36%	*	*	2%	62%	36%	709
ASHE 2013							
AR	3%	14%	3%	1%	79%	3%	812
YDR	10%	*	10%	*	79%	11%	238
Adult	5%	*	*	6%	89%	5%	439
ASHE 2014							
AR	2%	15%	3%	1%	79%	2%	1,027
YDR	12%	*	14%	*	73%	13%	315
Adult	7%	*	*	7%	86%	7%	502

Notes: Source, APS and ASHE, authors' calculations, unweighted. * indicates fewer than four observations. ASHE values do not sum across tables because of removal of cells with few observations; ASHE data allow for rounding for the monthly paid (see text)

The table shows, for each eligible rate, the percentages being paid at, above or below that rate; also, if above or below, the percentages being paid a different NMW to their statutory minimum. For example, the 2011 APS shows that, of the 6,435 individuals in the survey who have the AR as their statutory minimum wage, 4% receive the AR, 3% receive one of the other NMWs, 83% receive some other wage above the minimum, and 11% receive a wage below the minimum. The red boxes indicate unlawful wage rates. Only the 2011 APS shows non-negligible numbers of respondents eligible for the YDR (i.e. 19-20 years old who should be in their second or third year of their course) who are still being paid the AR.

The Interim Report (Drew et al, 2014) suggested that there is a significant difference between the hourly paid and the non-hourly paid. For this reason, we now analyse the hourly-paid and non-hourly-paid separately.

4.2 Measurement issues amongst the hourly paid

As the minimum wage is specified as an hourly rate, it may be expected that compliance is greater amongst those who are paid by the hour, as it is straightforward to check whether their pay is legal or not. The wage used is that reported in the survey as being the respondent's hourly rate. It is possible that actual wages paid may differ from what apprentices believe is their pay rate, if, for example, weekly pay calculations by employers are not exact. In the APS 2011 and 2012, only stated wage is collected, and so the stated hourly wage cannot be compared with a wage derived from total hours and earnings.

The Labour Force Survey (LFS) provides some support for the assumption of the accuracy of the hourly wage rate. The LFS collects both a stated wage rate and total pay and hours, and so can calculate a derived hourly wage rate. This latter measure is more subject to rounding error by the survey respondents, and so the stated rate is taken as the more accurate measure of wages. See Fry and Ritchie (2013) for a detailed analysis³. However, it should be noted that the need to account for hours of training as well as hours worked may lead to an actual hourly pay rate which is substantially different to what employers and/or apprentices understand to be the hourly wage rate; see section 4.4 below.

Table 6 presents the same information as Table 5 for the hourly-paid only:

Table 6 Non-compliance in responses by relevant MW, hourly-paid only

	Wage being paid					Non-compliance	Number
	Other, below	AR	YDR	Adult NMW	Other, above		
APS 2011							
AR	1%	5%	3%	7%	85%	1%	1,713
YDR	10%	1%	3%	2%	84%	12%	252
Adult	11%	*	*	7%	82%	11%	349
APS 2012							
AR	12%	4%	3%	5%	76%	12%	1,378
YDR	28%	*	8%	*	63%	29%	172
Adult	22%	*	*	6%	72%	22%	232
ASHE 2013							
AR	3%	19%	5%	1%	73%	3%	428
YDR	8%	*	16%	*	75%	9%	143
Adult	5%	*	*	10%	83%	6%	223
ASHE 2014							
AR	2%	20%	5%	1%	72%	2%	575
YDR	12%	*	19%	*	68%	13%	180
Adult	7%	*	*	13%	80%	7%	261

Source: APS and ASHE, authors' calculations, unweighted. * indicates fewer than four observations. . ASHE values do not sum across tables because of removal of cells with few observations; ASHE data allow for rounding for the monthly paid.

Non-compliance rates for the hourly paid are much lower in the APS data. In ASHE there is little difference. Although one reason for this might be the smaller sample in ASHE, previous studies suggest that this may be more indicative of a measurement error arising from the collection of APS data from the apprentices themselves. Ritchie et al (2014) noted that employee surveys are more likely to report rounded figures for wages; in some cases these reflect rounded wage payments made by employers, but in other cases this results from measurement error by the respondent employee. This tendency to round is common across all reporting periods; for example, hourly wages might be rounded to £6.00 an hour, weekly wages to £200 per week, annual salaries to £15,000 p.a.

³ Provisional analysis by the LPC of the 2014 APS microdata, which does allow for both a stated and derived rate calculation, suggests a substantial difference in the two measures. Derived hourly wages produce compliance rates similar to those of the non-hourly paid. This is to be expected as the latter are calculated using a derived wage.

Figures 2 and 3 below plot wage distributions in the APS 2011 and 2012 for England for the hourly paid; that is, the hourly-paid distribution only includes those who say they are paid an hourly wage, and give their wage rate. Each column has at least three observations at that wage level. Distributions have also been truncated at the top for clarity.

Figure 2 Distribution of wages for the hourly paid, APS 2011

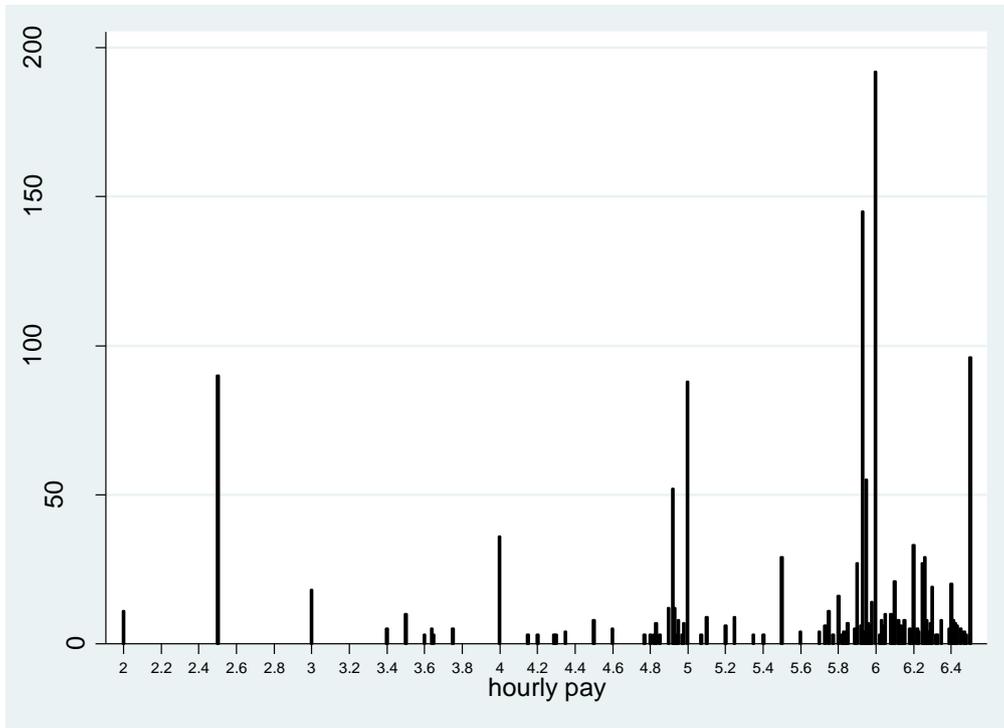
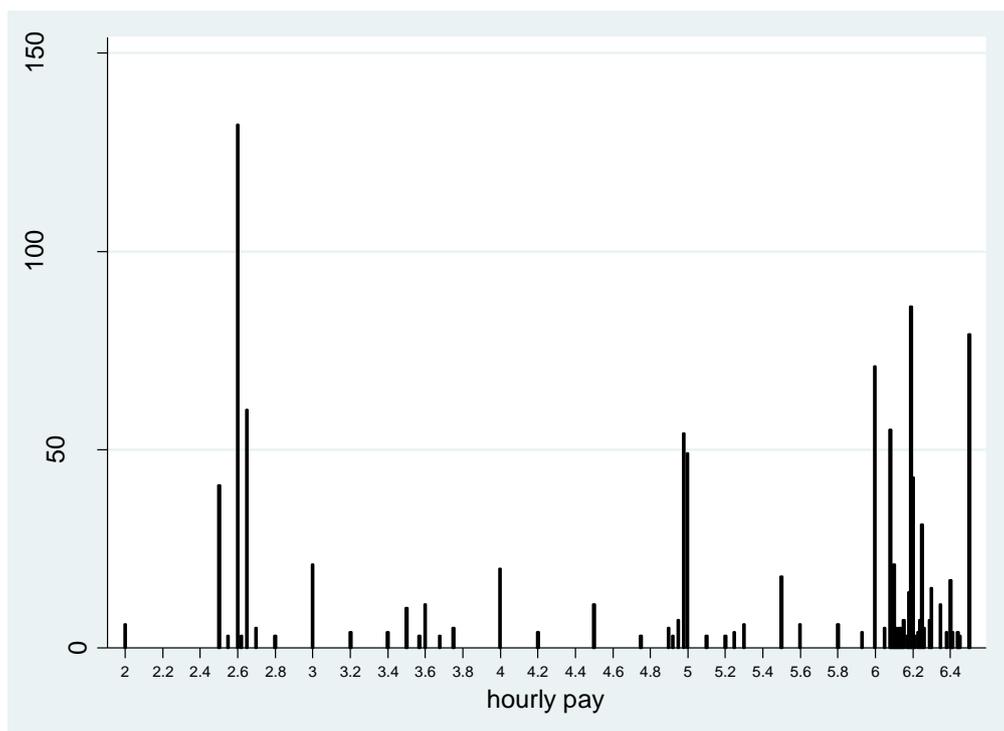


Figure 3 Distribution of wages for the hourly paid, APS 2012



Figures 2 and 3 plot the frequencies of reported hourly earnings less than or equal to £6.50 per hour for simplicity. It is important to note the spikes at “sensible” hourly pay rates (acting as “focal points”): £4.00, £5.00, £6.00, £6.50, etc. There are also spikes at the various minimum wages for both periods (£2.50, £4.92 and £5.93 in 2011; £2.65, £4.98, £6.19 in 2012).

In APS 2012, the very high frequency at £2.60 is of interest. It is the AR for the previous year, and so might genuinely reflect delays in the AR feeding into wages. However, it is also the lowest value that the APS interviewer was not required to check. If a respondent suggests a wage under £2.60 (for example, the popular £2.50) the interviewer is supposed to check that the value is correct; but £2.60 would not be checked.

For APS 2011, the peak at £2.50 is noticeable. Note that in 2011 the check value was £2.50, which was also the AR, as well as being a popular focal point. This may explain why Higton et al (2012) found less non-compliance in the 2011 data; their finding (figure 2.9, p30) that almost 10% of respondents earn below £2.50 an hour is almost entirely accounted for by the non-hourly paid (as can also be seen in Table 6 above and Table 7 below).

Unfortunately, it is impossible to identify whether the £2.60 spike in 2012 reflects the impact of APS checking or genuine response. This strongly suggests that in future the APS interview routing should not allow values below the AR to go through without checking.⁴

The £2.50 responses should, according to the APS routing guidance, have been checked by the interviewer. The respondent is therefore convinced that he or she is receiving £2.50 an hour, which may be a better indicator of the level of non-compliance.

To delve more deeply into this, we also compared two groups of hourly paid employees in APS 2012 in terms of their awareness of the existence of an AR: those that report a £2.60 hourly pay and those that report £2.65 (the AR). It seems that while 72% of the former group is aware of the AR, this percentage rises to almost 82% for the latter. Hence those reporting wages below the AR have a lower sample mean for awareness, a difference which is statistically significant at the 10% level as judged by a one-tailed test (the number of observations is too small to enable more statistical precision). There is, thus, some evidence that non-compliance may be increased by lack of awareness of the AR.

4.3 Measurement issues amongst the non-hourly paid

Table 7 breaks down compliance amongst the non-hourly-paid.

⁴ We understand that this has been changed for the 2014 APS.

Table 7 Non-compliance in responses, by relevant MW, non-hourly-paid only

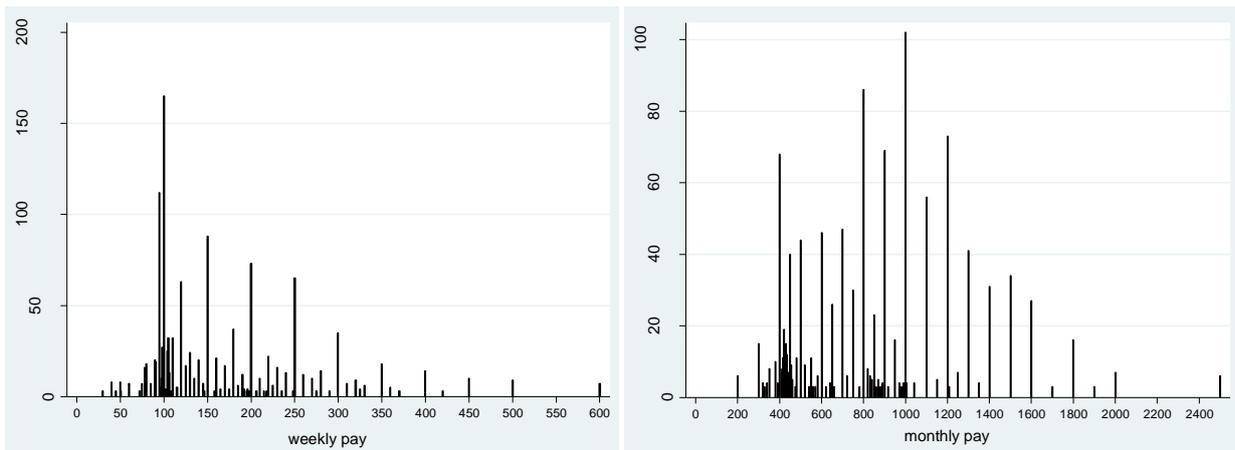
Non-hp	Wage being paid					Non-compliance	Number
	Other, below	AR	YDR	Adult NMW	Other, above		
APS 2011							
AR	15%	3%	0%	0%	82%	15%	4,722
YDR	46%	1%	*	*	53%	47%	670
Adult	28%	0%	*	*	71%	29%	1,004
APS 2012							
AR	20%	0%	*	*	79%	20%	2,921
YDR	55%	*	*	*	45%	55%	395
Adult	43%	*	*	*	57%	43%	477
ASHE 2013							
AR	3%	10%	2%	*	85%	3%	384
YDR	14%	*	*	*	86%	14%	95
Adult	4%	*	*	2%	94%	4%	216
ASHE 2014							
AR	3%	8%	2%	1%	87%	3%	452
YDR	13%	*	8%	*	79%	13%	135
Adult	7%	*	*	*	93%	7%	241

Source: APS and ASHE, authors' calculations, unweighted. * indicates fewer than four observations. . ASHE values do not sum across tables because of removal of cells with few observations; ASHE data allow for rounding for the monthly paid.

For ASHE, the compliance rates are broadly similar, although in 2013 non-compliance rose noticeably amongst 19-20 year-olds past their first year, who should be on the YDR at least. For those eligible for the apprentice rate, around 11% of them are actually being paid one of the other NMWs (a very small number get the 16-17 Year Old Rate; these are combined in "other, above"). However, for the APS data, the non-compliance rate is much higher; the APS 2012 indicates that more than half of those who should be on the YDR are being paid less than that.

It is worth noting that the APS shows almost no respondents being paid at any NMW rate in 2012 and only 4% at the AR in 2011. The 2011 AR of £2.50 is a popular focal point for paying wages, suggesting that one of the issues may be the way that apprentices are reporting pay. Figure 4 shows pay distributions in the APS 2012 for those reporting weekly and monthly payments.

Figure 4 Weekly and monthly pay distribution, APS 2012



For the weekly paid, the distribution is dominated by payments at £100 and £50 increments; monthly wages are concentrated on £400, £600, £800, etc. It could be argued that these reflect the fact that, prior to the AR, the norm for apprentice pay in each framework was being paid weekly. However, the pattern in Figure 4 is repeated when the respective distributions are plotted by framework (always reflecting, of course, the differences in average pay between them), and is also replicated in Labour Force Survey data (Ritchie et al, 2014, pp50-52); hence, this pattern does not seem to be driven by historical factors.

Non-compliance and the hours effect

In this section, we first present some tables with some examples of calculated hourly rates in the APS 2012 that are counted as “non-compliance” cases. Our aim is to show that the calculated measure of hourly pay that is derived from the reported data on earnings (hourly, weekly, monthly or yearly) and hours of work plus any off-the-job training, depends on the reporting accuracy of these underlying variables.

Table 8 looks at a spike in the derived hourly pay distribution: £2.22, a value that is found 17 times in the 2012 data. No person that reported an hourly pay rate actually reported this value (see also Figure 2 above). It can be seen that the value of £2.22 is mainly the outcome of two combinations of weekly pay and total hours (work and off-the-job training): £80 for 36 weekly hours or £100 for 45 hours.

Table 8 Distribution of respondents earning £2.22 per hour, APS 2012

	Observations	%
Paid hourly £2.22	0	-
Paid weekly £80, 36 hours per week (work + training)	4	24%
Paid weekly £100, 45 hours per week (work + training)	5	29%
Other cases	8	47%
Total	17	100%

Source: APS 2012, authors' calculations

A different picture is observed for a major spike in the derived hourly pay distribution, the one that corresponds to the value of £2.50 (Table 9; see also Figure 2 for the hourly paid). Here, a substantial

part of £2.50 earners are paid by the hour, something that points to possibly *genuine* non-compliance.

Table 9 Distribution of respondents earning £2.50 per hour, APS 2012

	Observations	%
Paid hourly £2.50	41	36%
Paid weekly £100, 40 hours per week (work + training)	39	34%
Other cases	35	30%
Total	115	100%

Source: APS 2012, authors' calculations

On the other hand, a similar proportion is weekly paid with a wage of £100 for 40 hours of work and off-the-job training. These latter two values may correspond to “sensible” reference points in terms of reported earnings and hours, while their inclusion in the genuine “non-compliance” cases is more debatable. A further investigation of these weekly paid cases, revealed an interesting finding: the vast majority of these £100/40-hours apprentices report no off-the-job training (26 cases). So, these people actually report working 40 hours per week. In order for them to be compliant with the AR, a weekly gross pay of £106 should have been reported instead of the £100 one that was reported (or 38 hours instead of 40). The difference can be plausibly considered as a result of rounding at the weekly wage level.

Table 10 focuses on the group of respondents that, based on their age and year of course, should be paid a minimum of £6.19 per hour in APS 2012. We have 10 observations for these respondents with an hourly rate of £6.00. The vast majority of them report this as their hourly pay. Note here that the previous NMW for this group was £6.08 (in place until the beginning of October 2012), so it cannot be the case that these observations are due to the timing of the survey. Again, this may point to *genuine* non-compliance or reference to a “sensible” rate by employees.

Table 10 Distribution of respondents (lawful NMW £6.19) earning £6.00 per hour, APS 2012

	Observations	%
Paid hourly £6.00	8	80%
Other cases	2	20%
Total	10	100%

Source: APS 2012, authors' calculations

In summary, it seems that the non-compliance among the non-hourly paid is related to the tendency to round both hours and earnings. However, this does not necessarily imply that the non-compliance is not real. Ritchie et al (2014) show that, while employees do round values more than employers, employers also show a tendency to pay round numbers. Thus an employee reporting £100 total weekly earnings may be misrepresenting earnings of £106. However, £100 may still be the genuine earnings the employee receives and it may be the employer who chose to pay rounded earnings. It is not possible to distinguish between the two explanations from the data.

4.4 The calculation of training hours

It was noted in the literature review that the calculation of training is important to the measurement of apprentice pay. This is complicated by the need to account for both on-the-job and off-the-job

training. Legally, apprentices should be paid both for the hours they are working and the hours they spend on off-the-job training. Formally, the relevant wage calculation for the non-hourly paid is:

$$\text{hourly wage} = \frac{\text{total earnings}}{(\text{hours on the job} + \text{hours off the job})}$$

A significant trend appears to be reporting errors related to training hours. Confusion surrounding training might explain why, in the 2012 APS, apprentices enrolled part-time were reported as earning more per hour. Higton (2013) has attempted to explain this phenomenon by suggesting that this group failed to recognise at least some training as part of their “contracted hours”, or that this group under-estimated their hours/over-estimated their pay. In addition, differences in the length of time spent with an employer prior to the apprenticeship may have impacted on the figures for job training. Higton (2013) found that a statistically higher number of apprentices had worked for a year or more with their current employer in 2012 (66 per cent compared to 59 per cent in 2011). Consequently, it could be posited that these young people would need less training time than a new starter.

Women are less likely to report training (Higton, 2013); this might be explained by the types of sectors in which women apprentices tend to be training. Over 21s are less likely to report on or off-the-job training (Higton, 2013). This resonates with research done on apprentice completion rates; for example, Karmel and Oliver (2011) show that a successful completion of an apprenticeship in Australia depends on the apprentice’s highest education level and, particularly, if the apprentice has completed Year 10 or Year 12.

Off-the-job training

A number of scenarios could occur depending on whether employers and employees both include off-the-job training in their calculation. For the hourly paid, the assumption must be that the wage is reported accurately, but the respective weekly wage could be too low if the employer does not pay the employee for off-the-job training.

For the non-hourly paid, the situation is more complicated. Consider an employee who works 30 hours a week, has 8 hours per week training, and whose employer aims to pay a wage of £5 per hour. Three wages are relevant: the total weekly wage, Wt; the actual wage rate paid, Wa; and the wage calculation from the information supplied, Wc. Also relevant are hours paid-for, Hp, and hours reported, Hr. Table 11 summarises the potential outcomes.

Table 11 Impact of off-the-job training in wage calculations for non-hourly paid

		Employer includes off-the-job training hours in earnings?	
		Yes	No
Employee reports off-the-job hours?	Yes	Hourly wage calculated and reported accurately <i>Hp=38 Hr=38</i> <i>Wt=£190 Wa=£5.00 Wc=£5.00</i>	Hourly wage underpaid and under-reported <i>Hp=30 Hr=38</i> <i>Wt=£150 Wa=£5.00 Wc=£3.95</i>
	No	Hourly wage calculated accurately but over-reported <i>Hp=38 Hr=30</i> <i>Wt=£190 Wa=£5.00 Wc=£6.33</i>	Hourly wage underpaid but reported accurately <i>Hp=30 Hr=30</i> <i>Wt=£150 Wa=£5.00 Wc=£5.00</i>

The Interim Report (Drew et al, 2014) showed that non-compliance is associated with off-the-job training. This may be the result of a practice where off-the-job training is not paid accordingly. Alternatively, we cannot exclude the possibility that apprentices in the survey over-report off-the-job training hours (something that leads to lower calculated hourly pay for people that do not report an hourly rate). A related risk for measurement error arises if APS respondents already include off-the-job training when asked about their working hours. In this case, off-the-job training is double counted when total hours (working hours plus off-the-job training) are used for the hourly pay calculation and, hence, the latter is biased downwards.⁵

Table 12 tries to shed some light on this issue, using the 2012 data.

Table 12 Extent of non-compliance, by pay period and off-the-job training (APS 2012)

	% of apprentices earning below their legal minimum
Full sample (N=5,570)	29.4%
Not hourly paid (N=3,790)	33.5%
Hourly paid (N=1,780)	20.7%
No off-the-job training (N=2,859)	26.1%
Not hourly paid, with off-the-job training (N=1,879)	37.9%
Not hourly paid, no off-the-job training (N=1,894)	29.5%

Notes: Source APS 2012, authors' calculations. Weighted data; the sum of the number of observations in the last two rows differs from that in the second row because of missing cases in the off-the-job training question

While for the full sample of apprentices, non-compliance stands at 29.4%, when we exclude people that undertake off-the-job training as part of their apprenticeship, non-compliance falls to 26.1%. However, this reduction is not as large as the one observed when we restrict the sample to hourly paid employees (reduction to 20.7%).

Hence, it seems that the amount of working hours reported and which is used for the calculation of hourly pay for non-hourly paid individuals is more important than the issue of the inclusion of off-the-job training in the hourly pay calculation. This can also be shown by a different finding: if we use a different hourly pay measure that is available in the APS, one that was derived by not including off-the-job training hours in the denominator, the non-compliance with that new measure is 27.5%; i.e. not that much lower than the 29.4% observed with the "correct" calculation.

The last two lines concentrate on persons that are not paid by the hour, since it is for these people that an hourly rate is derived taking also into consideration their off-the-job training hours. We can see that the extent of non-compliance is much more likely when off-the-job training is part of the course among this group of apprentices in our sample. Again, however, it seems that non-

⁵ We understand that the design of the questions concerning working hours and on- and off-the-job training in APS 2014 has addressed this issue.

compliance is a much more general issue and cannot be adequately and simply explained by an over-reporting or improper remuneration of off-the-job training hours.

Table 13 replicates Table 12 using APS 2011 data. A very similar picture (with a lower overall rate of non-compliance though) can be observed. However, it should be noted that the non-compliance gap between the non-hourly paid with and without any off-the-job training is far greater in 2011 than in 2012 (see the last two rows in Tables 12 and 13).

Table 13 Extent of non-compliance, by pay period and off-the-job training (APS 2011)

	% of apprentices earning below their legal minimum
Full sample (N=8,710)	19.8%
Not hourly paid (N=6,396)	24.8%
Hourly paid (N=2,314)	5%
No off-the-job training (N=4,676)	14%
Not hourly paid, with off-the-job training (N=3,045)	32.5%
Not hourly paid, no off-the-job training (N=3,323)	17.7%

Notes: Source APS 2011, authors' calculations. Weighted data; the sum of the number of observations in the last two rows differs from that in the second row because of missing cases in the off-the-job training question

On-the-job training

A different examination concerns *on-the-job* training, which is reported by around 70% of respondents. In the survey, on-the-job training is implicitly included in working hours and it is much more prevalent among apprentices than off-the-job training. Of course, since this is a part of working hours, it should be remunerated accordingly. However, it could be interesting to examine non-compliance among people that do not report any on-the-job training and compare it with the non-compliance observed for people that report some. Table 14 shows the relevant numbers.

Table 14 Extent of non-compliance, by pay period and on-the-job training (APS 2011 and 2012)

	% of apprentices earning below their legal minimum	
	2011	2012
Full sample	19.8%	29.4%
With on-the-job training	22.9%	32.7%
No on-the-job training	12.5%%	21.2%

Notes: Source APS 2011 and 2012, authors' calculations, weighted data.

It is interesting to note that the difference in non-compliance between apprentices that do and those that do not report any on-the-job training is similar to the difference between the hourly paid and the non-hourly paid reported in Table 3 above. This finding raises the following question:

although on-the-job training should be reported as working hours by apprentices, do employers consider it as part of the hours that should be paid?

Perhaps more importantly, do employees include it in their hours? Although the most obvious interpretation of the APS question on office time is that it does include both work and on-the job training (and this is what the hourly wage calculations assume), it is not entirely unambiguous.⁶ It is possible to envisage an apprentice who has clearly-defined periods of on-the-job training, omitting them from the reported work hours – particularly if the employer has indicated that not all on-the-job hours are paid for.

From the above, it becomes clear that it is very difficult to have an accurate picture of *genuine* non-compliance among the non hourly-paid apprentices once training is considered. Compared to non-compliance across the full sample of the non-hourly-paid in APS 2012 (33.5%, see Table 12), we estimate a 25.4% probability of non-compliance for the restricted sample of apprentices that are not paid by the hour and do not report any training (either on- or off-the-job).

However, it should be noted that the questions in the 2011 and 2012 APS are not exactly clear on how the interviewed apprentices should interpret working hours, on-the-job training and off-the-job training and what exactly the distinctions between them are. This in turn should affect the reporting of hours by apprentices and, thus, the hourly pay and non-compliance estimates.

4.5 Measurement issues in ASHE

The apprentice pay information in the ASHE 2013 dataset is experimental and so has not been through the same quality control measures as the regular ASHE data. Nevertheless, two measurement issues may be considered.

First, one of the validation checks done on ASHE data collection is to contact the employer if a wage calculation shows an employee earning below the NMW. This was not done in the case of the ASHE 2013 apprentice data. One notable feature of the data is that a large number of individuals appear to be earning one penny below the Apprentice Rate – that is, £2.64 per hour in 2013, and £2.67 in 2014. For all of those individuals, pay is reported for the month, meaning that the hourly rate has been back-calculated from weekly data, which themselves are calculated by adjusting monthly data for the number of days in the month⁷. For example, several people appear to earn £99.03657 for working 37.03657 hours; this seems an unlikely coincidence. If these penny-below-earners are considered to be a rounding error, this changes the ASHE figures substantially; see Table 15.

⁶ Again, we understand that this ambiguity was resolved in APS 2014.

⁷ These individuals can still be paid 'hourly paid': ASHE data records whether an individual is hourly paid or not by giving a non-zero value for the hourly wage rate. However, the preferred wage measure in ASHE (used by ONS and LPC) is the derived wage calculated from total earnings divided by hours of work. Hence, although a stated hourly wage rate is recorded, the derived wage may be based on monthly income.

Table 15 Non-compliance in ASHE allowing for rounding

	Study level	Age group	2013		2014	
			Non-compliant	Allowing for rounding	Non-compliant	Allowing for rounding
Hourly paid	Year 1	16-18	8%	4%	9%	3%
		19-20	4%	*	6%	3%
		21+	8%	3%	*	*
	Year 2+	16-18	4%	*	6%	*
		19-20	10%	9%	15%	13%
		21+	8%	7%	7%	7%
Not hourly paid	Year 1	16-18	9%	4%	7%	5%
		19-20	9%	4%	7%	4%
		21+	*	*	4%	*
	Year 2+	16-18	*	*	*	*
		19-20	13%	13%	14%	14%
		21+	4%	4%	7%	7%
Hourly paid			7%	5%	8%	5%
Not hourly paid			6%	5%	7%	6%
Overall			7%	5%	8%	5%

Source: ASHE 2013, authors' calculations, unweighted. * indicates fewer than four observations.

Table 15 presents non-compliance rates observed in ASHE, both in the raw data and allowing for values a penny below the NMW to be included as 'compliant'. Shaded boxes indicate at least a two percentage point fall in the non-compliance rate when allowing for errors; for example, the non-compliance rate for hourly-paid 16-18 year-olds (year 1) in 2013 falls from 8% to 4% when allowing for rounding error.

This makes a significant difference to those who should be paid the AR: those aged 16-18 or in the first year of their apprenticeships; generally, it has less effect on other groups. It is not entirely clear why this should be the case, and it does not appear to be a general problem in ASHE data (see the extensive analysis of wage distributions in Fry and Ritchie, 2013). Perhaps this is a scale effect: at higher wage levels, rounding errors have less effect at each stage of the calculations.

Evidence supporting the idea of measurement error is that almost all of the hourly-paid employees being paid a penny below the AR have their wage *rate* recorded as the AR by the employer. In other words, the employer may intend to pay the AR (a *stated* rate); but because ONS collects *weekly* wage data, which is then used to calculate the *derived* wage rate on which the compliance is assessed, the actual wage rate paid goes through two independent calculations (one by the employer, one by ONS). It is therefore not surprising that rounding errors can creep in. The same effect is not observed in the APS where the hourly rate is exactly the amount stated by the employee; that is, there is no derived wage calculation for those claiming to be hourly paid.

Overall, this suggests that LPC measures of non-compliance might want to take stated hourly rates into consideration when calculating the official estimates of non-compliance – for a quality check, if nothing else.

The second potential problem with ASHE is that it does not contain any information on training hours, it only has information on when the apprenticeship began. Given the questions raised above

about whether employees include training hours when doing wage calculations, this is a potential concern. However, there is no direct information in ASHE to investigate this possibility.

One suggestion made by the LPC was to compare hours of work between apprentices and those in similar jobs who are not doing apprenticeships: if training hours are not being included (allowing employers to pay lower wages than the NMW), then this may show up as shorter working hours for the apprentices.

A brief review of the data found that

- Those in their first year of an apprenticeship appear to do fewer hours than comparable workers not in apprenticeships.
- Amongst all workers, apprentices do longer hours, in all industries.
- However, these are distorted by the number of part-timers; when looking at full-timers only the picture is less clear, with some apprentices having higher hours (hairdressing, childcare), some lower (social care), and some varying (retail), depending on whether occupation or industry is used to define comparators.

In short, the hypothesis that training hours may not be included in wage calculations reported in ASHE is unproven.

4.6 Findings from the 2014 APS

Although not formally analysed in detail for this report, the first findings from the 2014 APS were published in December 2014 (Winterbotham et al, 2014). These seem to indicate⁸ that the pattern of non-compliance is repeated in 2014, at a slightly lower level: around 15% overall, compared to 20% in the 2011 APS, with similar findings when broken down by age groups. Investigating these findings further requires access to the microdata. There is significant potential to study both surveys in tandem as the same AR applies to both the surveys.

4.7 Measurement: conclusion

There are notable differences between the four surveys. The 2011 APS and ASHE (2013 and 2014) appear to be more reliable, although APS and ASHE still differ substantially. The APS 2012 results indicate much higher non-compliance. It is not possible to tell whether this is due to survey design, survey timing, or genuine non-compliance. However, it seems likely that this is an overestimate.

The raw ASHE data is likely to be an overestimate of non-compliance if allowance is not made for rounding errors in the construction of hourly rates. It is also possible that ASHE is overestimating compliance by not allowing for training hours, but this cannot be checked directly.

The higher level of non-compliance in the 2012 APS may be a delayed response to the uprating of the AR in October, which took place around the time of the 2012 survey; a similar effect was observed when the NMW first came in in 1999.

In summary, it would seem that the ASHE data, corrected for rounding errors, may provide a useful lower bound estimate of non-compliance (lower bound because of the potential for omitted training

⁸ The published APS 2014 figures are not directly comparable as they are broken down differently.

hours). APS 2011 (and hopefully the revised 2014) provide an upper bound (because compliance is a yes/no question, inaccurate data will increase non-compliance).

All surveys agree that there is a difference between those paid hourly and the rest. There is substantially less non-compliance for the people that report an hourly wage rate. The hourly-paid are also far more likely than the rest of the respondents to be paid the exact legal minimum, or any of the other exact legal minimum rates. For example, 8.2% of the hourly paid employees that are entitled to a minimum of £2.65 in APS 2012 report an hourly rate of either £4.98 or £6.19 (see Table 6 above). The same percentage for non-hourly paid employees in the same group is effectively zero.

The same picture can be seen by constructing “blobograms” of the distributions of derived hourly rates for hourly paid and not hourly paid apprentices. Figures 5 and 6 depict actual wages paid plotted against the appropriate NMW for each of the three groups (2.65, 4.98 and 6.19), with the size of the circle representing the number of observations (note: at least two observations per cell).

Figure 5 Distribution of measured hourly pay by wage group – hourly paid (APS 2012)

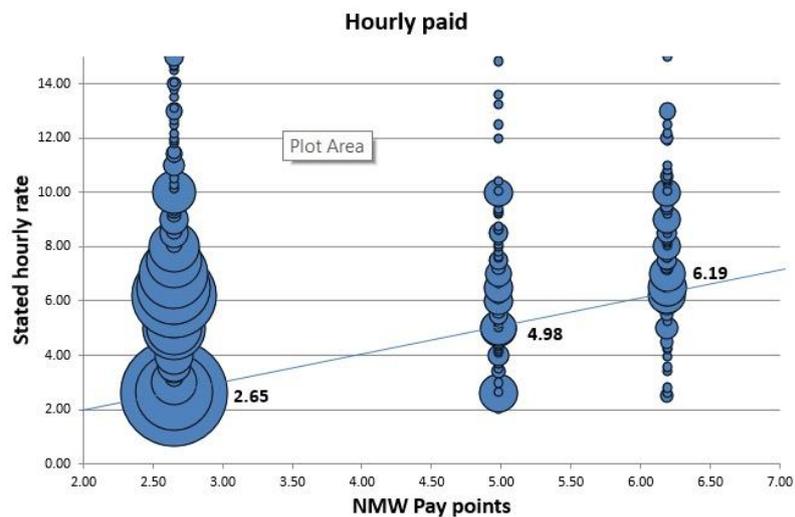
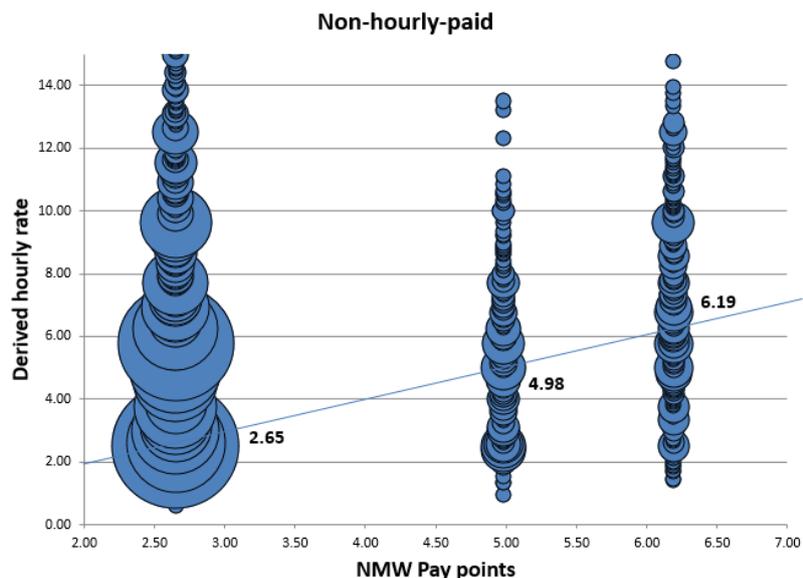


Figure 6 Distribution of measured hourly pay by wage group – non hourly paid (APS 2012)



A substantially larger dispersion can be observed for non-hourly paid apprentices and more so for those that are entitled to the two highest legal minimums. The blue line represents the lower legal limit; it is clear that the non-hourly paid have much more variation in both legal and illegal wages.

It is notable that amongst the hourly paid, only 12% of those with a legal minimum rate of £2.65 receive less than that (see Table 6 above); as can be seen from Figure 3, this is almost entirely accounted for by reported wages at £2.60 and £2.50. Hence, for the hourly paid, non-compliance appears to be a result of rounding, questionnaire design, and timing. For the non-hourly paid, given the clustering in total earnings shown in Figure 4 above, the wide distribution of earnings is likely to be a result of the earnings/hours calculation.

Finally, the exact role of the amount of training time is unclear: from the APS, it appears to be related to the level of compliance, but the direction of this relationship is not straightforward.

5. Compliance issues

The previous section considered how reliable the data was. Despite the differences and problems, there were patterns of non-compliance that were common to all sources, indicating ‘real’ non-compliance. This section studies the factors underlying this genuine non-compliance. The data are treated as accurate; while this is not strictly true, it is a practical working assumption as, while the errors in the data affect the scale of non-compliance, they do not appear to affect where it arises.

5.1 The Year 2 effect

A repeated finding is that those aged over 18, and not in the first year of their course, face a significantly higher probability of non-compliance. In other words, these employees continue to receive the AR (or another low value) when they should have moved to a higher age-related NMW. This is most acute for those who should be on the YDR.

Table 16 presents results from ASHE 2013 (note that if rounding error were not accounted for, the first two columns would show non-compliance rates of around 3% higher).

Table 16 Non-compliance by year of study, ASHE 2013

	First year		Latter years	
	hourly paid	not hourly paid	hourly paid	not hourly paid
2013				
16-18/first year	3.2%	3.4%	*	*
YDR			9.1%	13.9%
Adult rate			6.3%	3.7%
2014				
16-18/first year	2.1%	3.5%	*	*
YDR			12.8%	13.3%
Adult rate			7.3%	6.6%

Source: ASHE 2013, authors' calculations, unweighted. N=1,478. * insufficient observations.

A very small number of these non-compliant wages are being paid at the AR when the YDR or Adult rate is appropriate, which could be an indication that employers are unaware of the difference between the first and second year and continue paying the AR after it was no longer applicable. However, most are paid at some wage rate other than one of the defined rates, which is less easy to explain.

5.2 Framework-by-framework analysis

In this section we consider whether there are significant differences between the frameworks. This analysis is based solely upon the APS (2011 and 2012) data, as there are limited variables in ASHE which could be used and no direct framework identifier.

Framework differences

In Section 3, we reported our findings from the multivariate probit analysis of non-compliance in the APS 2012 data that appeared in the Interim Report (Drew et al, 2014). The full results are repeated in Annex Table A1. In the following, we proceed with our investigation by delving deeper into the differences in non-compliance patterns by framework.⁹ Tables referenced are presented in the Annex as Tables A2-A4.

Table A2 displays the sample means for all variables used in the multivariate analysis. Table A3 presents the regression results of the factors determining non-compliance.

The two frameworks where non-compliance is most extensive are hairdressing (70%) and, secondarily, children's care (42%). Similarly to children's care, high non-compliance is also observed in "other" frameworks (42%) and in construction (41%). Combining the sample means in Table A2 with the OLS regression results by framework in Table A3 we can draw some inferences concerning the sources of non-compliance in these sectors.

Concentrating first on hairdressing, relative to the total sample mean, apprentices in hairdressing are less likely to be hourly paid, more likely to be aged 19-20 and in their second year. In addition, they are more likely to be on a Level 2 apprenticeship, less likely to hold a permanent job, yet they also tend to work more hours. Comparing these differences with the coefficient estimates and the significance levels for hairdressing in Table A3 (or for the total sample in the last column), the conclusion that can be reached is that these differences are largely behind the far higher non-compliance rates observed in hairdressing. However, some "unexplained" non-compliance remains, something that can be seen in the positive and significant coefficient for hairdressing in the pooled multivariate analysis in Table A1.¹⁰ Similar exercises can be done for all frameworks. It is important to note here, that these results can guide some future qualitative (or other) research that specifically focuses on the "non-compliant" frameworks (which is one of our recommendations).

⁹ In contrast with the pooled results in Annex Table A1, for the framework-by-framework analysis we use simple linear regressions estimated by OLS rather than nonlinear probability models, since the number of observations in each framework is relatively small and maximum likelihood estimators have unknown finite sample properties. We also avoid the problem of "perfect prediction" when one estimates probit models, particularly for frameworks where the variation in the dependent variable is quite small.

¹⁰ The marginal effect for the hairdressing dummy shows the change in non-compliance probability for the hairdressing sector relative to the "other" sector which is the base category. The raw difference in non-compliance between the two sectors is about 30 percentage points (see Table A2). For the hourly paid sample, there is no significant difference between the two sectors.

Taking the example of a modern framework, team leadership and management where non-compliance is almost non-existent (3.3%, with a mean hourly gross pay of £9.10), one very important difference with the other frameworks is that the vast majority of apprentices here are older than 20 years old, and most of them are in their first year of apprenticeship. As we have already noted, non-compliance is lower for these apprentices. Another important difference that explains to some extent the very low non-compliance in this sector is that almost 92% of the apprentices in team leadership have worked for their employer for more than a year (compared to 46% in the total sample). It is important to note here that the regression for this specific framework gives in general very weak results, something that may be expected because of the very low incidence of non-compliance in it.

Another interesting pattern that is apparent in Table A3 is the almost universal importance of some of the variables in explaining non-compliance. Although demographics (as in the case of the pooled regression) are almost everywhere of no or minor importance, the age and year of course and the tenure with current employer are significant predictors of non-compliance across almost all frameworks. For example, being aged 19 and over (including being aged 21+) and on the second year of the apprenticeship is positively related with non-compliance in all frameworks (apart from Customer service). Longer tenure with employer, on the other hand, significantly lowers the probability of being paid an hourly wage that is lower than the legal minimum. Exceptions to this latter pattern are the Team Leadership framework (we noted above the issues surrounding this sector) and Hairdressing (again, we noted above the most likely reasons for the extensive non-compliance documented in this sector). Working hours and off-the-job training incidence are also estimated with the expected positive sign almost throughout (although this is not always statistically significant).

We noted in our Interim Report (Drew et al, 2014) that in our baseline regression (Annex Table A1), the awareness of the AR variable is estimated with a significantly positive coefficient – i.e. that greater awareness of the AR is associated with greater non-compliance – and that this finding seems counter-intuitive. The disaggregated analysis here shows that this variable is significant and positive in three sectors: Hospitality, Construction, and Other framework; while it also attracts marginally insignificant coefficients in Children’s care and Hairdressing (and a negative one in Retail). We are, nevertheless, unable to explain this finding with the information at hand.

Turning now to the APS 2011 data, where information about Scotland and Wales is also available, we can note few notable country differences:

Table 17 Non-compliance by country, 2011 APS

	GB	England	Scotland	Wales
Full sample	19.8%	20%	19.4%	15%
Not hourly paid	24.8%	25.1%	24.9%	18.3%
Hourly paid	5%	4.9%	5.9%	5.1%

Source: APS 2011, weighted.

Table 17 shows that non-compliance with the NMW was around 20% in GB in 2011. The highest was observed in England, the lowest in Wales. A clear distinction is apparent between the apprentices

that report an hourly pay and those that do not, a distinction that is even greater than the one observed in the 2012 data: while 25% of those not reporting an hourly pay rate seem to be underpaid, the percentage collapses to only 5% for those that report an hourly pay rate. This is the case in all countries of GB. Moreover, the lower overall non-compliance rate for Wales is accounted for by significantly lower non-compliance for the non-hourly paid relative to the other two countries.

Analysis of factors affecting non-compliance

Table 18 replicates the non-compliance model of the Interim Report (Drew et al, 2014), this time using APS 2011 data. Some variables (disability, written contract, permanent status, and awareness of the AR) are missing from the 2011 data. Since we also have Scotland and Wales here, we control for country in the regressions. Note that the country dummies are always insignificant. The slight country differences in non-compliance observed above (Table 17) are accounted for by our observable characteristics.

Note that the pattern of the results for the first two specifications is very similar to the one we have already observed in the 2012 data. Significances are as before, while even the marginal effects for some variables are very close to those for the 2012 data (see Table A1, columns 4-6). Table A1, columns 1-3 contains the detailed regression results.

In the third specification, the hourly paid sample, we should note that the incidence of non-compliance is very low, as noted above. Out of the 2,108 observations, only 83 are non-compliant cases. So, most of the variables are imprecisely estimated (e.g. the Customer Service framework observations are removed from the model due to perfect prediction) and not many significances are observed, in contrast with the somehow more precise results for the 2012 data. However, some of the 2012 results, such as the pattern of the marginal effects estimates for the age/year of course dummies, can still be observed in model (3) for the 2011 data.

Table 18 Factors associated with non-compliance, APS 2011

Dependent variable: probability of non-compliance	No framework dummies		Full specification	Hourly paid only
Male	-0.026	***	-0.003	0.002
White	-0.004		-0.003	0.001
Scotland	0.001		0.001	-0.001
Wales	0.011		0.007	0.004
Age: (Base: Age 16-18, Year 1)				
Age 16-18, Year 2 or above	-0.003		-0.012	* -0.002
Age 19-20, Year 1	-0.042	***	-0.033	*** -0.007 **
Age 19-20, Year 2 or above	0.153	***	0.156	*** 0.032 *
Age 21+, Year 1	-0.109	***	-0.083	*** -0.014 ***
Age 21+, Year 2 or above	0.105	***	0.136	*** 0.043 **
NVQ Level 2	0.053	***	0.05	*** 0.005 *
Length of work (Base: Did not work for employer before)				
Worked for employer 0-12 months	-0.019	***	-0.017	*** -0.003
Worked for employer over 12 months	-0.066	***	-0.051	*** -0.005
Working hours	0.004	***	0.003	*** 0 **
Off-the-job training (incidence)	0.063	***	0.052	*** 0
Overtime (incidence)	-0.015	***	-0.01	** -0.004
Hourly paid	-0.085	***	-0.075	***
Receives any tips	0.095	***	0.039	*** 0.003
Receives any bonuses	-0.022	***	-0.015	*** 0
Holding second job	0.034	***	0.026	** -0.002
Framework effect (Base: Other framework)				
Customer service			-0.051	***
Business administration			-0.027	*** 0.002
Retail			-0.033	*** -0.003
Health and social care			-0.041	*** -0.004
Engineering			-0.038	*** -0.005 *
Children's care, learning.			0.038	** 0.018
Hospitality and catering			-0.025	*** -0.002
Hairdressing			0.045	*** 0.027
Construction			-0.008	0.001
Team leadership and management			-0.05	*** -0.004
Electrotechnical			-0.031	*** -0.004 *
<i>Observations</i>	<i>8548</i>		<i>8548</i>	<i>2108</i>

Notes: Probit models; coefficients are marginal effects (*** p<0.01, ** p<0.05, * p<0.1); source: APS, unweighted

As the regressions on the 2011 and 2012 data show similar impacts, in the multivariate analyses that follow we now pool the 2011 with the 2012 data to increase sample sizes.

Identifying the Year 2 effect

Table 19 reports an OLS regression of non-compliance for the hourly paid people with relevant minimum wage of either 4.92 or 4.98 (we have pooled the data for both years). The regression is run

only for England.¹¹ These are people aged 19 or 20 years old, past their first year of the course, and so the Youth Development Rate applies for them. In both APS years we observed substantial non-compliance incidence for this group of people (relative to the otherwise low non-compliance for hourly paid people) and a separate examination may be worthwhile. We control for most of the variables that can be applied in this case.

The results should be interpreted with care. We only have 294 observations in the final sample. The Team Leadership framework dummy is removed since there are no people in this framework in the sample. The 2012 dummy confirms the far higher non-compliance in the 2012 data for the hourly paid. The only other similar result with the baseline models is the positive coefficient for the Level 2 apprenticeship dummy.

We can also observe substantially lower non-compliance for white people (but note that there are less than ten non-whites in this sample). A counter-intuitive result is the higher non-compliance probability estimated for apprentices with previous tenure with their employer (for 0-12 months) relative to those that did not work for their employer before their apprenticeship. Note also the differences in the framework effects where it seems that the higher non-compliance in this sample is observed for the Business Administration framework. In general, this exercise was not that informative, mainly because of the limited sample size.

¹¹ We only have the data for England for the APS 2012.

Table 19 Non-compliance for hourly-paid on Youth Development Rate

	Coefficient	Significance
APS 2012	0.135	***
Male	-0.004	
White	-0.348	**
Age = 20 years old	-0.006	
NVQ Level 2	0.223	***
(Base: Did not work for employer before)		
Worked for employer 0-12 months	0.136	***
Worked for employer over 12 months	-0.084	
Working hours	0.003	
Off-the-job training (incidence)	-0.018	
Overtime (incidence)	-0.025	
Receives any tips	0.073	
Receives any bonuses	-0.084	
Holding second job	0.105	
(Base: Other framework)		
Customer service	0.027	
Business administration	0.468	***
Retail	-0.102	
Health and social care	-0.310	*
Engineering	-0.051	
Children's care, learning and development	0.024	
Hospitality and catering	-0.229	
Hairdressing	0.153	
Construction	-0.105	
Electrotechnical	-0.131	
Observations	294	

Source: APS 2011 & 2012, unweighted

The next exercise is to estimate non-compliance OLS regressions by framework for the non-hourly paid. We pool 2011 and 2012 data to increase observations (again, we focus on England only). The models again include all variables that are available for both years, plus a 2012 dummy. The last column also shows the results from the pooled across frameworks regression (with framework dummies).

The results (reported in Table A4) show standard patterns for the majority of frameworks that have already been reported. First, non-compliance increased between 2011 and 2012 for the non-hourly paid in England for the majority of frameworks. Exceptions are the Engineering, Hospitality and Construction frameworks (where a positive but insignificant coefficient is estimated for the 2012 dummy) and the Team Leadership one (where non-compliance seems to have decreased, *ceteris paribus*). The standard results already noted above, and in the Interim Report (Drew et al, 2014) concerning age/year of course and the Level of apprenticeship, are also found here, for nearly all frameworks. The same also holds for tenure. Positive coefficients for working hours and off-the-job

training incidence also point to measurement issues. Finally dependent on the sector examined, receipt of tips either increases or decreases non-compliance.

5.3 Awareness of the NMW

Some analysis suggested that 'awareness' of the AR seemed to be positively correlated with non-compliance, which seemed counter-intuitive. However, this seems to be more of a compositional factor, with the most 'aware' industries having the highest non-compliance rates: there is an argument which way causality could run. The framework-based analysis suggested no statistical link between non-compliance and awareness of the AR for the majority of frameworks. In addition, an analysis looking at the hairdressing profession specifically could find no useful links between awareness, whether hourly paid or not, and compliance.

One possible explanation of this may be the wording of the question itself: 'Are you aware of the Apprentice Rate of the NMW' could be interpreted as any one of the following:

- 'Are you aware of the existence of an AR?'
- 'Are you aware of the correct current value of the AR?'
- 'Has someone told you the value of the AR?'
- 'Are you aware whether the AR applies to you?'

Hence, the simplest explanation may be that the question is too ambiguous to analyse. The 2014 APS has replaced this question with a sequence of questions to remedy this.

5.4 Analysis of compliance using ASHE

A final check is to look at non-compliance using ASHE. ASHE does not contain information on frameworks, or on the employee's work other than the characteristics of the job and employer. Nevertheless, looking at ASHE can provide triangulation of some of the APS results.

Table 20 presents the results from a simple model of the probability of non-compliance. Data from both 2013 and 2014 are pooled, as the years do not appear significantly different from each other. Results are presented for both the original data, and allowing for the 'rounding error' discussed in section 4.5. Note that, in contrast to the APS data, this table gives the probability of compliance.

Table 20 Probability of compliance using ASHE data

	Raw data		Allowing for rounding error	
2014 (default=2013)	0.104		-0.108	
In first year	-1.272	***	1.549	***
Female	-0.033		0.031	
Basic hours	0.047	***	-0.043	***
Gross Pay	-0.014	***	0.012	***
<i>Employer size (default: 1-9 employees)</i>				
Employer 10-49 employees	0.016		0.086	
Employer 50-249 employees	0.114		-0.041	
Employer 250+ employers	-0.104		0.255	*
Public sector	0.176		-0.413	**
Employed full time	0.503	***	-0.337	*
<i>Industry (default: not in low-paying industry)</i>				
Retail	0.058		0.033	
Hospitality	-0.037		0.093	
Social care	-0.259		0.583	
Childcare	0.421		-0.561	*
Leisure	-0.089		0.116	
Hairdressing	0.276		-0.161	
Employment agencies	-0.100		-0.160	
<i>Occupation (default: not in low-paying occupation)</i>				
Agriculture	-0.546			
Food Processing	0.063		-0.245	
Retail	-0.321		0.096	
Hospitality	0.050		-0.279	
Cleaning	0.485		-0.523	
Social care	0.360		-0.785	**
Childcare	-0.046		0.312	
Leisure	0.015		-0.106	
Hairdressing	-0.621		0.649	
Office work	0.007		0.043	
Non-food processing	0.484	*	-0.470	
Storage	-0.609		0.354	
Transport	-0.191		0.065	
Constant	-210.554		217.408	
Observations	3304		3278	

Notes: Probit models; (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$; source: ASHE 2013 and 2014 pooled and unweighted. Rounding affects the number of valid observations (observations all fall into one or other category). Additional industry (agriculture, food processing, textiles, cleaning) and occupation (textiles) dummies were included, but not all coefficients can be estimated.

Three factors are significant in both models: greater compliance is associated with higher basic working hours, not being in the first year of an apprenticeship, and earning more in total. The coefficient on being in the first year is considerably larger than any other. Note that being female, all other things being equal, does not appear to increase the probability of compliance. Other than these effects, little is significant: being in a low-paying industry or occupation seems to have little effect.

Once rounding error is allowed for, being in the public sector appears to lower the likelihood of compliance, surprisingly. Interestingly, working full-time is significant in both specifications, but it is positively associated with compliance in the raw data, whereas the adjusted data suggests full-

timers are less likely to have compliant wages. Similarly, allowing for error reverses the association between compliance and the hours and pay variables: without rounding error, higher gross pay is associated with lower compliance, whereas the opposite is the case when the rounding adjustment is made. In a linear regression, if a small change in the observations leads to a reverse in the sign of the constant and slope coefficients, this indicates most observations are randomly distributed and a small number of 'influential points' are driving the results (assuming no errors in coding). In a non-linear regression, individual observations should be less 'influential' (the non-linearity limits the need to account for extreme values); but large changes in coefficients are still indicative of a poor relationship between variables. It should be noted that roughly 10% of the observations in any of these regressions are omitted as they are completely determined (all combinations of values lead to the same outcome).

Given the size of the first-year effect, Table 21 considers first-years and other apprentices separately. Apprentices aged 16-18 but in the second or later year of their studies are included in the latter group.

Table 21 Probability of compliance using ASHE data, by year of study

	Year 1				Year 2 or later			
	Raw data		Allowing for error		Raw data		Allowing for error	
2014 (default=2013)	0.200		-0.183		0.210	*	-0.191	
Female	-0.198		0.162		0.134		-0.078	
Basic hours	0.582	***	-0.491	***	0.058	***	-0.055	***
Gross Pay	-0.231	***	0.207	***	-0.011	***	0.011	***
Employer size (default: 1-9 employees)								
10-49 employees	0.641	**	-0.448		-0.211		0.215	
50-249 employees	0.897	***	-0.786	**	-0.256		0.209	
250+ employers	0.489	*	0.204		-0.486	***	0.397	**
Public sector	-0.463		-0.591		0.423	*	-0.394	*
Employed full time	1.363	***	-1.203	*	0.251		-0.185	
Industry (default: not in low-paying industry)								
Retail	0.295		-0.618		-0.006		0.028	
Hospitality	0.009		-0.341		-0.071		0.136	
Social care	-0.074		0.054		-0.728		0.716	
Childcare	0.213		-0.960		0.653	*	-0.554	
Leisure	-0.481		-1.257		0.040		0.678	
Hairdressing	-0.196		0.264		0.425		-0.303	
Employment agencies	-0.453		-0.224		0.217		-0.239	
Occupation (default: not in low-paying occupation)								
Agriculture					-0.084			
Food Processing					0.101		-0.202	
Retail	-0.368		0.039		-0.777		0.657	
Hospitality	-0.314		0.485		0.121		-0.242	
Cleaning					0.664		-0.652	
Social care	-0.262		-0.516		0.585		-0.664	
Childcare	0.061		0.688		-0.283		0.252	
Leisure	0.154		0.136		-0.257		0.053	
Hairdressing	0.231		0.150		-1.088	*	0.925	
Office work	0.062		0.237		-0.102		-0.001	
Non-food processing					0.685	**	-0.571	*
Storage					-0.332		0.239	
Transport	0.492		-0.667		-0.220		0.182	
Constant	-402.985		368.867		-423.295	*	385.215	*
Observations	1473		1473		1759		1748	

Notes: Probit models; (***) p<0.01, ** p<0.05, * p<0.1); source: ASHE 2013 and 2014 pooled and unweighted. Rounding affects the number of valid observations (observations all fall into one or other category).

These results do not add much to the findings, save perhaps that employer size appears to be important. However, this is again very sensitive to whether adjustment is made for rounding.

In summary, the findings from ASHE support those from the APS: that there appears to be little quantitative evidence for the sources of non-compliance, other than the year of study. These results also indicate that the rounding error problem appears to have a significant effect on regression models; without further investigation of precisely why the effect is so large, these regressions should be treated with some caution.

5.5 Non-compliance: summary

Overall, there appears to be little that determines non-compliance. There is some evidence for ‘bad job’ theory (working long hours, no prior relationship with employer, precarious contracting), but not much. Neither the APS nor ASHE shows strong evidence of common factors in non-compliance.

One reason for the lack of significant quantitative findings may be the limited numbers of observations for breaking data down further. For example, LPC is particularly interested in Childcare and Hairdressing, and asked the authors to look into these sectors. Only Hairdressing provided enough data to do more than very simple tabulations (for example, looking at the ‘awareness’ variable), and even then the analysis was limited with wide significance levels.

However, both the APS and ASHE data seem to be giving consistent results across years, albeit at different scales. Preliminary findings from the 2014 APS (as quoted in Winterbotham, 2014) seem to show similar patterns to the 2011 APS. Hence, pooling the data may be a productive and statistically valid way to provide more detailed analysis. This might be a useful path for future researchers to explore.

The only factor that continually stands out is the increase in non-compliance once the apprentice moves beyond the first year of study. Initial analysis did suggest that this may be due to firms continuing to pay the AR into the second year of an apprenticeship, but this does not seem to be the case: most 2nd-year+ apprentices being paid non-compliant wages are paid something other than the AR. The effect is greatest for 19-20 year olds who should be receiving the YDR, but also affects those on the adult rate.

One concern is that, if ASHE is to be used to generate estimates of non-compliance for apprentices rounding error in the calculated wage (not the paid wage rate) appears to be a persistent problem for those on the AR. LPC may want to consider additional quality checks on these estimates.

6. Section 4: Implications for LPC

Much of the research has focused on identifying true non-compliance from data problems. In the Interim Report (Drew et al, 2014), a number of recommendations for the redesign of the APS were made. We understand that these have now been incorporated in a re-designed APS, along with a number of other improvements identified by the LPC. Hence, the recommendations below do not discuss the APS design any further.

This report recommends, in order of priority, that the LPC

- Concentrate non-compliance campaigns on those entering their second year of an apprenticeship and are aged 19+ (hence, a higher rate than the AR has to be paid). Non-compliance is significantly higher for these apprentices, particularly those aged 19-20.
 - This is where most of the non-compliance occurs. It could be plausibly argued that this is indicative of the employer’s inability to understand the 2nd-year+ wage rules. However, as this is concentrated in the 19+ age group and does not seem to be related to paying the AR to those on the YDR, it may also indicate deliberate abuse of power.
- Decide whether to adjust for rounding in the ASHE data in formal estimates of non-compliance

- This appears to be a problem for both descriptive statistics and analytical results, and disproportionately affects those on the AR. This report argues that this is primarily a statistical artefact, and does not reflect actual wages paid
- Analyse jointly the microdata from the 2014 APS and ASHE to try to reduce the difference between non-compliance estimates
 - As both surveys should cover the same pay period, this provides the first opportunity to triangulate both surveys
- Pool waves of the APS and ASHE data to create sufficiently large datasets for framework-level analysis
 - The report on 2014 APS shows substantial variations between frameworks. This was not investigated in this report as small sample sizes make this infeasible. However, the analysis so far suggests that for both APS and ASHE the breakdown of non-compliance is consistent in form, if not in scale. This would suggest pooling waves of the APS and ASHE to get the necessary sample sizes for frameworks (APS) or sectors and geography (ASHE) to be analysed in detail.
- Follow up on apprentices who appear to have no training hours.
 - If there is no training, these cannot be apprentices, and so this may be a case of non-compliance by the back-door. However, respondents might not take training during the reference period when these surveys were conducted as they could spread out their training over time. This may also be a source of non-compliance if training hours were not paid for and recorded in the data.
- Quantify ‘awareness’ of the NMW amongst apprentices.
 - As measured by the APS, there is no relationship between ‘awareness’ of the AR and non-compliance. Anecdotal evidence collected by the LPC team on visits suggests a number of possible reasons. Again, this may be a problem with the question phrasing, or the relatively recent introduction of the AR at the time of the 2011/2012 APS. The new survey question in the 2014 APS may help to address this issue
- Add a measure of paid-for training hours to ASHE.
 - This may not be feasible in the short-term but, if possible, it would allow the APS findings to be triangulated.
- Although it seems that most of the higher non-compliance observed in the hairdressing and children’s care sectors can be explained by differences in some of the observable characteristics of these sectors relative to the rest, a significant gap remains once these differences have been accounted for. This should be a cause for concern for the LPC and more (particularly qualitative) research may be needed to identify the reasons for this.

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Annex: Statistical results

All data in the Annex is sourced from the APS and ASHE, authors' calculations

Table A 1 Probability of non-compliance, APS 2011 and 2012

	(1)	(2)	(3)	(4)	(5)	(6)
	No framework dummies	Full specification	Hourly paid only	No framework dummies	Full specification	Hourly paid only
	2011			2012		
Male	-0.026*** [0.005]	-0.003 [0.007]	0.002 [0.003]	-0.091*** [0.011]	-0.017 [0.014]	-0.008 [0.017]
White	-0.004 [0.012]	-0.003 [0.011]	0.001 [0.004]	-0.035 [0.028]	-0.019 [0.025]	0.031 [0.019]
Scotland	0.001 [0.006]	0.001 [0.005]	-0.001 [0.002]			
Wales	0.011 [0.007]	0.007 [0.006]	0.004 [0.003]			
Disabled				0.019 [0.019]	0.009 [0.017]	0.034 [0.025]
NVQ Level 2	0.053*** [0.006]	0.050*** [0.006]	0.005* [0.003]	0.063*** [0.011]	0.058*** [0.011]	0.039*** [0.013]
<i>(Base: Age 16-18, Year 1)</i>						
Age 16-18, Year 2 or above	-0.003 [0.009]	-0.012* [0.007]	-0.002 [0.004]	0.009 [0.020]	0.003 [0.018]	-0.027 [0.017]
Age 19-20, Year 1	-0.042*** [0.005]	-0.033*** [0.005]	-0.007** [0.003]	-0.060*** [0.012]	-0.055*** [0.012]	-0.016 [0.015]
Age 19-20, Year 2 or above	0.153*** [0.017]	0.156*** [0.018]	0.032* [0.018]	0.144*** [0.025]	0.171*** [0.027]	0.091** [0.037]
Age 21+, Year 1	-0.109*** [0.007]	-0.083*** [0.006]	-0.014*** [0.005]	-0.194*** [0.014]	-0.159*** [0.014]	-0.079*** [0.019]
Age 21+, Year 2 or above	0.105*** [0.014]	0.136*** [0.016]	0.043** [0.021]	0.192*** [0.026]	0.238*** [0.028]	0.197*** [0.047]
<i>(Base: Did not work for employer before)</i>						
Worked for employer 0-12 months	-0.019*** [0.005]	-0.017*** [0.005]	-0.003 [0.002]	-0.039*** [0.011]	-0.043*** [0.010]	-0.042*** [0.011]
Worked for employer over 12 months	-0.066*** [0.006]	-0.051*** [0.006]	-0.005 [0.003]	-0.140*** [0.012]	-0.129*** [0.012]	-0.134*** [0.018]
No written contract				0.061*** [0.017]	0.054*** [0.017]	0.038* [0.022]
Permanent job				-0.103*** [0.014]	-0.093*** [0.013]	-0.085*** [0.021]
Working hours	0.004*** [0.000]	0.003*** [0.000]	0.000** [0.000]	0.005*** [0.001]	0.005*** [0.001]	0.000 [0.001]
Off-the-job training (incidence)	0.063*** [0.006]	0.052*** [0.005]	0.000 [0.002]	0.050*** [0.010]	0.039*** [0.010]	-0.008 [0.012]
Overtime (incidence)	-0.015*** [0.005]	-0.010** [0.005]	-0.004 [0.003]	-0.041*** [0.011]	-0.034*** [0.010]	-0.022* [0.014]
Hourly paid	-0.085*** [0.005]	-0.075*** [0.005]		-0.067*** [0.010]	-0.058*** [0.009]	
Receives any tips	0.095***	0.039***	0.003	0.099***	0.024	0.004

	[0.011]	[0.011]	[0.005]	[0.017]	[0.018]	[0.021]
Receives any bonuses	-0.022***	-0.015***	-0.000	-0.016	0.005	0.025
	[0.005]	[0.005]	[0.002]	[0.011]	[0.011]	[0.017]
Aware of NMWAR				0.031***	0.027***	0.011
				[0.010]	[0.009]	[0.012]
Holding second job	0.034***	0.026**	-0.002	0.110***	0.101***	0.018
	[0.012]	[0.011]	[0.003]	[0.027]	[0.026]	[0.025]
<i>(Base: 'Other' framework)</i>						
Customer service		-0.051***			-0.046**	-0.027
		[0.005]			[0.018]	[0.021]
Business administration		-0.027***	0.002		-0.052***	-0.013
		[0.006]	[0.008]		[0.015]	[0.023]
Retail		-0.033***	-0.003		-0.055***	-0.056***
		[0.008]	[0.003]		[0.020]	[0.014]
Health and social care		-0.041***	-0.004		-0.069***	-0.062***
		[0.006]	[0.003]		[0.017]	[0.012]
Engineering		-0.038***	-0.005*		-0.108***	-0.058***
		[0.005]	[0.002]		[0.009]	[0.011]
Children's care, L & D		0.038**	0.018		0.076***	0.029
		[0.015]	[0.017]		[0.029]	[0.033]
Hospitality and catering		-0.025***	-0.002		-0.055***	-0.039**
		[0.007]	[0.004]		[0.017]	[0.016]
Hairdressing		0.045***	0.027		0.099***	0.028
		[0.017]	[0.027]		[0.035]	[0.042]
Construction		-0.008	0.001		-0.063***	-0.044***
		[0.008]	[0.005]		[0.013]	[0.013]
Team Leader-ship / mgmt		-0.050***	-0.004		-0.126***	-0.054***
		[0.005]	[0.003]		[0.010]	[0.016]
Electrotechnical		-0.031***	-0.004*		-0.084***	-0.065***
		[0.005]	[0.003]		[0.011]	[0.011]
Observations	8,548	8,548	2,108	5,225	5,225	1,669

Notes

Probit models; table reports marginal effects calculated at the means of independent variables
Standard errors in brackets (***) p<0.01, ** p<0.05, * p<0.1)

Table A 2 Sample means by frame work (weighted values) – APS 2012

Variable	Customer service	Business admin	Retail	Health/ social care	Engineering	Children's care	Hospitality	Hairdressing	Construction	Team leadership/ management	Electro-technical	Other	Total
Gross hourly pay	6.929	6.22	6.359	6.829	7.018	5.048	6.001	3.569	5.14	9.109	6.937	5.496	6.263
Non-compliance	0.18	0.314	0.16	0.195	0.21	0.422	0.201	0.703	0.407	0.033	0.311	0.418	0.288
Male	0.37	0.208	0.405	0.193	0.956	0.095	0.444	0.064	0.982	0.372	0.986	0.715	0.481
White	0.891	0.925	0.907	0.877	0.938	0.842	0.951	0.988	0.958	0.906	0.984	0.92	0.914
Disabled	0.09	0.07	0.088	0.104	0.073	0.119	0.078	0.112	0.041	0.083	0.061	0.097	0.089
Age 16-18, Year 1	0.059	0.077	0.034	0.008	0.037	0.062	0.038	0.089	0.055	0.002	0.013	0.046	0.042
Age 16-18, Year 2 or above	0.018	0.053	0.043	0.012	0.133	0.07	0.034	0.325	0.27	0.006	0.063	0.147	0.088
Age 19-20, Year 1	0.079	0.127	0.136	0.034	0.035	0.114	0.106	0.076	0.063	0.025	0.019	0.09	0.078
Age 19-20, Year 2 or above	0.049	0.15	0.055	0.065	0.352	0.16	0.082	0.385	0.349	0	0.39	0.26	0.173
Age 21+, Year 1	0.45	0.281	0.391	0.397	0.156	0.235	0.429	0.037	0.039	0.559	0.017	0.167	0.285
Age 21+, Year 2 or above	0.345	0.313	0.342	0.485	0.286	0.359	0.311	0.088	0.224	0.408	0.499	0.29	0.335
NVQ Level 2	0.633	0.53	0.692	0.491	0.352	0.306	0.7	0.61	0.58	0.424	0.144	0.49	0.509
Did not work for employer	0.184	0.388	0.129	0.117	0.57	0.314	0.137	0.424	0.479	0.009	0.473	0.451	0.304
Worked for employer 0-12	0.188	0.176	0.169	0.342	0.187	0.31	0.314	0.32	0.334	0.068	0.32	0.239	0.238
Worked for employer over 12	0.628	0.436	0.702	0.541	0.243	0.376	0.55	0.256	0.187	0.923	0.207	0.31	0.458
No written contract	0.106	0.067	0.042	0.07	0.065	0.097	0.123	0.227	0.155	0.063	0.167	0.096	0.093
Permanent job	0.838	0.69	0.91	0.906	0.629	0.728	0.862	0.622	0.709	0.975	0.764	0.699	0.779
Working hours	33.559	35.16	29.202	31.41	38.083	31.832	33.807	36.606	38.081	36.06	39.517	36.679	34.687
Off-the-job training (incidence)	0.349	0.403	0.394	0.503	0.632	0.636	0.337	0.574	0.574	0.402	0.575	0.528	0.486
Off-the-job training (hours)	0.979	1.247	0.782	1.913	4.201	2.454	1.189	2.625	3.983	0.89	3.101	2.733	2.094
Overtime (incidence)	0.626	0.478	0.85	0.676	0.724	0.576	0.671	0.489	0.607	0.736	0.838	0.65	0.659
Hourly paid	0.293	0.219	0.506	0.432	0.288	0.372	0.421	0.187	0.229	0.304	0.411	0.246	0.32
Receives any tips	0.105	0.017	0.017	0.001	0.027	0.006	0.335	0.873	0.112	0.091	0.1	0.111	0.109
Receives any bonuses	0.256	0.22	0.422	0.115	0.46	0.099	0.159	0.187	0.375	0.263	0.257	0.23	0.245
Aware of NMWAR	0.492	0.609	0.38	0.39	0.534	0.541	0.506	0.66	0.524	0.514	0.505	0.581	0.517
Holding second job	0.057	0.088	0.042	0.087	0.036	0.087	0.08	0.045	0.066	0.025	0.049	0.068	0.064
Observations	398	500	384	407	482	434	383	466	439	376	468	488	5,225

Table A 3 Linear regressions by framework – APS 2012 Dependent variable: probability of non-compliance

	Customer service	Business admin	Retail	Health/social care	Engineering	Children's care	Hospitality	Hairdressing	Construction	Team leadership	Electro-technical	Other	Total
Male	0.028 [0.031]	0.035 [0.041]	-0.011 [0.024]	-0.026 [0.031]	-0.128 [0.088]	-0.119 [0.089]	-0.050 [0.033]	0.006 [0.078]	-0.051 [0.181]	-0.000 [0.008]	-0.163 [0.237]	0.009 [0.040]	-0.021* [0.012]
White	0.001 [0.050]	0.039 [0.071]	-0.006 [0.054]	0.039 [0.031]	-0.050 [0.072]	0.052 [0.073]	-0.093 [0.083]	0.048 [0.138]	-0.191** [0.092]	0.010 [0.010]	-0.385** [0.177]	-0.087 [0.078]	-0.013 [0.022]
Disabled	0.000 [0.049]	-0.084 [0.051]	-0.023 [0.035]	0.055 [0.048]	-0.010 [0.074]	0.087 [0.069]	-0.012 [0.057]	0.037 [0.062]	-0.140 [0.112]	-0.007 [0.007]	-0.120** [0.060]	0.047 [0.068]	0.007 [0.018]
Age 16-18, Yr 2 or above	0.573*** [0.107]	-0.004 [0.152]	-0.232** [0.110]	0.223 [0.261]	-0.078 [0.057]	0.143 [0.122]	0.059 [0.203]	0.033 [0.056]	0.060 [0.059]	0.016 [0.024]	0.006 [0.087]	-0.019 [0.097]	0.009 [0.028]
Age 19-20, Year 1	-0.156* [0.087]	-0.049 [0.064]	-0.088 [0.085]	0.104 [0.109]	-0.054 [0.057]	-0.092 [0.075]	-0.117 [0.080]	-0.179** [0.071]	0.010 [0.058]	0.007 [0.017]	-0.061 [0.074]	-0.174** [0.073]	-0.100*** [0.022]
Age 19-20, Yr 2 or above	0.364*** [0.138]	0.506*** [0.088]	0.096 [0.147]	0.340** [0.161]	0.097 [0.061]	0.147 [0.108]	0.186 [0.152]	0.278*** [0.053]	0.385*** [0.068]	...	0.093 [0.071]	0.125 [0.087]	0.179*** [0.025]
Age 21+, Yr 1	-0.211*** [0.075]	-0.100* [0.059]	-0.124 [0.080]	0.027 [0.085]	-0.118** [0.073]	-0.118 [0.073]	-0.133* [0.075]	-0.280*** [0.079]	-0.039 [0.062]	0.011 [0.016]	-0.129* [0.074]	-0.258*** [0.071]	-0.151*** [0.019]
Age 21+, Yr 2 or above	-0.001 [0.103]	0.186** [0.085]	0.138 [0.106]	0.337*** [0.103]	0.285*** [0.069]	0.303*** [0.092]	0.200* [0.111]	0.264** [0.125]	0.444*** [0.087]	0.102** [0.051]	0.207*** [0.071]	0.113 [0.091]	0.188*** [0.025]
NVQ Level 2	0.022 [0.026]	0.034 [0.031]	0.018 [0.023]	0.051* [0.026]	0.036 [0.038]	0.085* [0.045]	0.016 [0.029]	0.111** [0.050]	0.167*** [0.040]	0.006 [0.012]	0.050 [0.048]	0.047 [0.038]	0.064*** [0.010]
Worked for emp 0-12	-0.266*** [0.072]	-0.133** [0.053]	-0.327*** [0.085]	-0.087 [0.062]	-0.000 [0.041]	-0.154** [0.060]	-0.321*** [0.074]	-0.053 [0.048]	-0.060 [0.046]	0.056 [0.039]	0.094** [0.044]	-0.065 [0.052]	-0.073*** [0.016]
Worked for emp >12mths	-0.277*** [0.070]	-0.189*** [0.052]	-0.337*** [0.086]	-0.138** [0.062]	-0.083* [0.045]	-0.222*** [0.062]	-0.360*** [0.075]	-0.077 [0.056]	-0.163*** [0.053]	0.059 [0.040]	-0.100** [0.049]	-0.104** [0.053]	-0.150*** [0.016]
No written contract	-0.032 [0.065]	0.070 [0.073]	-0.011 [0.088]	-0.011 [0.060]	0.027 [0.072]	0.020 [0.072]	0.019 [0.054]	0.059 [0.048]	0.076 [0.058]	-0.023 [0.015]	0.120** [0.053]	0.029 [0.063]	0.049*** [0.018]
Permanent job	-0.014 [0.055]	-0.028 [0.047]	-0.083 [0.070]	-0.069 [0.055]	-0.023 [0.037]	-0.205*** [0.061]	-0.012 [0.052]	-0.116*** [0.043]	-0.116** [0.046]	-0.007 [0.006]	-0.047 [0.046]	-0.226*** [0.052]	-0.113*** [0.015]
Working hours	0.004** [0.002]	0.006*** [0.002]	0.000 [0.001]	0.001 [0.001]	-0.002 [0.004]	0.008*** [0.002]	0.001 [0.001]	0.016*** [0.003]	0.010*** [0.003]	-0.000 [0.001]	0.008*** [0.003]	0.005** [0.002]	0.005*** [0.001]
Off-the-job training (inc)	0.002 [0.028]	0.065* [0.035]	0.013 [0.025]	0.010 [0.025]	0.049 [0.033]	0.044 [0.040]	0.031 [0.030]	0.061 [0.042]	0.091** [0.039]	0.018 [0.013]	0.104*** [0.037]	-0.017 [0.037]	0.041*** [0.010]
Overtime (inc)	-0.020 [0.031]	-0.015 [0.032]	-0.039 [0.034]	-0.072** [0.031]	-0.022 [0.039]	0.069 [0.042]	-0.033 [0.033]	0.060 [0.041]	-0.099** [0.040]	-0.012 [0.016]	-0.124** [0.053]	-0.078* [0.040]	-0.032*** [0.011]
Hourly paid	0.027 [0.030]	0.070* [0.043]	-0.029 [0.021]	-0.063** [0.024]	-0.049 [0.039]	-0.072* [0.039]	-0.030 [0.027]	-0.164*** [0.058]	-0.124*** [0.045]	0.012 [0.013]	-0.199*** [0.036]	-0.047 [0.044]	-0.059*** [0.011]
Receives any tips	0.018 [0.051]	0.116 [0.147]	0.040 [0.125]	0.017 [0.064]	0.229 [0.148]	-0.168* [0.086]	-0.004 [0.032]	-0.113* [0.057]	0.074 [0.072]	0.026 [0.029]	0.128* [0.065]	0.045 [0.063]	0.024 [0.019]
Receives any bonuses	0.028 [0.032]	-0.037 [0.036]	0.029 [0.025]	-0.008 [0.039]	-0.055 [0.034]	-0.039 [0.063]	0.018 [0.033]	0.033 [0.052]	0.041 [0.041]	0.000 [0.011]	0.091** [0.045]	-0.064 [0.040]	0.004 [0.012]
Aware of NMWAR	0.014 [0.029]	-0.013 [0.033]	-0.037* [0.020]	-0.003 [0.026]	0.008 [0.033]	0.058 [0.040]	0.053** [0.026]	0.063 [0.042]	0.088** [0.039]	0.008 [0.010]	-0.038 [0.038]	0.082** [0.039]	0.024** [0.010]
Holding second job	0.062 [0.078]	0.130** [0.063]	0.046 [0.057]	0.035 [0.045]	0.066 [0.103]	0.077 [0.058]	-0.036 [0.067]	0.098 [0.103]	0.000 [0.072]	-0.021 [0.017]	0.263*** [0.080]	0.152** [0.074]	0.101*** [0.022]
Constant	0.351*** [0.109]	0.031 [0.112]	0.572*** [0.123]	0.140 [0.116]	0.398** [0.186]	0.197 [0.121]	0.575*** [0.131]	0.003 [0.183]	0.010 [0.230]	-0.074 [0.059]	0.510 [0.326]	0.509*** [0.130]	0.301*** [0.042]
Observations	398	500	384	407	482	434	383	466	439	376	468	488	5,225
R-squared	0.379	0.298	0.360	0.282	0.153	0.331	0.335	0.272	0.261	0.103	0.245	0.284	0.305

Notes: Robust standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1; Final column ("Total") also includes framework dummies.

Table A 4 Linear regressions by framework – Non-hourly paid, pooled 2011 & 2012 data, England only

Dependent variable: probability of non-compliance

	(1) Customer service	(2) Business admin	(3) Retail	(4) Health/ social care	(5) Engineering	(6) Children's care	(7) Hospitality	(8) Hairdressing	(9) Construction	(10) Team leadership	(11) Electro- technical	(12) Other	(13) Total
APS 2012	0.083*** [0.022]	0.082*** [0.024]	0.065*** [0.025]	0.066*** [0.022]	0.015 [0.028]	0.148*** [0.036]	0.013 [0.026]	0.122*** [0.030]	0.024 [0.032]	-0.020* [0.011]	0.153*** [0.037]	0.109*** [0.030]	0.078*** [0.008]
Male	-0.013 [0.022]	0.034 [0.030]	-0.033 [0.025]	-0.065** [0.027]	-0.125* [0.068]	-0.045 [0.075]	-0.012 [0.027]	0.006 [0.061]	-0.096 [0.123]	-0.003 [0.013]	-0.184 [0.175]	0.018 [0.033]	-0.019* [0.010]
White	-0.001 [0.027]	0.015 [0.044]	0.042 [0.037]	0.009 [0.027]	-0.171** [0.085]	-0.164*** [0.063]	0.013 [0.056]	0.102 [0.090]	0.065 [0.087]	0.001 [0.024]	-0.095 [0.108]	-0.001 [0.056]	-0.020 [0.016]
Age 16-18, Year 2 or above	0.638*** [0.076]	-0.001 [0.107]	0.018 [0.208]	-0.009 [0.219]	-0.126*** [0.042]	0.092 [0.110]	0.169 [0.188]	0.024 [0.041]	-0.011 [0.049]		-0.075 [0.066]	0.127* [0.070]	0.015 [0.022]
Age 19-20, Year 1	-0.176*** [0.058]	-0.017 [0.042]	-0.061 [0.080]	-0.114 [0.102]	-0.129*** [0.042]	-0.097 [0.060]	-0.090 [0.056]	-0.191*** [0.051]	-0.074 [0.045]	-0.076** [0.034]	-0.074 [0.074]	-0.153*** [0.046]	-0.118*** [0.016]
Age 19-20, Year 2 or above	0.561*** [0.119]	0.479*** [0.076]	0.176 [0.296]	0.258 [0.168]	0.083* [0.048]	0.326*** [0.085]	0.401*** [0.120]	0.355*** [0.040]	0.401*** [0.054]		0.092 [0.058]	0.316*** [0.062]	0.252*** [0.020]
Age 21+, Year 1	-0.197*** [0.055]	-0.048 [0.041]	-0.149** [0.071]	-0.129 [0.095]	-0.193*** [0.039]	-0.148*** [0.054]	-0.140*** [0.048]	-0.210*** [0.059]	-0.107** [0.050]	-0.034* [0.018]	-0.183*** [0.062]	-0.216*** [0.046]	-0.160*** [0.015]
Age 21+, Year 2 or above	-0.065 [0.071]	0.160** [0.063]	0.206** [0.100]	0.217* [0.113]	0.189*** [0.052]	0.307*** [0.080]	0.356*** [0.092]	0.257*** [0.091]	0.331*** [0.070]	0.121*** [0.038]	0.127** [0.060]	0.149** [0.068]	0.180*** [0.020]
NVQ Level 2	0.048*** [0.019]	0.063** [0.025]	0.049** [0.024]	0.058** [0.025]	0.068** [0.034]	0.043 [0.042]	0.028 [0.029]	0.175*** [0.043]	0.137*** [0.036]	0.001 [0.012]	0.033 [0.067]	0.042 [0.030]	0.080*** [0.009]
Worked for empl 0- 12 months	-0.145*** [0.043]	-0.137*** [0.038]	-0.098 [0.062]	-0.087* [0.048]	-0.006 [0.034]	-0.173*** [0.049]	-0.186*** [0.061]	-0.043 [0.035]	-0.046 [0.036]	0.050 [0.039]	0.059 [0.038]	-0.096** [0.038]	-0.072*** [0.012]
Worked for emp over 12 months	-0.154*** [0.042]	-0.187*** [0.041]	-0.103* [0.056]	-0.103** [0.045]	-0.111*** [0.032]	-0.240*** [0.051]	-0.197*** [0.059]	-0.082* [0.044]	-0.179*** [0.043]	0.046 [0.035]	-0.040 [0.052]	-0.116*** [0.039]	-0.130*** [0.013]
Working hours	0.004*** [0.001]	0.008*** [0.002]	0.002* [0.001]	0.001 [0.001]	0.006*** [0.002]	0.012*** [0.002]	0.002 [0.001]	0.018*** [0.002]	0.010*** [0.002]	0.001 [0.001]	0.012*** [0.002]	0.009*** [0.002]	0.007*** [0.000]
Off-the-job training (inc)	0.029 [0.021]	0.113*** [0.026]	0.002 [0.025]	0.018 [0.022]	0.095*** [0.026]	0.069* [0.036]	0.054* [0.029]	0.166*** [0.030]	0.099*** [0.031]	0.023* [0.012]	0.190*** [0.035]	0.063** [0.029]	0.083*** [0.009]
Overtime (inc)	-0.032 [0.020]	-0.012 [0.024]	-0.023 [0.023]	-0.054* [0.028]	0.005 [0.029]	0.000 [0.037]	-0.018 [0.029]	0.064** [0.030]	-0.118*** [0.032]	0.005 [0.012]	-0.083** [0.041]	-0.083*** [0.032]	-0.032*** [0.009]
Receives any tips	0.049 [0.050]	-0.004 [0.091]	0.112 [0.124]	-0.259*** [0.098]	0.233* [0.122]	-0.207*** [0.054]	-0.034 [0.027]	0.009 [0.040]	0.148** [0.059]	0.096** [0.047]	0.091 [0.059]	0.026 [0.049]	0.043** [0.017]
Receives any bonuses	0.009 [0.021]	-0.023 [0.029]	0.038* [0.021]	0.012 [0.038]	-0.073*** [0.028]	-0.033 [0.050]	-0.017 [0.033]	-0.068* [0.038]	-0.028 [0.034]	-0.006 [0.012]	0.068 [0.041]	-0.068** [0.033]	-0.025*** [0.010]
Holding second job	0.072 [0.061]	0.024 [0.047]	0.037 [0.044]	0.059 [0.053]	0.096 [0.089]	0.129** [0.058]	0.118 [0.072]	0.097 [0.074]	-0.035 [0.063]	-0.042* [0.022]	0.276*** [0.077]	0.143** [0.063]	0.099*** [0.020]
Constant	0.142** [0.061]	-0.158** [0.076]	0.088 [0.077]	0.148 [0.108]	0.207 [0.134]	0.081 [0.101]	0.249** [0.099]	-0.486*** [0.116]	-0.149 [0.171]	-0.058 [0.063]	-0.141 [0.230]	-0.012 [0.078]	0.034 [0.029]
Observations	594	785	426	462	728	534	479	815	721	548	595	762	7,449
R-squared	0.347	0.251	0.256	0.282	0.165	0.286	0.341	0.300	0.235	0.180	0.184	0.253	0.293

Notes: Robust standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1; Final column ("Total") also includes framework dummies.