An impact analysis of the introduction of the Apprentice Rate of the National Minimum Wage

A research paper
to the Low Pay Commission
for the preparation of its
2013 report

Felix Behling
Stefan Speckesser
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Background

The Commission's 2009 Report concluded that there should be an apprentice rate under the NMW. After further work contained in its 2010 Report, the Commission recommended the introductory rate and detailed arrangements of an apprentice rate of the minimum wage 'applied as a single rate to those apprentices … exempt from the National Minimum Wage. That is all those under the age of 19 and those aged 19 and over in the first 12 months of their apprenticeship' (Low Pay Commission 2010: 150). This was introduced on 1 October 2010 at £2.50 an hour and recently increased to £2.65.

The National Minimum Wage Apprentice Rate (NMWAR) replaced the 'recommended minimum level' for LSC-funded apprenticeships in England, which had been raised from £80 to £95 per week in 2009 for non-programme led apprentices. Comparable regulation of the levels of apprentice pay did not exist in the other countries of the UK, although scheme contractual arrangements required that employed apprentices had to be waged (with the exception of Level 2 apprentices in Wales, who could have been unwaged).

The existing evidence base on the impact of the introduction of the NMWAR, or preceding wage arrangements, for apprentices, comprises surveys of employers (Higton et al. 2012a) and qualitative case-study work (Denvir et al. 2009). These studies focused on the impact of the rate on offering apprenticeships or on uptake of apprenticeships by young people (Lawton and Morris 2010). The findings suggested that pay levels were not the primary reason for starting an apprenticeship and also – at least not at current minimum levels – the NMWAR did not impact significantly on employer offers of apprenticeships.

Objective of this study

This study had been commissioned by the Low Pay Commission in order to support the preparation of its 2013 report and aims to estimate the impact of the introduction of the NMWAR on wage levels of apprentices pay using individual level data. Our objective was to understand whether the NMWAR had an impact on pay levels and what conclusions could be drawn from this to guide the further development of the rate.

Our report consists of two main parts:

■ A descriptive analysis of the development of apprentice pay between 2007 and 2011 and the bite of the NMWAR (the rate relative to median earnings and other points on the earnings distribution), in particular for specific groups of apprentices and sectors.

■ An econometric analysis of the quantitative impact of the introduction of the NMWAR on levels of gross hourly apprentice wages considering the counterfactual of non-introduction, which we estimate a) based on people learning towards similar qualifications, who are not participating in apprenticeships and b) using data for apprentices below and above the NMWAR and by further comparing these groups over time (2007 to 2011).

Findings of the descriptive analysis

■ The bite of the Apprentice Rate against median earnings is substantial for the youngest apprentices group (those aged 16 to 18). Young apprentices, in particular when starting multi-year programmes, are often paid very close to the NMWAR.

■ Low pay sectors, hairdressing in particular, show a bite near 100 per cent. The lower quartile for hairdressing is only £2.30 an hour, which suggests that there is substantial non-compliance in this sector.

■ When looking into apprentice wages over time, for example based on the BIS apprentice pay surveys, we observe that apprentice pay was on average rising. This increase was primarily caused by a growing segment of mature apprentices and substantial changes in the characteristics of the apprenticeship population. Hourly wages of the youngest apprentices (16-18 year olds) were decreasing between 2007 and 2011 in all sectors apart from retail and health and social care. For the entire age group of young apprentices (between 16 and 25 years) median pay increased in most sectors (apart from business administration), although the mean in many of them did not, which again suggests that the incidence of low pay of young apprentices at the lower end of the wage distribution increased. Finally, a growing segment of mature

apprentices age 25 years and older, which had not existed in a similar way in 2007, showed wages that were consistently above the NMWAR in 2011. Our analysis suggests that the NMWAR is an important benchmark for young apprentices both in sectors traditionally operating an apprenticeship system, like construction and hairdressing, but also in dynamically growing sectors like business administration, childcare and customer service.

Impact analysis

The impact assessment of the introduction of the NMWAR in part three of this report aimed to address this heterogeneity by estimating models separately for young and older apprentices and for specific sectors. We implemented difference-in-differences estimators using two alternative control-group based approaches. In summary the findings were that:

■ Mature apprentices (aged 25 and over) were hardly affected by introduction of the NMWAR. However, in empirical models based on LFS comparison groups of non-apprentices, we found significant pay increases for apprentices above the age of 25 years in customer service, business administration and team leading. We believe these findings result from the substantial increases in apprentice numbers in these sectors, which cannot be fully controlled for. The nature of apprenticeships in these sectors has changed over the last five years and many more people than previously with substantial work experience are now undertaking apprenticeships and start such programmes with higher pre-apprenticeship wages than before. This development resulted from policy changes in funding for further education (and training) and cannot be attributed to the impact of the introduction of the NMWAR.

■ In contrast, we believe that some more credible conclusions can be drawn from the finding for young people:

1. Apprentice wages of young workers were decreasing following the introduction of the NMWAR in traditional non-low pay sectors. However, the question of whether the introduction of the NMWAR may have helped wages not decrease any further cannot be understood with available data, although this is quite likely for some sectors, which have shown quite substantial decreases in apprentice wages. The youngest apprentices (aged 16 to 18) experienced dramatic decreases in apprentice pay in very large frameworks such as construction (where observed median hourly wages decreased from £4.20 to £3.25) and business administration (where median pay decreased from £4.20 to £2.86) similarly to wage decreases for all young people over this period.

2. However, there is also evidence that pay increased following the introduction of the NMWAR in hairdressing (for the group of apprentices below the age of 25). This is very plausible because pay was around the NMWAR levels before the introduction and would have been increased by many businesses for their apprentices to remain compliant with minimum pay regulation.

Implications

We recommend continuing to recognise the heterogeneity of apprentices, in particular of young and mature apprentices, when providing recommendations for the Apprentice Rate for 2013.

■ An NMWAR uprating would increase the existing net costs of apprenticeship to employers, which are only recovered in post-apprenticeship employment (see Hogarth et al. 2012). Any recommended increase in the Apprentice Rate needs to carefully consider whether there might be any adverse effect on the supply of apprenticeship places, particularly for the younger age groups and in sectors most affected by the wage.

■ However, there is also some evidence that the introduction of the NMWAR did not have much of an impact on the pay levels of mature apprentices. Often, such apprentices have already been employed in the firm of their apprenticeship for some time (see IFF 2012) and were paid as non-apprentices at higher wages, which they retain while undertaking the apprenticeship. For them, the wage floor defined by the NMWAR seems too low to matter.

Further research requirements

In order to make better recommendations about the future development of the NMWAR, in particular we further emphasise that better empirical data need to be collected.

■ When comparing apprentices and other employees, the microeconomic link between wages and productivity as suggested by standard microeconomic theory (ie wages link to marginal productivities of workers) cannot be directly applied to apprentices because of the nature of such employment as a skills investment. Since there is substantial evidence that there are net costs to employers on completion of an apprenticeship (Hogarth et al. 2012), applying the simple wage-productivity link would suggest that wages during the apprenticeship would have to decrease. However, since employers are likely to obtain a post-apprenticeship return to their investment, one needs to understand both in- and post-apprenticeship contribution of apprenticeships in

order to find out how the particular wage during the apprenticeship affects the supply of apprenticeships.

- In order to come to better recommendations than on the basis of an analysis of the wage impact, better information is needed about the value of the contribution of young people in- and post-apprenticeship, and further crucial parameters like employer costs for supervision and administration. This is needed in order to understand the true costs and benefits of apprenticeships for employers and how a specific NMWAR impacts on their decision to supply apprenticeships.

1 Introduction

1.1 Policy context

1.1.1 Apprenticeships in the UK

Apprenticeships in the UK economy

Apprenticeships have been the traditional way of qualifying for a range of occupations, in particular in the crafts, in most European countries from as early as the 12th century. Traditionally, the system allowed a master craftsman to employ young people and to instruct them in their craft, which was a necessary condition for becoming a master of the craft, as was a period of time spent as a journey man. In return, master craftsmen had access to a cheap source of labour as apprentices were usually only provided with food and lodging, but not a salary, and stayed with their master craftsmen for a long time, usually seven years.

With industrialisation and the liberalisation of many restrictions, the apprenticeship system lost importance in many European countries, including the United Kingdom. However, many technology-intensive industries such as manufacturing, utilities and the railways continued to operate apprenticeship systems in the UK in order to attract, retain and develop their workforce to intermediate and high level practical skills. With the decline of UK manufacturing from the early 1980s, opportunities for apprentices declined and the growing service sector did not create a similar system of apprenticeships, which could have filled the gap. In addition, training levies imposed on employers to finance the Industry Training Boards (ITBs) and to share the cost of training more evenly between employers, were stopped when ITBs were transformed into non-statutory bodies in most industries with the exception of construction and engineering. This further reduced the incentives to invest in employer-based training.

In many other countries, notably Germany, Austria, Switzerland and the Netherlands, where manufacturing industries did not decline as far,

apprenticeships remained the central mechanism supplying intermediate skills to the economy[1]. Apprenticeships expanded to service sector qualifications through standard setting of corporatist bodies, free public provision of vocational education in state-led institutions and private sector buy-in. In all of these countries, apprenticeships in the dual systems of state school-based off-the-job learning and apprenticeship employment, engage two thirds of all school leavers (at age 16) in two to four year-long programmes in order to qualify in a recognised trade (*Ausbildungsberufe*)[2].

Findings from research[3] suggest that this is one of the main reasons why unemployment of 16-24 year olds is much lower in the Netherlands (7.6%),

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[1]   In these countries, apprentice pay is subject to wage bargaining at sector level. In Germany, monthly wages vary for 182 different apprentice frameworks, by year of apprenticeship and regionally (East and West) in Germany. The variation is substantial:
The lowest wages are found for apprentices in hairdressing (€253 in East Germany in year 1) and in the building industry (€1,191 in year 3 in West Germany). It is difficult to compare this to an hourly minimum wage as set in the UK, but 40 hours per week, the corresponding hourly wage (at £0.79 per €) would range between £1.15 (hairdressers in East Germany in year 1) and £5.43 (building industry in West Germany, year 3).

Source: Training Allowance Database of the Federal Institute for Vocational Education and Training (http://www.bibb.de/dokumente/pdf/DAV_Gesamtuebersicht_ Ausbildungsverguetungen_2011.pdf)

Apprentice wages from collective bargaining are not binding in Germany because employer associations are no statutory bodies. For firms not covered by collective bargaining, Employment Courts of Justice repeatedly established that apprentice pay must not be lower than 80 per cent of the bargained wages, ie ranging from £0.92 per hour (hairdresser year 1/East Germany) to £4.34 (building year 3/West Germany).

Source: Bundesarbeitsgericht, Urteil vom 19.02.2008, 9 AZR 1091/06).

[2]   More on apprentices in these countries:
Germany: http://datenreport.bibb.de/html/4650.htm
Netherlands: http://ecabo.nl/international/vocational-education-netherlands/)
Austria: http://www.ba-auslandsvermittlung.de/lang_de/nn_2784/DE/LaenderEU/Oesterreich/BeruflicheBildung/BeruflicheBildung-knoten.html__nnn=true
Switzerland: http://www.bbt.admin.ch/themen/berufsbildung/index.html?lang=de&download=NHzLpZeg7t,lnp6I0NTU042l2Z6ln1acy4Zn4Z2qZpnO2Yuq2Z6gpJCDdH96e2ym162epYbg2c_IjKbNoKSn6A--

[3]   http://ec.europa.eu/europe2020/pdf/themes/17_youth_unemployment.pdf

Austria (8.3%) and Germany (8.6%) than in all other EU Member States, including the UK (21.1%).[1]

Since the mid 1990s, both the UK Government and the UK devolved administrations have invested heavily in the apprenticeship system in order to increase its attractiveness to the service sector. This resulted in a number of new framework agreements, set up by Sector Skills Councils from the mid-1990s, to help supply virtually all sectors of the economy with a labour force at intermediate and high level skills, knowledge and competence. The UK administrations complemented the support by offering funding for college education and assessments. In addition, as described above the levy system was retained in some industries with high labour mobility to help ensure a sufficient supply of trained workers and access for both large and small business by spreading training costs across larger and smaller employers.

Regulation

Apprentices work for an employer. They make a productive contribution to the firm and at the same time undertake structured learning activity in the company (on-the-job) and in programmes of specific learning providers or local colleges (off-the-job). Employers must follow a specific framework, which structures the learning activity undertaken by the apprentice.

With education being a devolved policy matter, frameworks are specific to countries of the UK. There are currently 162 frameworks in existence in England leading to 258 specific qualifications at level 2 and 3 (and 11 qualifications at level 4 and above), while 145 frameworks have been set up for Wales.[2] Our research found 57 Modern Apprenticeship Frameworks for Scotland.[3]

The structure of and qualifications obtained by apprentices are similar across the countries of the UK because they are coordinated with UK-wide sector bodies such as Sector Skills Councils. There are three key elements of qualifications:

- A **competencies qualification** achieved by the apprentice on performing the skill, trade or occupation to which the framework relates at level 2 or 3 of the

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[1] See for example Allmendinger J (1989). Educational Systems and Labour Market Outcomes. European Sociology Review 5(3), 232–250, or more recently Kohlrausch B (2009). *A Ticket to Work? Policies for the Young Unemployed in Britain and Germany*. Frankfurt and New York: Campus, Frankfurt am Main/New York.

[2] http://www.afo.sscalliance.org/frameworkslibrary/index.cfm#current

[3] http://www.skillsdevelopmentscotland.co.uk/our-services/modern-apprenticeships/ma-frameworks.aspx

Qualifications and Credit Framework (QCF), following National Occupational Standards (NOS) and approved by the Sector Skills Council (SSC) or Sector Body (SB).

■ A **technical qualification** demonstrating achievement of the technical skills, knowledge and understanding of theoretical concepts and knowledge and understanding of the industry relevant to the framework. Again following NOS Standards and approved by SSC/SB.

■ Achievement, or evidence of having achieved when starting apprenticeship, in **Functional Skills in English and Mathematics** and/or ICT if relevant for the framework (level 2 or equivalent).

Further regulation of apprenticeships exists in the different countries of the UK when college tuition of apprentices is funded by public bodies. In England, the Specification of Apprenticeship Standards for England (SASE) sets out the minimum requirements on the learning activity for levels 2 and 3, which are:

■ Minimum of 37 credits on the 'Qualifications and Credit Framework' (QCF), awarding credits for the achievement of units and qualifications, which can be measured and compared.

■ Specification of the number of Guided Learning Hours (GLH) that an apprentice must receive to complete the framework (Minimum: 280 GLH).

■ At least 100 GLH or 30 per cent (whichever is the greater) GLH off-the-job, ie in colleges or with other learning providers and another 180 GLH on-the-job, which have to be clearly evidenced.

■ A minimum duration of 12 months (for those aged 16-18).

Further policies promoting apprentices

With the recession affecting young people disproportionately more, various publicly funded schemes by each of the UK administrations have been set up in order to retain/increase the number of apprenticeships. Current programmes are:

■ An 'Adopt an Apprentice' Scheme in Scotland launched in 2009, for apprentices who had been unemployed previously, offered employers a grant of £2,000[1].

■ The 'ReAct' and 'ProAct' programmes in Wales[2] offer a maximum subsidy of £2,500 for people who have been made redundant and who start suitable

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[1]   http://www.scotland.gov.uk/News/Releases/2009/06/10164847

[2]   http://www.assemblywales.org/11-005.pdf

training, including apprenticeships, and offer additional support for employers (co-financed by the European Social Fund).

■ An Employer Incentive in England[1] ('Apprenticeship Grant for Employers of 16 to 24 year olds') helping eligible employers to offer young people employment through the apprenticeship programme. In its recently re-launched design, the programme aims to provide 40,000 extra apprenticeships in the financial year 2012/13 in companies of up to 1,000 employees by offering a subsidy of £1,500. A similar scheme existed in 2010, when a £2,500 subsidy was available for those creating an apprenticeship for a 16-17 year old.

■ In April 2012, the UK Government launched a £1 billion 'Youth Contract' to provide half-a-million new employment opportunities for 18-24 years olds, including incentives for businesses to take on more apprentices.

1.1.2 Participation in production and minimum wage regulation

Apprenticeships serve a dual purpose:

■ apprentices undertake structured learning activity in a firm (on-the-job) and in programmes of specific learning providers or local colleges (off-the-job); and

■ apprentices make a productive contribution to the firm's product.

While a growing body of evidence exists on the impact of apprenticeships on skills development and workforce productivity, very little is known on Apprentices' direct contribution to the firms' product and its market value, which would be necessary in order to understand how apprenticeship wages should be set to recognise their value contribution.[2]

When the National Minimum Wage was introduced in 1999, it only applied to people aged 18 and over. Apprentices in their first year of apprenticeship were not covered and young apprentices under the age of 19 were exempted as were people participating in specified pre-apprenticeship schemes or programme-led apprentices (Low Pay Commission 2009). This exemption remained in place following the introduction of the minimum wage for 16-17 year olds in October 2004. However, with the growing importance of apprentices to the economy the

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[1]   http://www.apprenticeships.org.uk/employers/steps-to-make-it-happen/incentive.aspx

[2]   With the exception of the study by Hogarth et al. (2012), who collected cost-benefit information on the basis of 79 employer case studies. This study included the only recent estimates of net benefits of apprentices to employers in the UK, which considered the value contribution of apprentices as well as the relevant costs (wages, supervision costs and others), but the evidence is related to some very broadly defined level 2 and level 3 apprenticeships in selective sectors of the economy.

wages paid in such employment affected many more people. There was also some evidence of high drop-out rates. Following the Low Pay Commission's recommendation that it should be asked to review the apprentice exemption from the NMW, the Government eventually agreed and this appeared in the Commission's remit for its 2009 Report.

A 2005 survey on apprentice pay, commissioned by the Department for Education and Skills (DfES), provided evidence on the pay levels of apprentices and revealed substantial variations between the various apprenticeship frameworks. Following this baseline study, a regulation was introduced in England from August 2005 that 'all employed apprentices funded by the Learning and Skills Council (LSC) … must receive a minimum income of £80 per week (exclusive of tips and overtime)' (Fong and Phelps 2008). Further surveys of apprentice pay in 2007 and 2011 brought some evidence that pay levels for apprentices were increasing, albeit there was still great variation by sector/apprentice framework.

The Low Pay Commission (2009) referred to the evidence which helped to shape the original exemption for apprentices from the NMW: 'by the second or third year of an apprenticeship wages are often well above the minimum wage, but for the first year or phase, wages are likely to be low, reflecting the extent to which the apprentice is in training rather than productive work' (Low Pay Commission 2009: 151). The Commission's analysis also highlighted the variations in apprentice pay, particularly by sector, age and gender and the level of qualification.

The Commission's 2009 Report concluded that there should be an apprentice rate under the NMW. After further work, contained in its 2010 Report, it recommended the introductory rate and detailed arrangements. The Low Pay Commission recommended that the introduction of an apprentice rate of the minimum wage 'applied as a single rate to those apprentices … exempt from the National Minimum Wage. That is all those under the age of 19 and those aged 19 and over in the first 12 months of their apprenticeship' (Low Pay Commission 2010: 150). This was introduced on 1 October 2010 at £2.50 an hour.

Table 1.1 NMW rates 2010-2012

	2010	2011	2012
21+	5.93	6.08	6.19
18-20	4.92	4.98	4.98
16-17	3.64	3.68	3.68
Apprentice Rate*	2.50	2.60	2.65

*   Applies to all apprentices in their first year and all apprentices less than 19 years old in other years. Apprentices 19+ in later years qualify for the relevant age-related rate of the NMW.

Source: Low Pay Commission, Report 2012

The National Minimum Wage Apprentice Rate (NMWAR) replaced the 'recommended minimum level' for LSC-funded apprenticeships in England, established as a contractual arrangement and set at £80 in 2005 and which had been raised to £95 per week in August 2009 (covering non-programme led apprentices). In the other countries of the UK, a comparable contractual obligation on the level of apprentice pay did not exist, although scheme rules did require that employed apprentices had to be waged with the exception of level two apprentices in Wales, who could have been unwaged. Subsequently, the level of the NMWAR increased to £2.60 (October 2011) and rose further, to £2.65 an hour, from 1 October 2012.

1.1.3 Apprentices pay 2011

A recent report for BIS (Higton et al. 2012b) provided an up-to-date picture of apprentice pay in the UK in 2011. This survey found gross median hourly wages of apprentices in the UK of £5.87 (see also Table 2.4 of this report). However, around 20 per cent of apprentices appeared to be paid below their applicable NMW rates (which are either the NMWAR or the age-specific rates), with sector differences showing the lowest pay levels (and levels of compliance) existed in the hairdressing sector. These findings confirm some of our own work at IES (Denvir et al. 2009), which found that apprentices in hairdressing, leisure and childcare earned below the then required contractual weekly minimum of £80 for LSC funded apprenticeships in England.

1.2 Objectives of this study

1.2.1 Background

The existing evidence base on the impact of the introduction of the NMWAR or preceding exemption from the NMW regulations is based on surveys of employers (Higton et al. 2012a), or qualitative case-study work (Denvir et al. 2009) and

focused on the impact of the rate on offering apprenticeships or on uptake of apprenticeships by young people (Lawton and Morris 2010). The findings suggest that pay levels are not the primary reason for starting an apprenticeship and also – at least not at current minimum levels – do not impact significantly on employer offers of apprenticeships.

According to a qualitative and survey-based study commissioned by the Low Pay Commission the introduction of the NMWAR had a very little impact on the number of apprenticeships offered or the levels of hourly wages actually paid. These findings were confirmed in stakeholder consultations (Low Pay Commission 2012, 3.7.2).

The employer survey commissioned for the Commission's report last year (Higton et al. 2012a) explored the impact of the NMWAR introduction on employers and found 'that the Apprentice Rate appears to have had a minimal impact on these employers' decisions, with 76 per cent agreeing with the statement that the introduction of the Apprentice Rate made no change to their offering of apprenticeship places and 12 per cent disagreeing' (Low Pay Commission 2012: 95). In addition, only 15 per cent of the employers no longer offering apprenticeships agreed that the introduction of the NMWAR was the main reason for withdrawing their apprenticeships offer (ibid.).

1.2.2 Aims and objectives of this study

This study aimed to explore the impact of the introduction of the NMWAR on wage levels of apprentices, by:

- Reviewing available data sources on apprentice pay (specific apprentice pay surveys, the UK Labour Force Survey, Understanding Society Study, the Annual Survey of Hours and Earning (ASHE), the Youth Cohort Study and the Longitudinal Study of Young People in England).

- A descriptive analysis of the development of apprentice pay between 2007 and 2011 and the bite of the NMWAR (the rate relative to median earnings and other points on the earnings distribution), in particular at sector level.

- An econometric analysis of the quantitative impact of the introduction of the NMWAR on levels of gross hourly apprentice wages considering the *counterfactual of non-introduction*.

1.2.3 Methodology used for econometric impact analysis

As with any quantitative impact evaluation of Minimum Wages based on causal models, employing control group-based designs is not straight forward: the Apprentice Rate, has a universal coverage in the UK and there is no group similar

to apprentices with observed outcomes which would provide a credible estimate for the counterfactual apprentice pay had the NMWAR not been introduced.

Similar to many existing quantitative impact evaluations of the NMW, we used a difference-in-differences (DiD) estimator, implicitly modelling a counterfactual outcome on the basis of a group of people not affected by the introduction of the NMWAR. We use two alternative control groups:

- A comparison group of other learners ('non-apprentices') from LFS data, whose employment status in quarterly LFS data is identified as employment outside of apprenticeships and who are qualifying to the same intermediate level qualifications as apprentices[1], but who are covered by age-specific rates of the NMW rather than the introduction of the NMWAR.

- A comparison group of apprentices from the apprentice pay surveys, who earn above the upcoming NMWAR.

In our view, an assessment of the introduction of the NMWAR on individual take-up and competition for apprenticeships, or more generally on young people's educational choices, cannot be undertaken, as complementary and continuously changing public programmes affect educational decisions continuously over time, violating the central assumptions of a DiD design. With policy taking an active steer in availability of apprenticeships in all countries of the UK through ad hoc or evolving public programmes, it is not possible to compare the situation after the NMWAR introduction with the one before for this particular outcome.

1.3 Remainder of the paper

The remainder of this paper is structured into two main sections:

- Descriptive analyses (based on apprentice pay surveys 2007 and 2011):

    i. Development of take-up and completion of apprenticeships between 2005 and 2011.

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[1] NVQ level 3, Advanced/Progression (14-19) Diploma, Level 3 Diploma, International Baccalaureate, A-level or equivalent, OND/ONC/BTEC/SCOTVEC National etc, City & Guilds Advanced Craft/Part 1, SCE higher or equivalent, Access qualifications, AS-level or equivalent, NVQ level 2 or equivalent, City & Guilds Craft/Part 2, BTEC/SCOTVEC First or General diploma e, Higher (14-19) Diploma) based on the information of current learning activity and 'Highest qualification training leads to'. We estimate models for learners of two age groups (16-25 and 25+), ie comparison groups from LFS data are then restricted additionally to match the age of the apprentices from the two pay surveys. This comparison group includes people who study for A-levels and other generic qualifications.

   ii. Development of hourly gross wages of apprentices in the UK since 2007 by age, year of apprenticeship, different countries of the UK and sector.

   iii. 'Bite' of NMWAR (rate relative to median).

- Impact analyses:

   i. Estimating the impact of the introduction of the NMWAR for particular groups (age groups/by sector).

2 Descriptive Analysis

2.1 Apprenticeships and other post-16 education

2.1.1 Apprentices in the context of total education and training undertaken by the working age population

In the following, we analyse Labour Force Survey (LFS) data on the working age population's engagement in education and training activity after compulsory schooling age in order to provide some context for apprenticeships (Table 2.1).

There were about 6.15 million people between 16 and 65 years of age participating in education and training in the third quarter of 2011. More than 4 million of the 6.15 million learners also report being in employment at the same time, but only 165,471 say that an apprenticeship is a part of their main employment. Of those in employment, 1.862 million (46%) were aiming for qualifications in higher education, 26 per cent (1.04 million) for intermediate qualifications and 28 per cent for qualifications below level two. The group of learners who reported not to have been in employment was much smaller (2.146 million) and, relatively more people were participating in training leading to intermediate qualifications (857,000 or 40%). Forty one per cent of those not in employment were studying for HE degrees or other qualifications above level three including NVQs, and 19 per cent were aiming for qualifications below level two.

Table 2.1 Highest qualification aimed for by employment status, Quarter 4/2011 (UK working-age population, apprentices are subgroup of all employed)

Training leads to highest qualifications of	Not employed	Employed	Apprenticeship part of main employment	Total (aged 16-65)
Higher degree	164,046	512,165	516	676,211
NVQ level 5	1,702	12,881	1,154	14,583
Level 8 Certificate	0	589		589
First degree/foundation degree	601,720	837,553	3,101	1,439,273
Other degree	35,832	175,660	1,539	211,492
NVQ level 4	3,210	50,035	3,228	53,245
Level 6 Diploma	0	932		932
Level 6 Certificate	0	2,001		2,001
Diploma in higher education	23,733	80,383	613	104,116
Level 5 Diploma	0	1,198		1,198
HNC/HND/BTEC higher etc	31,922	83,637	6,208	115,559
Teaching	538	39,113		39,651
Nursing	11,454	40,385		51,839
Other higher education below degree	12,091	25,010	717	37,101
Level 4 Certificate	0	1,261		1,261
NVQ level 3	39,607	283,377	28,381	322,984
Advanced/Progression (14-19) Diploma	2,098	7,887	739	9,985
Level 3 Diploma	2,056	5,588		7,644
International Baccalaureate	5,840	2,182		8,022
A-level or equivalent	440,082	226,737	364	666,819
RSA advanced diploma	614	0		614
OND/ONC/BTEC/SCOTVEC National etc.	95,775	78,550	2,626	174,325
City & Guilds Advanced Craft/Part 1	3,977	17,407	4,932	21,384
Scottish 6 year certificate/CSYS	493	662		1,155
SCE higher or equivalent	36,819	13,942		50,761
Access qualifications	7,702	17,702		25,404
AS-level or equivalent	91,789	46,248		138,037
Trade Apprenticeship	5,370	113,559	111,353	118,929
Level 3 Certificate	639	0		639
NVQ level 2 or equivalent	59,987	181,929		241,916
CR intermediate	1,282	2,340		3,622
City & Guilds Craft/Part 2	5,173	16,461		21,634
BTEC/SCOTVEC First or General diploma e	49,321	16,642		65,963
Higher (14-19) Diploma	4,123	3,883		8,006

Training leads to highest qualifications of	Not employed	Employed	Apprenticeship part of main employment	Total (aged 16-65)
Level 2 Diploma	1,196	3,312		4,508
Level 2 Certificate	2,838	2,688		5,526
O-level, GCSE grade A*-C or equivalent	185,108	47,592		232,700
Level 3 Award	0	1,278		1,278
NVQ level 1 or equivalent	27,394	34,091		61,485
Foundation Welsh Baccalaureate	617	0		617
Foundation (14-19) Diploma	4,303	4,795		9,098
Level 1 Diploma	1,964	0		1,964
BTEC/SCOTVEC First or General certificate	14,271	1,518		15,789
SCOTVEC modules	549	786		1,335
OCR basic	0	696		696
City & Guilds foundation/Part 1	5,753	8,820		14,573
Level 1 Certificate	2,737	0		2,737
Level 2 Award	0	611		611
Key skills qualification	514	3,201		3,715
Basic skills qualification	54,066	53,463		107,529
Entry level qualification	19,282	14,648		33,930
Entry level Diploma	0	491		491
Level 1 Award	616	0		616
Other qualification	80,214	930,734		1,010,948
Total with qualification aim	2,140,417	4,006,623	165,471	6,147,040
No qualifications	3,887,803	30,627,187		34,514,990
Does not apply	35,409	0		35,409
No answer	39,440	28,387		67,827
D/K	43,378	89,647	3,213	133,025
Total	**6,146,447**	**34,751,844**	**168,684**	**40,898,291**
Unweighted base	10,066	56,662	252	66,728

Source: UK Labour Force Survey data Q4 2011

The third column of Table 2.1 shows qualification aims of learners who reported that they were employed in an apprenticeship (165,471). Apprentices were working towards a variety of qualifications, but about 90 per cent were either qualifying towards levels two or three. LFS data estimated that 111,000 apprentices were qualifying towards a Trade Apprenticeship – about two thirds of the total – which may be associated with either QCF level 2 or level 3. The rest were aiming for other, primarily level three, qualifications.

While numbers of people starting and achieving apprenticeships have increased over the last couple of years in the UK and particularly in England, the estimated total of 165,500 employed apprentices[1] still only represents four per cent of all learners in employment aiming for any qualifications. This corresponds to sixteen per cent of all learners in employment, aiming for intermediate vocational and non-vocational qualifications below HE level.

2.1.2   Development of apprenticeships in low pay and other sectors

Information of the specific sectors of the apprenticeships undertaken can be obtained from learner records, which are routinely collected for all individual learners who participate in post-compulsory learning, subject to some or full funding by the Skills Funding Agency (SFA)[2] in England, Skills Development Scotland, the Welsh Government or the Department for Employment and Learning (DELNI) in Northern Ireland. Funding is usually provided if apprenticeships lead to recognised vocational qualifications following one of the more than 180 frameworks, which have been approved for funding in consultation with Sector Skills Councils (SSCs), Standard Setting Bodies (SSBs) and Sector Bodies (SBs). Apprenticeship frameworks are specific to occupations, and can be linked to the low pay occupations/low pay sectors and other sectors relevant to the monitoring undertaken by the Low Pay Commission (ie the sectors defined in the Annual Report of the Low Pay Commission 2010, Table A.41)

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[1]   Note that these numbers are much smaller than the total numbers of apprentices as reported in the basis of learner data from the Skills Funding Agency (SFA)[1] in England, Skills Development Scotland, the Welsh Government or the Department for Employment and Learning (DELNI) in Northern Ireland, which will be discussed in more detail in part 2.1.2 below. This has two main reasons:

    a)   Mature learners funded through apprenticeship budgets and covered in learner data may not self-declare to be apprentices in generic survey data. This may be of increasing importance in the light of the extensive growth of this group of apprentices: Learner records show 502,540 apprentices in England in 2011/12, 219,870 (or 44 per cent) aged 25 and older. In contrast, LFS data (Q4/2011) show a total of 176,642 and only 8.6 per cent aged 25+.

    b)   EFA/SFA apprentice count is higher for the age group 16-18 (126,350 apprentices, twice the LFS estimate) because funding data represent flows rather than stocks (ie some drop out and programmes with a duration of less than a year). This gap is likely to narrow over time as SASE standards (coming into effect in 2012) require a minimum duration of one year only and flows with much lower duration as in previous years are likely to decrease.

[2]   http://readingroom.lsc.gov.uk/SFA/FundingParametersGenericGuidance-21may2010-v2.pdf

In the following, we provide a breakdown of apprentice starts in low pay or other sectors for the countries of the United Kingdom[1]. Figure 2.1 shows how the total numbers of apprentices in England, Wales, Scotland and Northern Ireland developed over time[2].

- In England, the total number of people starting an apprenticeship increased from 167,700 in 2002 to 240,020 in 2008/09 and further to 279,730 in 2009/10. The academic year 2010/11 saw an increase of apprenticeship starts to 457,220 (+63%) and most recently, apprentice starts increased to 5025,80 (2011/12). The breakdown by low pay and other sectors shows that despite the huge increase, substantial shifts towards the low pay sectors did not occur. In 2010/11, about 56 per cent of all apprentices in England were in low pay sectors (255,880) and 44 per cent in non-low pay sectors (201,340), exactly the same composition as in 2002/03 when 94,550 of the total recorded learners (167,700) started in a low pay sector.

- Total numbers of apprenticeship starts also increased in Scotland. In 2010/11, the total number of people starting a publicly funded or co-financed apprenticeship increased by 29 per cent (23% in 2011/12), reversing a trend of declining numbers of apprentices between 2002/03 and 2005/06, when total starts had fallen from 20,196 to 10,579. Most of the increase in Scotland affected low pay sectors, where apprentice numbers rose from 5,246 in 2002/03 to 15,154 in 2011/12, a share of 57 per cent of all apprentices compared to the rest of the economy, where starts had fallen from 14,950 to 11,273.

- Although increasing by 13 per cent between 2009 and 2010, the long-term trend in Wales shows declining numbers of apprenticeships and the total number of apprenticeship starts decreased from 24,525 in 2004/05 to 18,580 in 2010/11. The shares of apprentices working in low pay sectors remained fairly constant, increasing from 51 per cent to 53 per cent over the same time period.

- In Northern Ireland, apprenticeship starts increased from 5,587 in the academic year 2007/08 to 9,364 (in 2010/11). Subsequently, the number decreased again to 8,395 (2011/12). The percentage share of apprentices starting in low pay sectors increased from 36 per cent in 2007 to 79 per cent in 2011.

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[1]   The mapping of apprentice frameworks and low/non-low pay sectors is described in detail in Appendix 1.

[2]   The data shown in the graph are tabulated in Appendix 2, Tables A2.1-A2.3.

Figure 2.1 Apprenticeship starts in countries of the United Kingdom
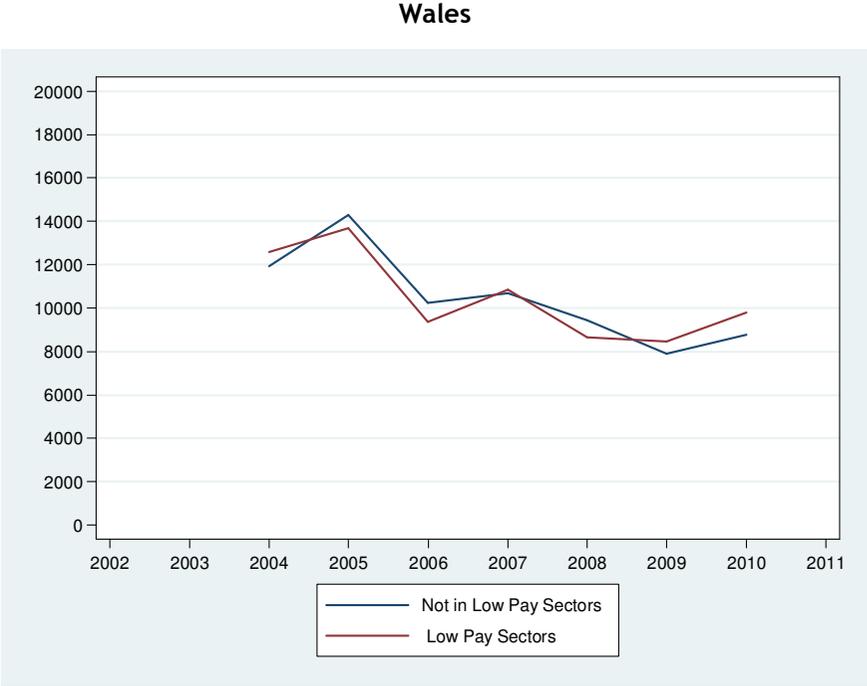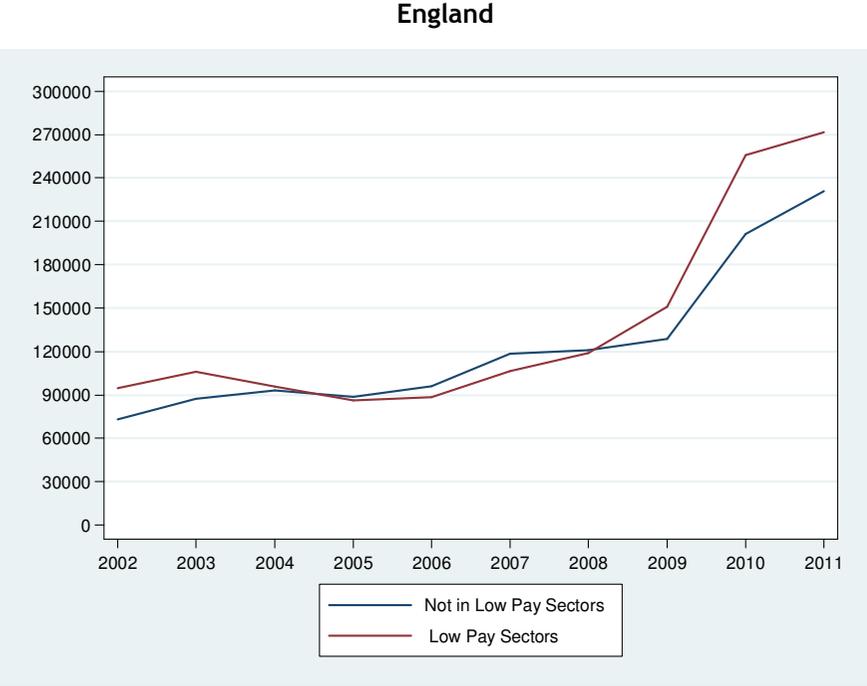
Scotland
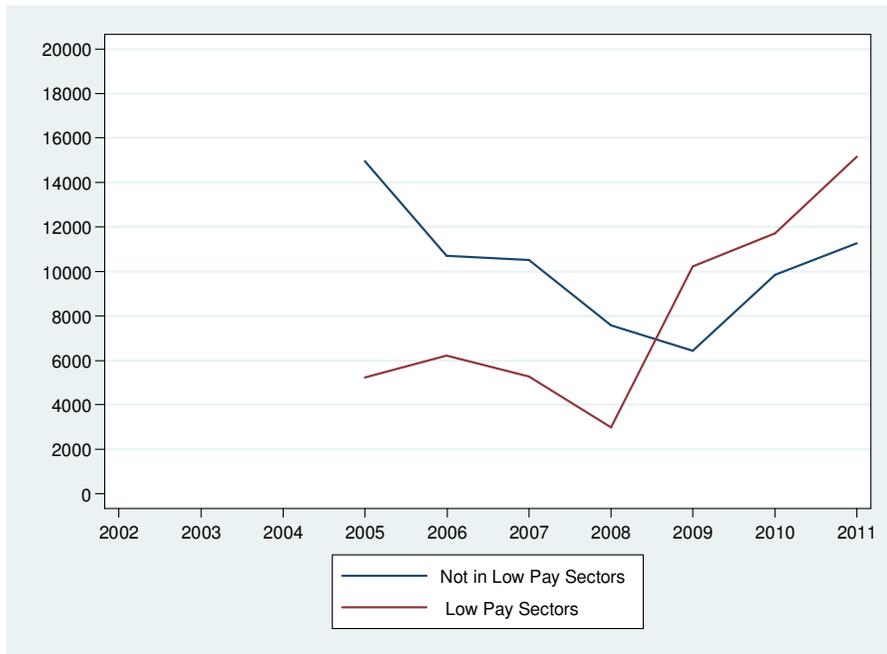
Northern Ireland
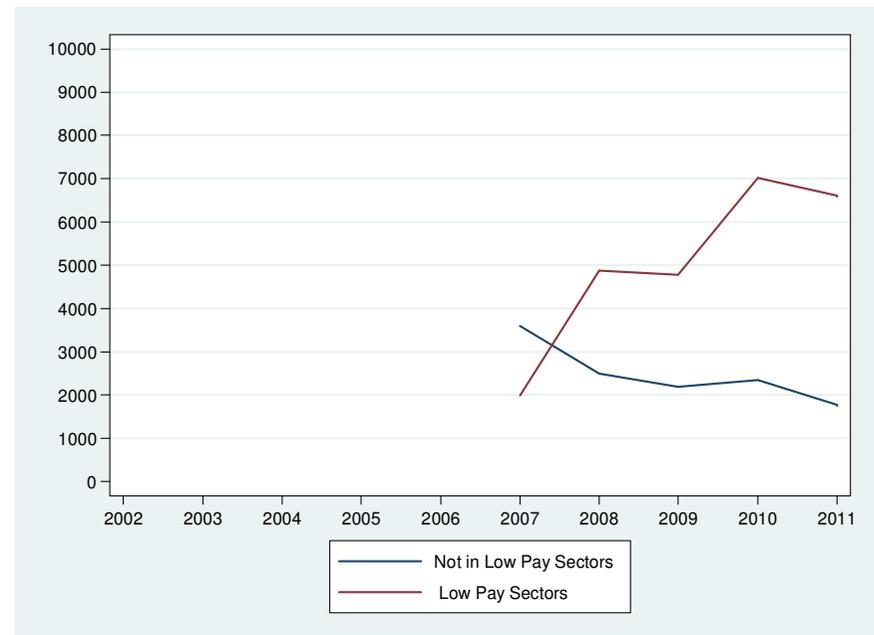
Note: Academic years in England, Wales and Scotland, financial years in Northern Ireland

Sources: Individualised Learner Records (England), Lifelong Learning Records (Wales), Skills Development Scotland Data (Scotland), Apprenticeship NI (Northern Ireland);
Sector classification in Table A1.1, Appendix;

Figure 2.2 provides detailed breakdowns of the development of apprenticeship starts in low pay sectors between 2006 and 2010 in England, Scotland, Wales and Northern Ireland[1].

- In England, the total number of apprentice starts grew by 148 per cent between 2006/07 and 2010/11. While growth in non-low pay sectors was 109 per cent, apprentice starts increased by 627 per cent in social care (to 53,720), 405 per cent in food processing (1,920), 254 per cent in leisure (20,380), 345 per cent in retail (54,550) and 151 per cent in office work (38,900).
  Growth was similar to non-low pay sectors for hospitality (+125% to 29,810), childcare (+108% to 27,520) and agriculture (+106% to 2,960) and below growth in non-low pay sectors for hairdressing (+9.7% to 19,610) and the textiles/clothing industry (-40% to 90).

- In Scotland, total numbers of apprenticeship starts increased by 27 per cent between the academic years 2006/07 and 2010/11. The growth was much higher for some low pay sectors, in particular hairdressing (+352% to 1,342), childcare (from 77 to 1,000, an increase of almost 1,200 per cent), food processing (from 17 apprentices in 2006/07 to 635 in 2010/11) and leisure/hospitality (+129% to 2,511).

- In Wales, apprenticeship starts have decreased in most low pay sectors over time, with the exception of apprentices in social care, which have increased from 2,120 in 2006/07 to 3,780 in 2010/11.

- In Northern Ireland, employment of apprentices in most of the low pay sectors increased between 2007 and 2010, most significantly in office work (from 264 to 1,967) and social care (from 438 to 1,247). There are also large increases in other low pay sectors.

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[1]   Tables for these graphs are included in Appendix 2, Tables A2.5-A2.8.

Figure 2.2 Apprenticeship starts in Low Pay Sectors
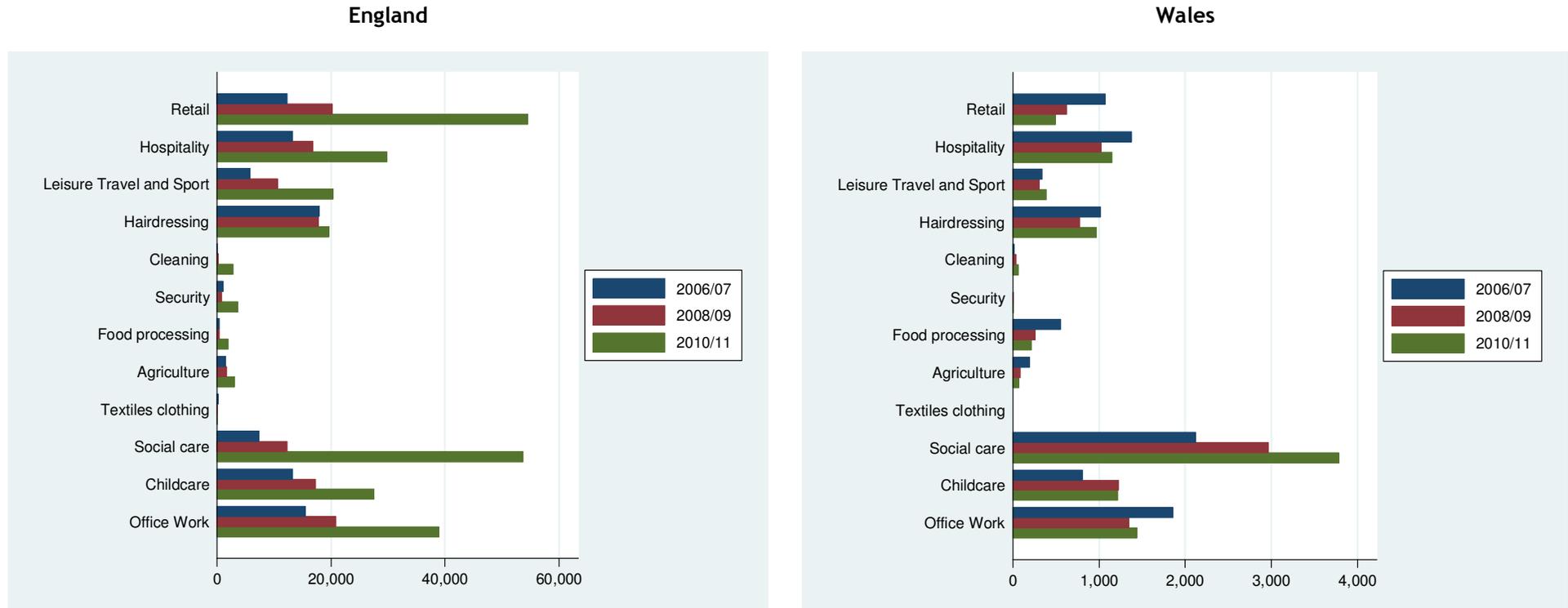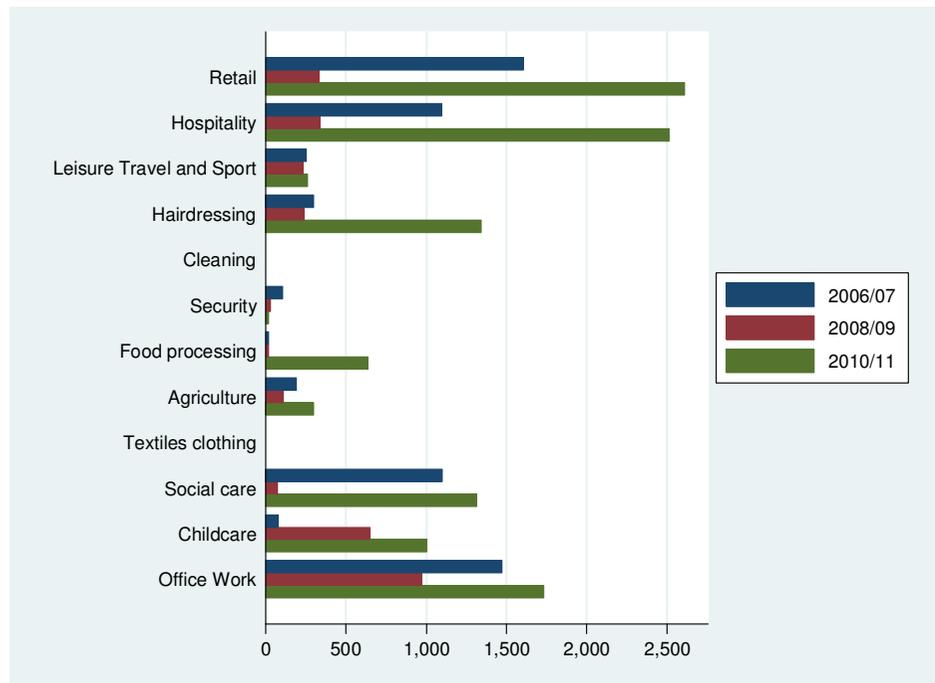
England

Wales

Scotland

Northern Ireland
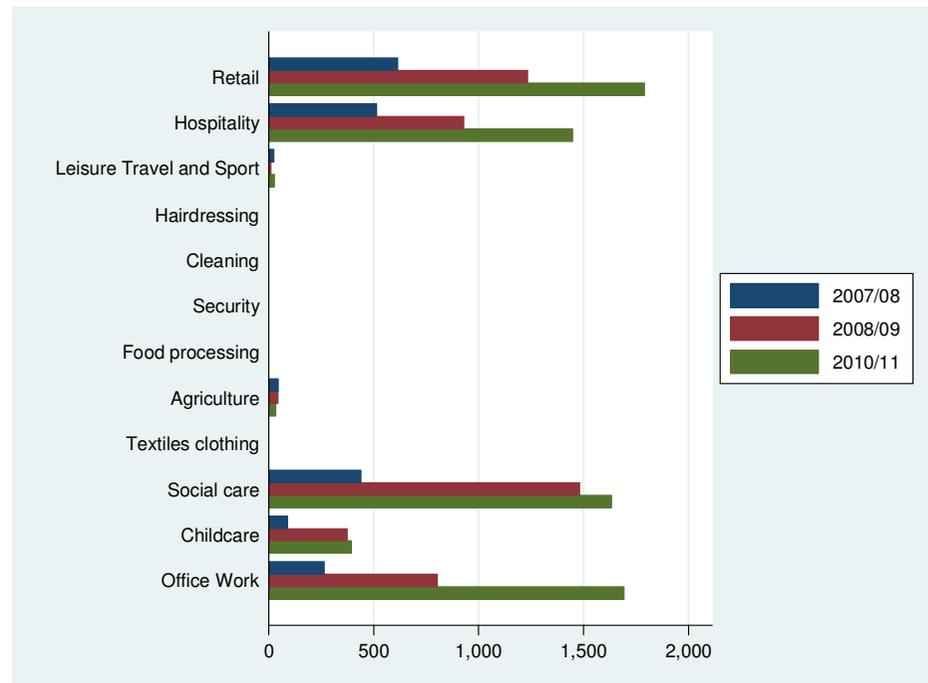
Note: Academic years in England, Wales and Scotland, financial years in Northern Ireland

Sources: Individualised Learner Records (England), Lifelong Learning Records (Wales), Skills Development Scotland Data (Scotland), Apprenticeship NI (Northern Ireland);
Sector classification in Table A1, Appendix;

2.2 Apprentice pay

2.2.1 Regulation

Pay for apprentices in the first year of their apprenticeship or generally for apprentices under the age of 19, had been exempt from National Minimum Wage regulation when this was first introduced in 1999. These exemption rules were also retained when a NMW was introduced for 16-17 year olds in 2004. However, there were some regulations in place before the universal NMWAR at £2.50 was introduced in October 2010 as shown in Table 2.2:

■ In England, a minimum wage regulation was introduced as a requirement for the funding by the LSC. From August 2005, a minimum weekly pay of £80 had to be paid for those employed in level two or three apprenticeships, which was increased to £95 in August 2009.
Non-employed apprentices were entitled to Education Maintenance Allowance payments (EMA), which varied between £10 and £30 per week, depending on the household income (if under £30,000 per year). EMA has been abolished in England, while still in effect in the other countries of the UK.

■ In Scotland, Wales and Northern Ireland, there was no explicit level of payment associated with apprenticeships, although scheme rules prescribed that apprentices had to be waged, with the exception of level 2 apprenticeships in Wales. In Scotland, a recommendation to pay the NMW existed. In addition, allowances for non-waged apprentices/Level 2 trainees were more generous in Scotland and Wales with £55 or £50 awarded respectively. In Northern Ireland a non means-tested EMA of £40 per week is payable for those in unwaged training.

When the NMWAR was introduced in October 2010 at an hourly rate of £2.50, the English regulation was effectively extended to the rest of the UK as the 'recommended minimum' of £95 per week corresponds exactly to £2.50 per hour when assuming a 38 hour working week. Therefore, one might expect that the introduction of the NMWAR resulted in more substantial regulatory change with respect to pay levels in areas outside England.

Table 2.2 Minimum wage regulation before the introduction of NMWAR

	Level two Apprenticeship	Level three Advanced Apprenticeship
England	Minimum wage of £95 per week if employed. EMA if non-employed programme-led	Minimum wage of £95 per week if employed. EMA if non-employed programme-led
Northern Ireland	Apprenticeships NI Employed Apprentices <u>must be waged</u>. Encouragement of payment commensurate with the industry rate for the job. EMA if non-employed programme-led	Apprenticeships NI Employed Apprentices <u>must be waged</u>. Encouragement of payment commensurate with the industry rate for the job.
Scotland	Skill-seekers: Minimum £55 per week training allowance if non-employed/unwaged. (Modern Apprenticeship at Level 2 only recently introduced)	Modern Apprenticeship Employed and Waged. Encouragement of payment of the National Minimum Wage.
Wales	Foundation Modern Apprenticeship Minimum £50 per week training allowance if non-employed/unwaged.	Modern Apprenticeship All are <u>employed and waged</u>.

Source: Low Pay Commission 2010

2.2.2 Pay levels

Data[1]

In the following, we provide a detailed analysis of apprentice pay based on two surveys carried out on behalf of the Department for Business, Innovation and Skills (and its predecessor):

- DIUS Survey of Apprentice Pay in England (2007).

- BIS Survey of Apprentice Pay in the UK (2011).

The 2007 survey ran from April to July and achieved a sample size of 4,477 apprentices, obtained from Individualised Learner Records (ILR). It was only conducted in England and restricted to apprentices in one of the eleven largest sector frameworks. Quotas were set to ensure that there was sufficient coverage within the sectors. As a consequence, weights had to be used to achieve

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[1] Sample sizes of the surveys are shown in Appendix 3, Tables A3.1-A3.3. The breakdown by age groups of these surveys show substantial increases in apprentices of mature age between the 2007 and 2011 surveys.

descriptive statistics corresponding to the population of apprentices. In the data supplied, missing values in the derived hourly wage variable reduce the sample size in this analysis to 4,076.

As with the previous survey, the 2011 survey[1] was undertaken in the second quarter, using disproportionate, randomly selected samples of level two and three apprentices, who were still on their course in April 2011. A large sample size of 11,020 was achieved in the UK in total (6,140 in England, 2,041 in Scotland, 1,997 in Wales and 842 in Northern Ireland) using telephone interviews of learners taken from the ILR data in England as well as learner records maintained by Lifelong Learning and Skills in Wales and Skills Development Scotland. Data for Northern Ireland was obtained in a postal survey of all learners, facilitated by the Department of Employment and Learning in Northern Ireland (DELNI).

Apprentice wage distribution and bite of the NMWAR

In the following, we describe the observed distribution of gross hourly wages for apprentices in 2007 (England) and 2011 (UK) and measure the bite of the minimum wage in 2011, which is expressed as its rate (£2.50) at the time of the survey as a percentage of the observed median wage for the group affected by NMWAR.

The histograms show the percentage of people reported providing valid hourly wage information in the sample when falling in particular intervals of one pound between a minimum of £0-£1 and a maximum of £29-£30. The different heights of the bars show the percentages falling in particular wage intervals. This implies that the observed wages exceeding £30 were recoded to £29.99.[2] This affects fewer than 0.1 per cent of the observations.

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[1] Sample sizes described in Appendix 3, Table A3.1-A3.3.

[2] In contrast to the graphs, the actual descriptions in the text are based on weighted data without the recoding of highest wages to £29.99.

In addition, the graphs show the estimated kernel densities of the wage distribution, which smooth out the contribution of each observed value x relative to other data points.[1]These kernels are then aggregated to form the kernel density estimate shown as the solid blue curve. Compared to the discrete nature of the histogram categories of £1-£30, the kernel density estimates converge faster to the true underlying density for continuous variables such as wages.

■ 2007: Median hourly wage of apprentices in England in 2007 was £4.18. The corresponding mean was £4.41. The distribution was unimodal, although there were also many apprentices in the £2-£3 wage bracket. The long right side tail shows that many of the apprentices earned more than the £2.50 per hour subsequently introduced as the NMWAR. For example, twenty five per cent of the apprentices earned more than £5.18 per hour, which was closer to the adult rate of the NMW in 2007 than to the introductory apprentice rate of October 2010 or the youth rates of 2007.

■ 2011: The 2011 survey shows median hourly gross wage of apprentices of £5.87, ie close to the NMW rate for adults. At the same time, a bimodal distribution had emerged, with relatively more people now also earning in the low pay segment close to the NMWAR (£2.50). The distribution is wider and more positively skewed, ie there has been considerable growth of the high earnings in the distribution compared to 2007. The upper quartile starts at £7.09, which is well above any minimum wage levels.

Overall the distribution of the 2011 apprentice wages in comparison to 2007 points towards a much more highly segmented apprentice labour market, with a growing low pay segment, where the NMWAR is clearly relevant, as well as an increasing high pay segment.

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[1] This depends on the distance between point x(i) and x subject to a kernel function (we assume a normal kernel on each of the data points) and a bandwidth parameter. The estimated density at any point x is

$$\hat{f}(X) = \frac{1}{N} \sum_{i=1}^{n} K\left(\frac{x - x(i)}{h}\right)$$

with kernel function K and bandwidth h. Estimated f(x) integrate to one and depend both on bandwidth and shape of the kernel function. While the latter is less, the choice of the bandwidth clearly matters as a too low bandwidth would result in very spiky kernel densities.

Figure 2.2 Apprentice pay 2007 (England) and 2011 (UK)
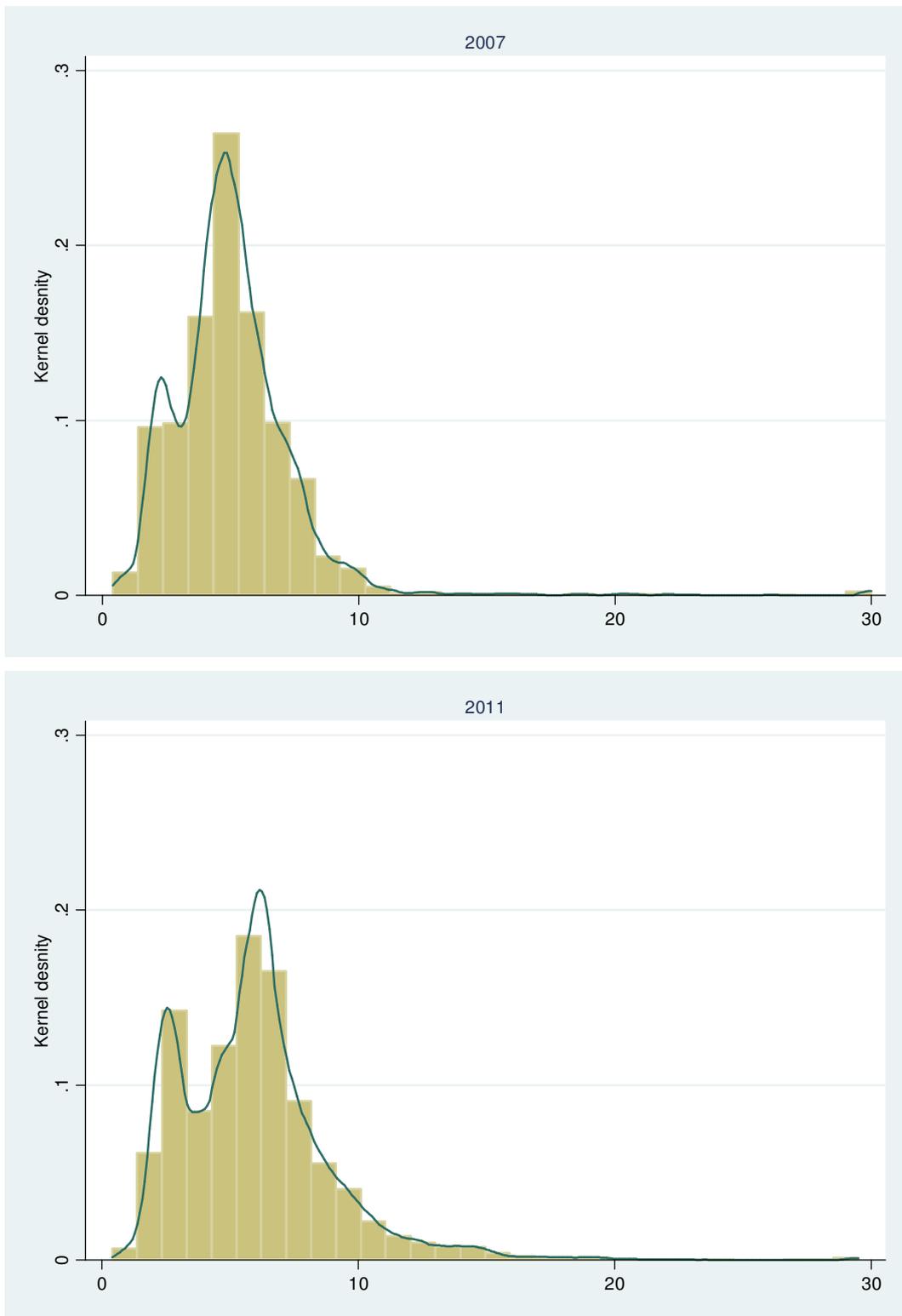
Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

NMWAR eligible group

A restriction to the group with NMWAR eligibility shows that apprentice pay for the group under 19 or if older than 19 and in their first year is only slightly below all apprentices as observed in the surveys. The median hourly wage for this group is £5.67 (compared to £5.87 for all), but the main properties of the distribution are very similar, in particular the positive skewness, the emerging bimodal shape and the hourly wage at the upper quartile above the adult rate of the NMW.

Age differences

Figure 2.4 shows the apprentice wage distribution of different age groups in England 2007 and in the UK 2011. [1] The description shows some fundamental changes in the wage distribution of various age groups and particularly the substantially decreasing wages for the youngest age groups (aged 16-18):

■ Mean apprentice wages for 16-18 year old apprentices decreased from £4.21 in 2007 (in England) to £3.73 (in England 2011, UK mean is £3.73). This reduction of mean wages happens together with a more substantial reduction in median wage from £4.03 (2007) to £2.90. The centre of the distribution has shifted to the left. In addition, while wages were growing at the lowest decile, the lower quartile of wages is lower in 2011 than in 2007 (standing at £2.44), which suggests that young apprentices are very often paid less than statutory wages.

■ The age group 19-25 shows small increases in mean wages, from £5.55 to £5.57, and an increase in median wages from £5.18 to £5.63. There are some further changes, in particular the reduction of wages at the lower quartile.

■ Finally, wage data for the age group of apprentices older than 25 (mature apprentices) show an increase in mean wages (from £6.87 to £7.81 in England/£7.85 in the UK). As was discussed in the section on learner data, this group of apprentices also grew very substantially – while they were hardly represented in the apprentice pay survey of 2007 (N=82), they now represent about one third of the total sample of the survey.

[1]   The full description of these findings can be found in Appendix 3, Tables A3.4

Figure 2.3 Apprentice wage distribution in 2007 (England) and 2011 (UK) by age groups
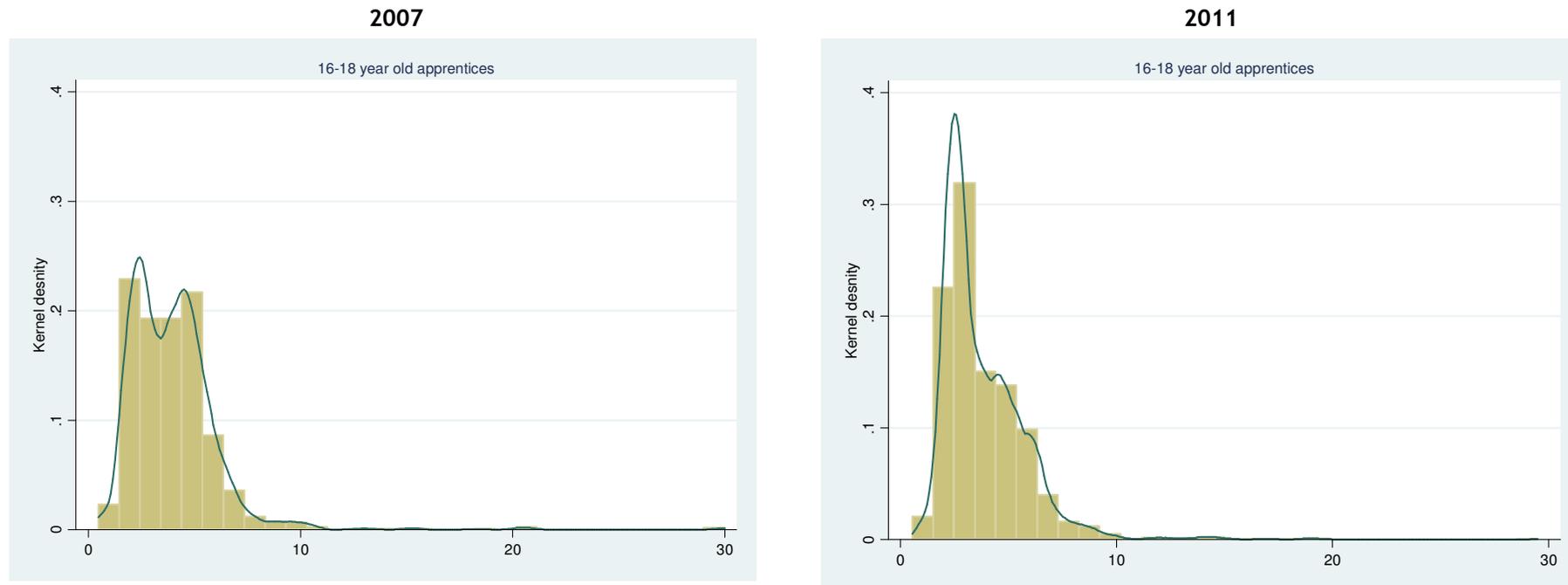
Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

Figure 2.3 (continued) Apprentice wage distribution in 2007 (England) and 2011 (UK) by age groups
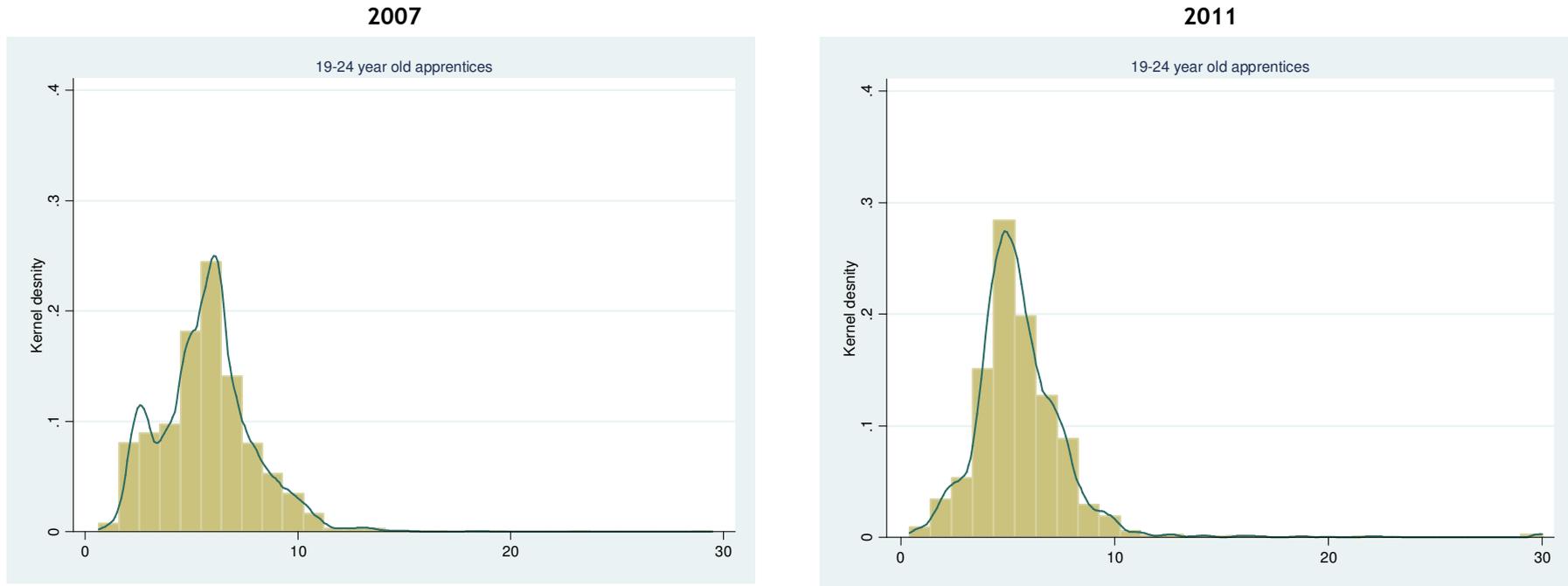
Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

Figure 2.3 (continued) Apprentice wage distribution in 2007 (England) and 2011 (UK) by age groups
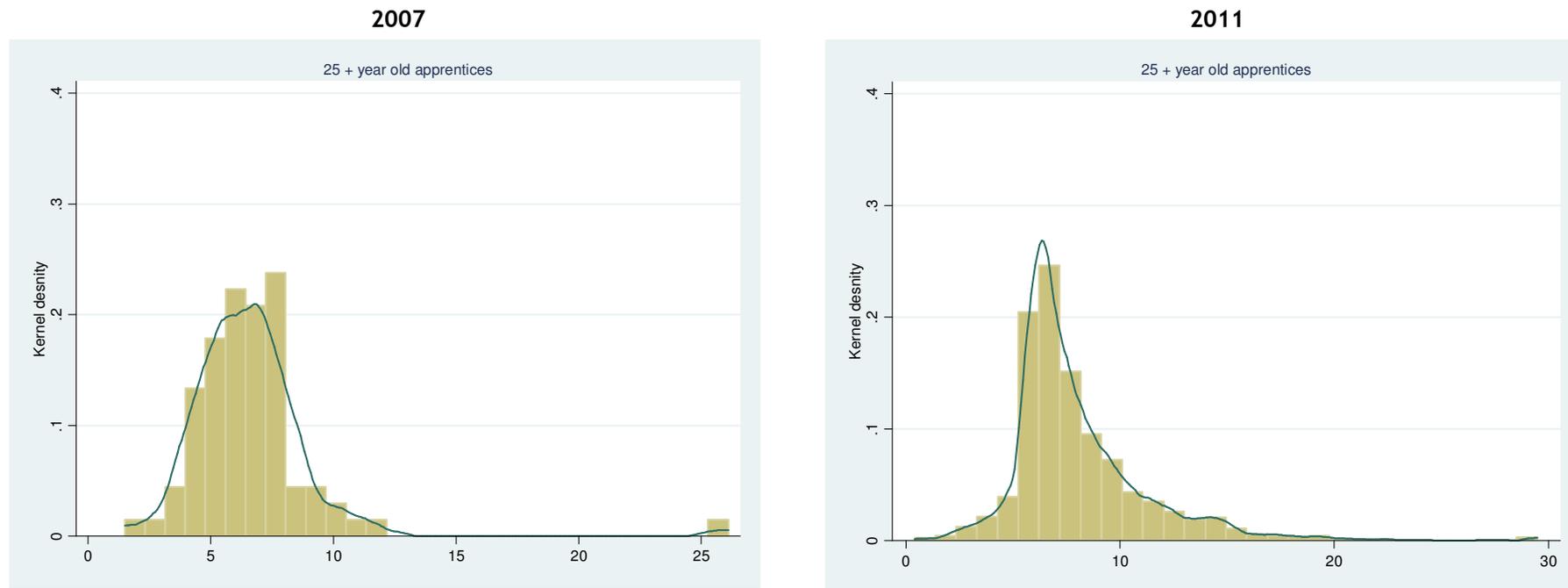
2007

2011

Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

Sector differences

Before turning to a closer description of the development for groups affected by the NMWAR introduction, we will provide some description of the entire wage distribution for each of the eleven main sectors represented in the survey, comparing the wage distributions of 2007 (England) and 2011 (UK). Low pay sectors and other sectors of the economy are shown separately in Figures 2.5 and 2.6.

The distributions of wages in all sectors are positively skewed, but much less so in customer service activities and hospitality than in the other sectors. There are also sectors with much more compressed wage distributions than in the whole distribution, especially retail (median 6.25, upper quartile 6.82, inter-quartile range only 90p) and hairdressing (inter-quartile range 1.51). Pay levels and distribution differ widely by sector, with hairdressing in 2007 showing pay levels close to what then became the NMWAR, while most other sectors' median hourly wages are close to the development and adult rates of the NMW. There are also bimodal distributions emerging in some sectors (health, retail, but particularly childcare). Overall the description at sector level shows that the 2007 distribution as shown in Figure 2.4 is caused by sector differences, with its lower part driven by hairdressing and other low pay sectors (childcare) and most of the other sectors paying apprentices closer to NMW levels.

In contrast to this, the 2011 distribution is noticeably different and shows that low-paying apprenticeships have grown in all sectors. While hairdressing remains a sector at the very bottom of the wage distribution with a unimodal distribution and a median close to the NMWAR, there are now also low pay segments in business administration, childcare and customer services, pointing towards an emerging division between low and high pay apprentices in these sectors with previously unimodal wage distribution .

Figure 2.4 Apprentice pay in low pay sectors
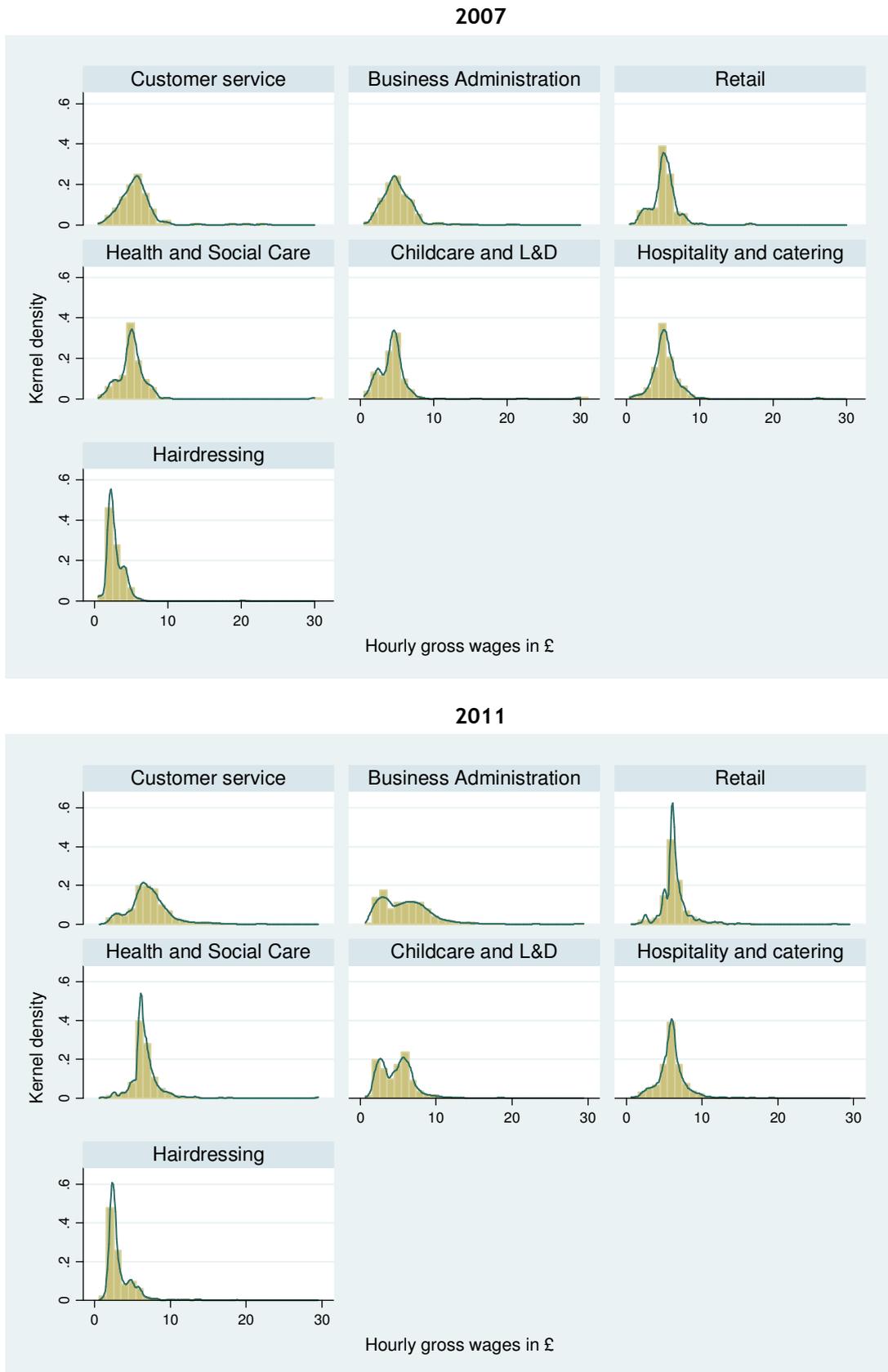
Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

Compared to Figure 2.5, the distribution of hourly pay in the other sectors of the economy shows generally higher pay levels and a narrower distribution in most of the sectors. With the exception of construction, where median hourly wages decreased between 2007 and 2011, none of the sectors show declining median hourly pay levels.

The most noticeable changes in the overall shape of the distribution are that:

- skewness increased, ie more differentiation at the higher ends of the wage distribution; and

- tendencies in the direction of bimodal wage distributions, in particular in the 'Other' sectors.

Figure 2.5 Apprentice pay in other sectors
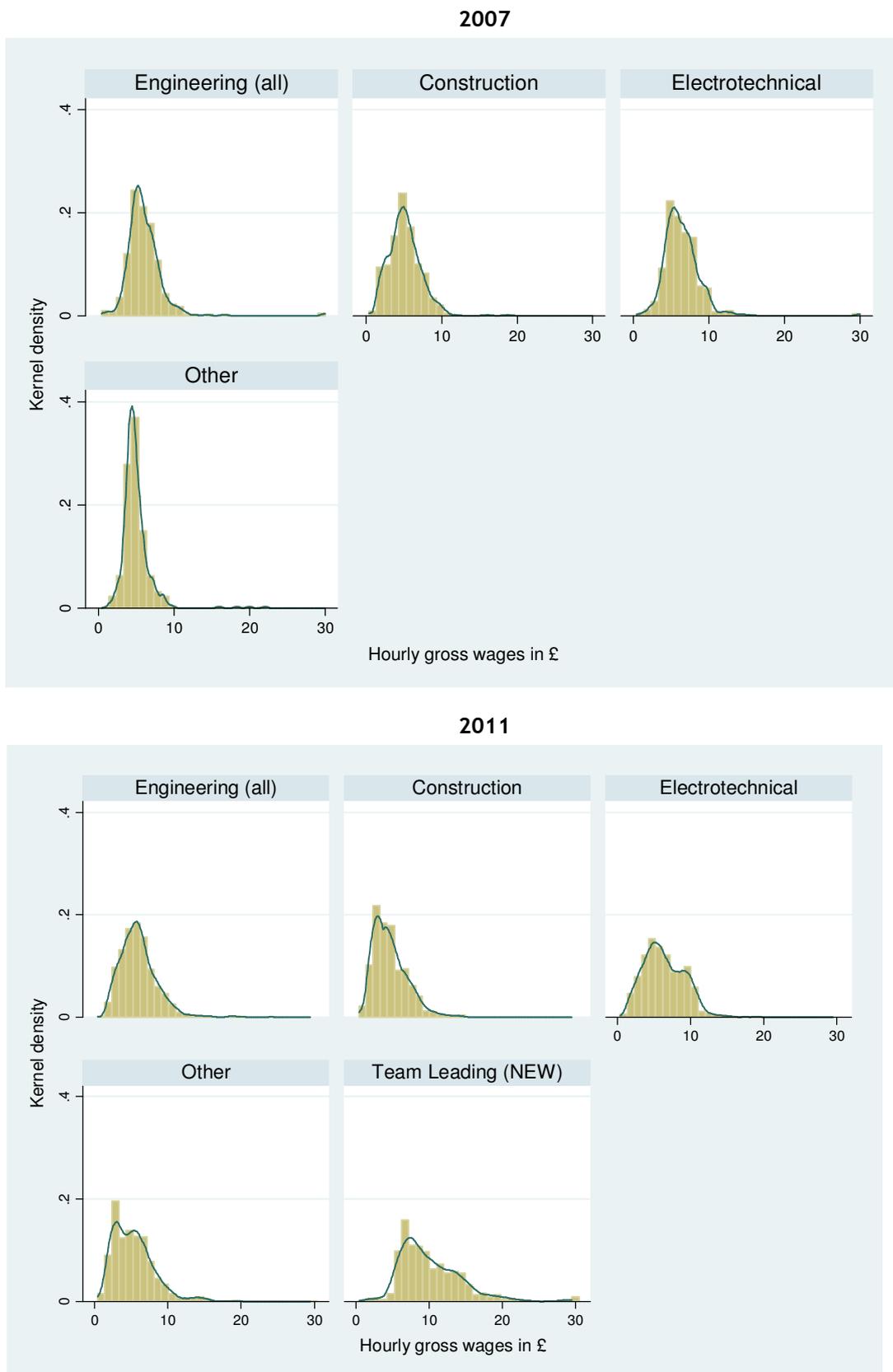
Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

Sector differences for different age groups

We further analysed distributions of apprentice wages by sector and age in 2007 (for England) and 2011 (for the UK), which can be found in Appendix 3, Table A 3.6. This table confirms the average changes in the distribution of age groups as discussed above, but adds some important details to this picture:

■ Average wages have gone down for very young apprentices (16 to 18 years old) between 2007 and 2011 in many sectors of the economy apart from retail, health and care and hairdressing. In business administration, the largest framework of service occupations in England, median hourly wages decreased from £4.20 (2007) to £2.86 (2011). In construction, wages decreased at median from £4.20 to £3.25 and mean wages decreased from £4.27 to £3.67.

■ A more complex picture is shown for the total age group below 25. Median wages for this group decreased in business administration (from £4.95 to £4.00), hairdressing (from £2.62 to £2.57), construction (from £5.00 to £4.29) and other frameworks (from £5.70 to £4.51). The mean wage has fallen in six frameworks (customer service, business administration, engineering, childcare, construction and other).

■ Apprentices above the age of 25 were hardly represented in the 2007 apprentice pay survey. The cells of the survey size are between one and thirteen, so that a description of central moments of the wage distribution for this group would not be very useful. The 2011 distribution show that hardly any of these apprentices are paid at minimum wage levels. In all sectors apart from hairdressing (where the lowest five percent are being paid below NMWAR levels), 99 per cent of the wages observed are above the NMWAR.

2.3 The Bite of the NMWAR

2.3.1 Analysis of the 'bite'

All

In the following, we describe gross hourly wages of apprentices for particular groups, the lower, median and upper quartile of the distribution and the bite of the NMWAR, which expresses the NMWAR as a percentage of the observed median wage of the various groups. We start by describing wages for all apprentices. Obviously, the bite of the NMW for all apprentices does not correspond to the bite of the NMWAR as groups are subject to various rates if older than 19 and in their second year. Table 2.3 shows such a 'hypothetical bite' of various NMW rates related to the median apprentice hourly wage with

eligibility to specific NMW rates derived from age and year of apprenticeship in individual level data. This 'hypothetical' bite was 44 per cent in 2011.

Table 2.3 Apprentice pay and minimum rates (£/h) 2007 and 2011

	Wages/ minimum wage	At percentile of distribution	England 2007	England 2011	UK 2011
All apprentices	Observed hourly wage	25%	3.92	3.75	3.77
		50%	4.89	5.83	5.87
		75%	6.06	7.02	7.09
	Eligible National Minimum Wage*	25%			2.50
		50%			2.50
		75%			4.92
	Hypothetical bite			44%	44%

*   Median Minimum Wage = Eligible National Minimum Wage level as calculated by the survey using age (Q37) and year of apprenticeship (Q5), median at sector level (2010 NMW)

Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations (results are weighted)

NMWAR eligible group

While observed apprentice wages in Table 2.3 are consistent with the basic statistics as recently published in Higton et al. (2012b), the bite of the NMWAR is only relevant for eligible apprentices under 19, or in the first year of apprenticeship if older. Therefore, all the following analyses are restricted to the population eligible for the NMWAR.

Table 2.4 shows descriptive statistics of hourly apprentice wages by country. The median is considerably higher in Wales (£6.25 compared to the UK average of £5.67), slightly higher in Northern Ireland (£5.93) but lower in Scotland (£4.71). While the lower and upper quartiles are similar across much of the UK, the wage distribution seems shifted to the right in Wales. The bite differs accordingly between 53 per cent in Scotland and 40 per cent in Wales, with England and Northern Ireland being very close to the UK average of 44 per cent.

Table 2.4 Apprentice pay (£/h) and bite by country

Observed wage by country*	at percentile of distribution	2007	2011
All	25%		3.13
	50%		5.67
	75%		6.78
	Bite		44%
England	25%	2.82	3.04
	50%	4.18	5.65
	75%	5.18	6.76
	Bite		44%
Scotland	25%		3.13
	50%		4.71
	75%		6.29
	Bite		53%
Wales	25%		4.65
	50%		6.25
	75%		8.00
	Bite		40%
Northern Ireland	25%		3.65
	50%		5.93
	75%		6.50
	Bite		42%

* restricted to apprentices with NMWAR eligibility (<19 or >=19, 1st year)

Source: BIS 2011 Survey on apprentice pay, own calculations (results are weighted)

While the bite of the NMWAR in year one is only 42 per cent at a median wage of £5.93, the bite in year two is surprisingly high at 73 per cent, which suggests that the bite of the NMWAR is more clearly related to age than to the year of apprenticeship (Table 2.5). Obviously, the NMWAR is only relevant to people under the age of 19 after the first year of an apprenticeship, and therefore refers to a much younger group than the bite expressed for apprentices in year one.

The bite is still comparatively high in year three, although there are noticeable increases in the median hourly wages and at the higher end of the wage distribution. However, in the lower part of the wage distribution (low percentile)

hourly wages for apprentices in their third year are actually lower than for apprentices in the second year.[1]

Table 2.5 Apprentice pay (£/h) and bite by year of apprenticeship

Observed wage by year *	at percentile of distribution	2007$	2011
All	25%	2.82	3.13
	50%	4.18	5.67
	75%	5.18	6.78
	Bite		44%
Year 1	25%	3.02	3.54
	50%	4.26	5.93
	75%	5.36	7.00
	Bite		42%
Year 2	25%		2.41
	50%		3.44
	75%		4.75
	Bite		73%
Years 2 and 3[2]	25%	2.72	2.39
	50%	4.17	3.50
	75%	5.16	4.89
	Bite		71%
Year 3	25%		2.14
	50%		4.57
	75%		6.84
	Bite		55%

$ 2007 only England
* restricted to apprentices with NMWAR eligibility (<19 or >=19, 1st year)

Source: BIS 2011 Survey on apprentice pay, own calculations (results are weighted)

Table 2.6 more explicitly shows the bite of the NMWAR for the different age groups. Young people (16-17 year olds) clearly mark the lower end of the wage distribution, with median wage levels of £2.75 and reported gross hourly wages in the lower quartile below the NMWAR. The bite is correspondingly high at 91 per cent. The lower quartile of an hourly wage of £2.38 corresponds to £95/week for 40 hours (equivalent to the weekly pay set by the LSC before 2011), but is below

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[1] This represents an age effect as young people tend to engage more in multi-year programmes.

[2] Year 2 and 3 are one category in 2007.

statutory pay levels set by the NMWAR of £2.50 by the time of the survey. Young people also show substantial declines in hourly wages across the distribution when comparing 2007 and 2011, with stagnant lower quartiles and falling wages at the median and upper quartile of the distribution.

The bite declines for apprentices aged 18 as the observed median hourly wage increases. The bite is much smaller for apprentices aged 19+. The NMWAR is clearly less important for older apprentices than for the very young.

Table 2.6 Apprentice pay (£/h) and bite by age groups

	at percentile of distribution	2007[$]	2011
All	25%	2.82	3.13
	50%	4.18	5.67
	75%	5.18	6.78
	Bite		44%
16-17 year olds	25%	2.38	2.38
	50%	3.46	2.75
	75%	4.57	4.00
	Bite		91%
18 year olds	25%	2.75	2.50
	50%	4.19	3.28
	75%	5.13	4.95
	Bite		76%
19+ year olds	25%	3.96	5.00
	50%	4.94	6.20
	75%	6.24	7.45
	Bite		40%

[$]   2007 England only
*   restricted to apprentices with NMWAR eligibility (<19 or >=19, 1st year)

Source: BIS 2011 Survey on apprentice pay, own calculations (results are weighted)

2.3.2 Bite by sector

The breakdown of the analysis by sector shows that the median hourly wage of apprentices in most of the sectors increased between 2007 and 2011 for the group eligible for the NMWAR, in particular in low pay sectors. Compared to this, wages in some of the non-low pay sectors were stagnant or declined, namely in engineering, construction and electro-technical industries, where wages at the lower quartile and median declined. The bite by sectors ranges from almost 100

per cent in hairdressing to 29 per cent for apprentices in team leading and management, with most sectors having a bite of around 50 per cent.

Table 2.7 Apprentice pay (£/h) and bite by framework

Sector*	Percentile	2007$	2011	Sector*	Percentile	2007$	2011
All	25%	2.82	3.13				
	50%	4.18	5.67				
	75%	5.18	6.78				
	Bite		44%				
Customer service	25%	3.88	5.37	Hospitality and catering	25%	4.03	5.00
	50%	4.89	6.50		50%	4.76	5.94
	75%	6.51	8.00		75%	5.26	6.50
	Bite		38%		Bite		42%
Business administration	25%	3.2	2.71	Hairdressing	25%	2.00	2.30
	50%	4.34	5.05		50%	2.37	2.56
	75%	5.18	7.50		75%	2.97	3.31
	Bite		50%		Bite		98%
Retail	25%	3.47	5.90	Construction	25%	3.00	2.63
	50%	5.03	6.25		50%	4.22	4.00
	75%	5.68	6.78		75%	5.26	5.75
	Bite		40%		Bite		63%
Health and social care	25%	2.70	5.92	Team leading and management	25%		6.85
	50%	4.62	6.25		50%		8.50
	75%	5.57	7.00		75%		11.81
	Bite		40%		Bite		29%
Engineering (all categories)	25%	4.04	3.45	Electro-technical	25%	4.00	3.68
	50%	4.9	4.79		50%	5.00	5.00
	75%	5.75	6.25		75%	6.04	6.50
	Bite		52%		Bite		50%
Children's care, learning and development	25%	2.57	2.50	Other	25%	3.49	2.63
	50%	4.07	4.77		50%	3.85	4.59
	75%	4.99	6.00		75%	4.53	6.30
	Bite		52%		Bite		54%

$ 2007 England only
* restricted to apprentices with NMWAR eligibility (<19 or >=19, 1st year)

Source: BIS 2011 Survey on apprentice pay, own calculations (results are weighted)

3 Impact Analysis

3.1 Empirical strategy

3.1.1 The evaluation problem

Our evaluation aims to estimate the causal impact of the introduction of the National Minimum Wage Apprentice Rate (NMWAR) on gross hourly apprentice wages, which implies that outcomes following the introduction of the NMWAR have to be compared to a hypothetical outcome had there been no introduction of the NMWAR. This follows causal models as, for example, suggested by Rubin (1974) or Heckman and Vytlacil (2007).

The fundamental problem here is that this hypothetical outcome cannot be observed. Any empirical evaluation has to address this fundamental evaluation problem of estimating outcomes relative to the counterfactual either using an informative control group of young people not affected by the regulatory changes or based on outcomes from a period before. Estimating the unbiased impact of the introduction of the NMWAR is particularly difficult for two reasons:

■ The universal coverage of the NMWAR for all apprentices implies that there are no groups of substantial size, which could be used in order to construct a comparison group as, for example, for microeconomic impact evaluations of voluntary programmes.[1]

■ Any situation in the past is unlikely to be a helpful measure of comparison because the economic cycle has had massive implications on young people applying for apprenticeships and more generally for the transitions between the education system and paid employment. As a consequence, a before-after

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[1]   Note that apprentices not covered by the NMWAR do not offer a suitable control group as this would only allow us to estimate the impact of the NMWAR introduction on the wages of some of the apprentices after year one representing a selective group.

comparison would not result in any credible impact estimates because of the time, the economic cycle and also the policy changes implemented to subsidise the creation of apprenticeships by employers.

Therefore, a straightforward non-experimental evaluation that could benefit from a matched control group, which is the contemporary standard of microeconomic programme evaluation, cannot be undertaken.

3.1.2 Estimating the counterfactual

Conceptual issues

The standard approach to estimate the impact of a minimum wage is to compare groups, which are affected or unaffected by the minimum wage or a specific uprating[1]. Usually, such studies use groups of people with reported pay below NMW levels comparing it with another group just above NMW levels for a variety of outcomes.

By taking differences between the time before the introduction of the NMW and after the introduction, and taking the differences between both groups (thus implementing the difference-in-differences estimator or DiD), such studies have estimated the impact of the NMW on employment probabilities of low-wage workers and other outcomes of interest (eg Stewart 2004).

Implementation

As a reserved policy matter, the variation between England, Scotland, Wales and Northern Ireland could in principle be exploited to estimate a counterfactual outcome based on control groups because the introduction of the NMWAR replaced regulation, which hitherto existed as a devolved matter in the context of regulation on apprenticeships. However, in reality, numbers of apprentices outside England are very small and would have been of limited relevance as most of the apprentices are based in England.

We decided to implement an alternative DiD based on a control group, which remained unaffected by the introduction of the NMWAR or pre-dating minimum pay regulation. More specifically, we implemented two approaches:

A) A control group of non-apprentices, whose main economic status is employment and who are aiming to achieve similar vocational

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[1] Initially suggested by Card and Krueger (1993), who compared the 80 cent increase in the New Jersey minimum wage (to $4.25) to neighbouring Pennsylvania which provided a natural comparison group.

qualifications in alternative (ie learner-focused) arrangements provides a more credible control group. As was shown in Table 2.1 above, this group represents the majority of learners for level two and level three qualifications in the UK, allowing us to condition on characteristics (age/sector) which are crucial for differences in productivity (and wages) not affected by the NMWAR introduction.

B) Apprentices in both surveys, who report to earn more than the upcoming NMWAR. In our view, such an approach requires more assumptions than other econometric studies on the impact of the NMW for adults because apprentices are developing skills over time. As a consequence, specifically low hourly wages naturally increase over time more dynamically than wages for apprentices, whose pay is higher at the onset: Given similar learning aims/achievements, such wage differentials should converge as people with initially lower pay increase to similar productivity levels. In order to avoid that some of this dynamic is then incorrectly attributed to the impact of the NMWAR introduction in a difference-in-differences analysis, we therefore additionally control for age and year of the apprenticeship.

3.2   Description of treatment and control groups

3.2.1   Apprentices and non-apprentices

Description of learning characteristics

Table 3.1 on the following page shows a description of the control group obtained from LFS data. In order to achieve large sample sizes, this group was obtained by pooling observations from LFS data over the four quarters of the years 2007 and 2011, who had reported that employment was their main economic status, that they were undertaking training leading to intermediate qualifications and that valid information for hourly wages could be obtained from the data. In addition, only persons were included who answered that an apprenticeship was not part of their main employment.

Table 3.1 shows the learning aims of these control groups. Two thirds of non-apprenticeships are studying towards occupational qualifications, most of them for NVQs. However, there are also substantial numbers of A-Level/AS-Level students, which we continue to include in the control group in order to retain sufficient sample sizes for an analysis at sector level.

Table 3.1 Education aims of control groups used in DiD analysis

	2011		2007	
	Freq.	Percent	Freq.	Percent
NVQ level 3	325	29.68	306	22.09
Advanced/Progression (14-19) Diploma	+	+		
Level 3 Diploma	+	+		
International Baccalaureate	+	+	+	+
A-level or equivalent	300	27.4	366	26.43
RSA advanced diploma	+	+	+	+
OND/ONC/BTEC/SCOTVEC National etc.	95	8.68	88	6.35
City & Guilds Advanced Craft/Part 1	+	+	+	+
Access qualifications	+	+	+	+
AS-level or equivalent	56	5.11	83	5.99
Level 4 Award	+	+		
NVQ level 2 or equivalent	234	21.37	272	19.64
CR intermediate	+	+		
City & Guilds Craft/Part 2	+	+	+	+
BTEC/SCOTVEC First or General diploma e	+	+	+	+
Higher (14-19) Diploma	+	+		
Level 2 Diploma	+	+		
Level 2 Certificate	+	+		
GNVQ intermediate			+	+
RSA diploma			+	+
NVQ level 1 or equivalent			43	3.1
GNVQ/GSVQ foundation level			+	+
BTEC/SCOTVEC first/general certificate			+	+
RSA other			+	+
O-level or equivalent			134	9.68
Total	1,095	100	1,385	100

[+]Suppressed because of small cell sizes

Source: UK Labour Force Survey Data, unweighted frequencies (variables hitqua5/hitqua11) of pooled Q1-Q4 of 2007 and Q1-Q4 2011 for groups with valid information on hourly pay,

Characteristics of DiD samples

The descriptive statistics of the samples used for the DiD analysis reveal some fundamental differences between apprentices and other learners, in particular when using groups from the full age range between 16 to 65. The description is restricted to England, excluding the non-English apprentices available from the

survey because the survey of apprentices in 2007 had only been implemented in England. The description shows wages of £5.09 on average in 2007 for apprentices, rising to £5.86 in 2011. However, there are also substantial differences in average age and gender composition between 2007 and 2011. Average age increased by six years, showing many more mature apprentices who are likely to have had substantial pre-apprentice learning and employment experience. In addition, there are more women (53% in 2011 compared to 45% in 2007).

A breakdown by subsectors, as defined in part two of the paper, indicates that the increase in average age and the share of women was more substantial in the low pay sectors than in other sectors. Average age in other (non low-pay) sectors increased from 19.5 years to 20.9 years, while it increased from 20.4 years to 32.5 years in retail, from 21.3 years to 34.6 years in care, and similarly between four and eight years in all other low pay sectors.

The proportion of women in apprenticeships increased on average by seven percentage points, but decreased in care and childcare, although in those sectors, we still find an almost entirely female workforce. The share of women in non-low pay sectors increased from one per cent to eight per cent.

In contrast to this, the comparison groups of non-apprentices in 2007 and 2011 show much less change in average characteristics. Average age and average hourly wages are higher for these groups and there is a much higher share of women. Between 2007 and 2011, average gross hourly wages of this group increased slightly from £6.94 to £7.42.

In the light of the change in observable characteristics, the observed unconditional increase in average apprentice hourly wages comparing the 2007 and the 2011 surveys on apprentice pay are put into a different perspective: the cohorts engaged in apprenticeships differ substantially in their average characteristics, especially in age and therefore labour market experience, likely to result in relatively higher hourly pay on average. When looking into those sectors with relatively unchanged characteristics, which are the traditional non-low pay sectors offering apprenticeships, the average change in hourly wages points towards falling wages of apprentices between 2007 and 2011, which is likely to be similar for other sectors if differences in observable characteristics are controlled for, eg in a multivariate model.

Table 3.2 Characteristics of DiD-samples broken down by sectors§ (unweighted)

Sector	Group	Year	Hourly wage§	Age	Female	Observations
All	Non-Apprentices	2007	£6.94	27.62	64%	1,385
		2011	£7.42	27.47	65%	1,095
	Apprentices	2007	£5.09	19.73	45%	4,150
		2011	£5.86	25.74	53%	6,140
Non-Low*	Non-Apprentices	2007	£8.62	34.30	60%	506
		2011	£8.84	34.26	63%	459
	Apprentices	2007	£5.67	19.49	1%	1813
		2011	£5.52	20.86	8%	2028
Retail	Non-Apprentices	2007	£5.43	19.86	62%	410
		2011	£6.34	20.54	62%	253
	Apprentices	2007	£5.15	20.42	61%	254
		2011	£6.37	32.48	73%	537
Care	Non-Apprentices	2007	£7.65	37.58	82%	137
		2011	£8.88	36.02	79%	56
	Apprentices	2007	£5.16	21.32	91%	285
		2011	£6.43	34.26	84%	511
Childcare	Non-Apprentices	2007	£6.83	31.64	86%	44
		2011	£5.80	30.28	94%	32
	Apprentices	2007	£4.53	19.78	97%	403
		2011	£4.77	23.25	95%	518
Hospitality	Non-Apprentices	2007	£5.26	18.88	59%	176
		2011	£5.54	18.86	64%	179
	Apprentices	2007	£5.30	20.53	49%	330
		2011	£5.77	26.30	50%	496
Hairdressing$^{\&}$	Non-Apprentices	2007	+	+	+	+
		2011	+	+	+	+
	Apprentices	2007	£2.82	18.29	91%	475
		2011	£3.29	19.01	92%	491
Other low$^{\&}$	Non-Apprentices	2007	£6.73	25.40	59%	99
		2011	£6.75	23.18	59%	91
	Apprentices	2007	£5.26	20.08	73%	590
		2011	£7.26	29.74	68%	1,559

Notes: §Sectors adjusted to LPC definition (DIUS and BIS surveys sectors/LFS using SIC/SOC-Codes as specified in LPC (2010), Table A 4.1.
* Non-low pay: Engineering, construction, electro-technical and others,
$^{\&}$Other low pay: Customer Service, Business Admin., Team Leading and Management,
$^{+}$Suppressed because of small cell sizes

Sources: DIUS 2007/BIS 2011 Surveys on apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Some further insight into this can be gained when looking into cohorts of similar age. Table 3.3 shows descriptive statistics restricting the sample to all under 25 year olds and suggests that average hourly gross wages have fallen for apprentices on average and in non-low pay sectors, while they were increasing slightly for apprentices in most low-pay sectors (except for child carers). Observable characteristics for both apprentices and other non-apprentice learners are now much more similar over time, with only small differences in age and gender, with the exception of the increase of women in non-low pay sectors.

Table 3.3 Under 25's DiD-samples broken down by subsectors (unweighted)

Sector	Group	Year	Hourly wage§	Age	Female	Observations
All	Non-Apprentices	2007	£5.36	17.89	62%	796
		2011	£5.78	18.19	65%	626
	Apprentices	2007	£5.06	19.52	44%	4009
		2011	£4.98	19.43	45%	4187
Non-Low*	Non-Apprentices	2007	£6.23	19.38	62%	151
		2011	£6.45	19.49	66%	137
	Apprentices	2007	£5.64	19.39	1%	1785
		2011	£5.23	19.20	7%	1813
Retail	Non-Apprentices	2007	£5.13	17.31	60%	363
		2011	£5.58	17.59	62%	216
	Apprentices	2007	£5.13	20.20	62%	244
		2011	£5.80	20.48	62%	240
Care	Non-Apprentices	2007	+	+	+	+
		2011	+	+	+	+
	Apprentices	2007	£5.13	20.79	91%	255
		2011	£5.72	20.45	88%	172
Childcare	Non-Apprentices	2007	+	+	+	+
		2011	+	+	+	+
	Apprentices	2007	£4.49	19.48	97%	383
		2011	£4.34	19.27	95%	404
Hospitality	Non-Apprentices	2007	£5.02	17.37	58%	163
		2011	£5.37	17.59	63%	164
	Apprentices	2007	£5.18	20.20	49%	309
		2011	£5.29	19.95	43%	321
Hairdressing$^\&$	Non-Apprentices	2007	+	+	+	+
		2011	+	+	+	+
	Apprentices	2007	£2.82	18.26	90%	473
		2011	£3.21	18.28	92%	468
Other low$^\&$	Non-Apprentices	2007	£5.62	17.46	60%	65
		2011	£5.96	17.95	63%	65
	Apprentices	2007	£5.21	19.79	73%	560
		2011	£5.27	20.00	68%	769

Notes: §Sectors adjusted to LPC definition (DIUS and BIS surveys sectors/LFS using SIC/SOC-Codes as specified in LPC (2010), Table A 4.1.
* Non-low pay: Engineering, construction, electro-technical and others,
$^\&$Other low pay: Customer Service, Business Admin., Team Leading and Management,
$^+$Suppressed because of small cell sizes.

Sources: DIUS 2007/BIS 2011 Surveys on apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Characteristics of the wage distribution

Figure 3.1 shows the wage distribution of the DiD samples of apprentices and non-apprentices in England in 2007 and 2011 from the apprentice pay surveys and LFS data. A restriction to specific ages or the year of apprenticeships was not set as the LFS data do not allow control for the year of apprenticeship and thus, we cannot impose NMWAR eligibility on LFS data. In addition, we had to pool LFS data for hourly wages to achieve larger sample sizes for non-Apprentices.

The resulting histograms/kernel density estimates show strictly unimodal distributions of hourly gross wages for non-apprentices with median values of £5.82 in 2007, increasing to £6.25 in 2011.[1] The distribution is increasingly positively skewed (skewness increased from 2.55 to 9.36). Accordingly, there are higher mean values (£6.94 in 2007 and £7.42 in 2011). Mean values for Apprentices in England are slightly higher than the median (£5.09 compared to £4.88) in 2007 and slightly lower in 2011 (£5.86 compared to £5.90). The distribution is less positively skewed in 2011. As was found in the descriptions before, the emerging bimodal distribution observed in 2007 becomes more manifest in 2011, when a clear second peak appears around the NMWAR.

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[1]   Full description of the distributions in Appendix 4, Table A4.1.

Figure 3.1 DiD samples: Apprentices (Surveys) and other learners (LFS)
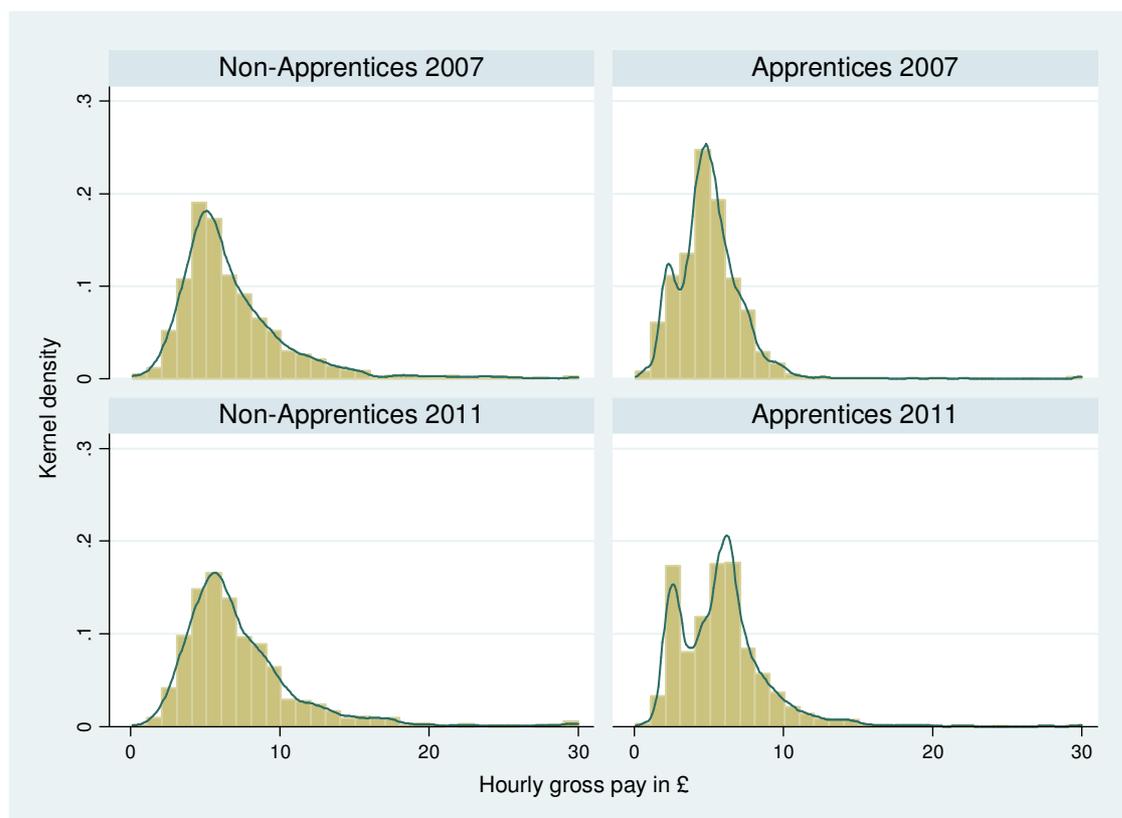
Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Unconditional difference-in-differences in full samples

The comparison at the median shows that the non-apprentice wages are 5.9 per cent above the apprentice wages (with a difference at the mean of 27%) decreasing from 19.3 per cent in 2007 (with the difference at the mean of 36%).

This indicates that unconditional wages of apprentices and non-apprentices become more similar over time as hourly wages of apprentices increased more significantly (+15%) than the wages of non-apprentices (+7%). Taking simple Difference-in-differences at means would result in positive impacts of the NMWAR introduction as the average difference decreases over time, showing an increase of £0.29. However, as was shown in the descriptive statistics, the 2011 cohort of apprentices are very dissimilar to the cohort observed in 2007 and such differences in characteristics have to be controlled in order to obtain an interpretable estimate of the impact of the NMWAR introduction.

Unconditional difference-in-differences in young cohorts

A first way of eliminating the impact of changes in characteristics is to restrict samples to groups with similar observable characteristics, in particular when of similar age as shown in Table 3.3 in the previous section. In Figure 3.2, we show the observed wage distribution of the DiD samples when restricting both groups to young apprentices under the age of 25. When looking through the differences in sample medians, a very different picture emerges: Median apprentice hourly pay increased for both groups between 2007 and 2011 from £5.00 to £5.31, while non-apprentice pay went up from £4.82 to £4.93.[1]

However, as can also be clearly seen from Figure 3.2, there is now a much clearer bimodal distribution observed for this group and the distribution is much less skewed. This all contributes to decreasing mean hourly wages observed for apprentices under the age of 25 (from £5.06 to £4.98).

As a consequence, while median hourly wages of the control group are seven per cent above those of apprentices (in 2007, it was 3.8%), the difference in means actually increased to 16 per cent compared to only six per cent (in 2007). A resulting unconditional difference-in-differences would show a decrease of mean gross hourly wages of apprentices by £0.50 replicated from means of the sample descriptions.

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[1]   Full description in Appendix 4, Table A4.2.

Figure 3.2 DiD samples (group <25): Apprentices (surveys) and other learners (LFS)
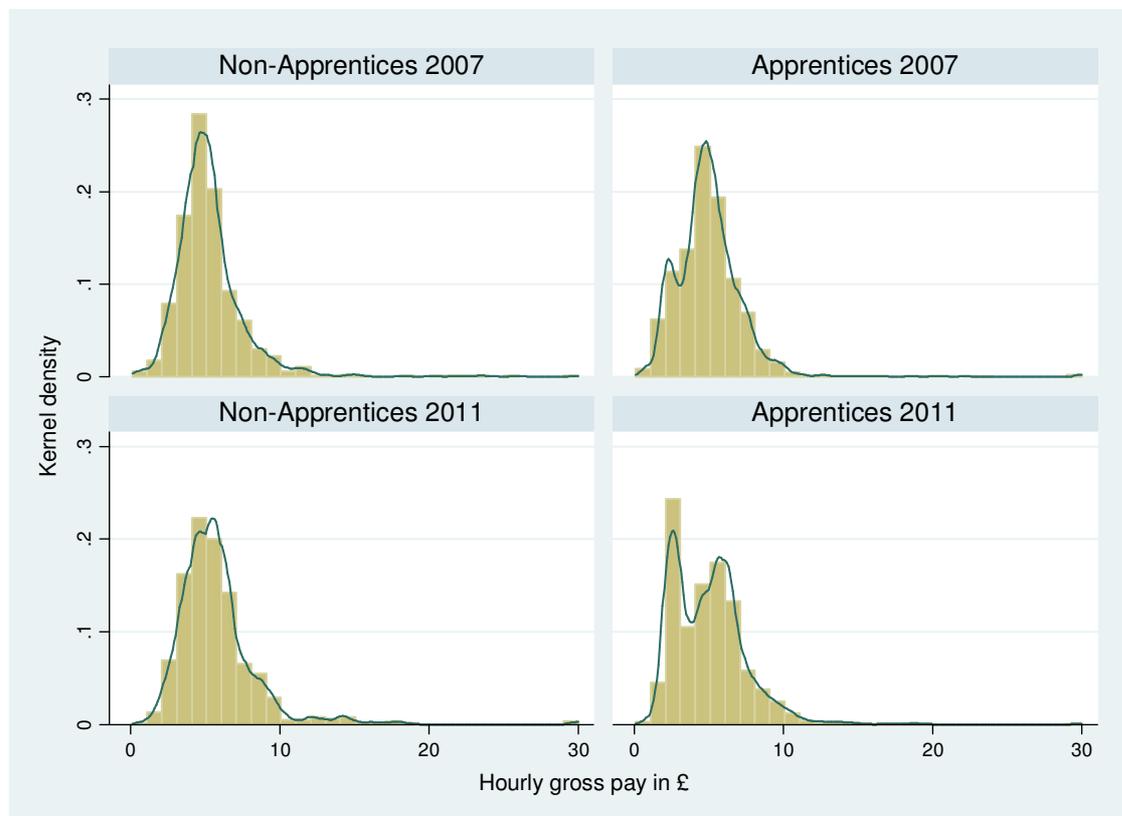
Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, UK Labour Force Survey data
*Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations*

Note that we implemented the same analysis solely on the basis of samples of Apprentices and non-apprentices taken from LFS data[1] in order to address problems that may arise from using different data sources for the different groups. A naïve difference-in-differences estimator based on LFS data would show an impact of -£0.90 based on all LFS apprentices/non-apprentices.

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[1]   The associated histograms and descriptions can be found in Appendix 4, Figure A4.1. In these descriptions, which compare the hourly wages of all English apprentices found in LFS data with a corresponding group of other non-apprentice learners with similar learning aims at levels two and three, a similarly negative development of Apprentice pay has been found for the group of under 25 year olds. According to LFS data, median apprentice pay decreased from £5.12 in 2007 to £4.72 in 2011 and mean hourly pay from £5.86 to £5.44. Non-Apprentice pay increased from £6.94 to £7.42. A naïve difference-in-differences estimator would show an impact of -£0.90.

Note that no bimodal distribution had been found for apprentice pay on the basis of LFS data as was shown in Figures 3.2 and 3.2. Consistent with the description of the survey data, such a result is not surprising as there are far less mature apprentices in LFS data (who cause the increasing bi-modal distribution in 2011) than in the 2011 apprentice pay survey, see footnote 13 above for some further discussion.

3.2.2 Apprentices below and above the NMWAR

Characteristics of DiD samples

The second empirical approach uses groups of apprentices above and below the NMWAR threshold implemented in 2010 and compares their development between 2007 and 2011. Table 3.4 compares mean values of important characteristics for these different groups.

The hourly wages for the group below £2.50 increased from £1.95 to £2.11, while average age remained fairly constant around 18 years. 42 per cent started their apprenticeship from school or non-HE education in 2007 and similarly, 39 per cent in 2011. However, there are also some significant changes, eg in the share of female apprentices, falling for apprentices earning below £2.50 from 73 per cent (2007) to 53 per cent.

In contrast, the groups of apprentices earning more then £2.50 per hour in 2007 and 2011 are very different: average age of this group increased from 20 to 26 years. Forty-four per cent reported in 2011 that they had been working for their employer for at least a year before starting the apprenticeship, 30 percentage points above the corresponding figure from the 2007 survey. About 45 per cent are level three apprentices in 2011 (60% in 2007).

As was repeatedly discussed previously, this increase in the number of apprentices over 25 substantially affects the observed wages for the group unaffected by the NMWAR introduction (increasing from £5.51 in 2007 to £6.25 in 2011). A naïve DiD estimator on this basis would result in a wage decrease of around £0.58 an hour for the group of apprentices below NMWAR.

DiD samples of young apprentices

As for the alternative empirical strategy using control groups from LFS, we also restrict samples for this DiD to apprentices of the specific age groups in order to achieve more consistency over time in important characteristics. The description of the average characteristics for young apprentices below the age of 25 is shown in Table 3.5 below. A corresponding description of the groups above 25 years is not informative because this group was very small in the year 2007.

■ Average age is similar for groups earning below and above the £2.50 threshold in 2007 and 2011 with around 18 and 19.6/19.7 respectively.

■ The share of female participants in the groups earning above £2.50 in both years is similar, while in 2007, female apprentices were extremely over-represented in the group below £2.50 (in 2007).

- The share of people in year one of their apprenticeships of those earning below £2.50 has increased from 24 per cent in 2007 to 74 per cent in 2011, similar to the change observed for the group of apprentices earning above £2.50.

- Of the low-earning apprentices in 2007, about 12 per cent said that they were working with their employer for at least a year before the apprenticeship. The corresponding share in 2011 is ten per cent. Of those apprentices whose wages were above £2.50 in both years, there are more than twice as many reporting to have been with their employer at least a year before the apprenticeship in 2011 than in 2007 (29% compared to half this in 2007).

- Table 3.5 compares further characteristics within sectors for the various groups of apprentices below and above the £2.50 threshold and shows that these groups are far more consistent over time than samples for the total group of apprenticeships.

A naïve DiD estimator for the group of apprentices below the age of 25 years based on this estimation strategy would show an increase of £0.22 an hour between 2007 and 2011. As for the empirical strategy using a group of non-apprentices as a comparison group, this effect would not be driven by the great differences in the development by sectors: The naïve DiD estimator would show increases in childcare (+£0.55), hospitality (+£0.19), other low (+£0.26) and non-low pay sectors (+£0.27), while decreasing in other sectors. However, such sector-specific estimates would not be informative without further controlling for changes in apprenticeship characteristics, which remain within the group of apprentices below the age of 25.

Table 3.4 Characteristics of alternative DiD-samples broken down by sectors[§] (unweighted, all)

Sector	Group	Year	Hourly wage[§]	Age	Female	Percentage shares of apprenticeships with following characteristics					Observations
						With employer at least one year before course	Started apprenticeship from school/ non-HE college	In year one	Level 3	Eligible to NMWAR	
All	Earning < £2.50	2007	£1.95	18.2	73%	12%	42%	24%	21%	79%	419
		2011	£2.11	18.3	53%	10%	39%	73%	17%	89%	494
	Earning > £2.50	2007	£5.51	19.9	41%	14%	32%	14%	60%	36%	3,731
		2011	£6.25	26.4	53%	44%	15%	75%	45%	79%	5,646
Non-Low*	Earning < £2.50	2007	£1.91	18.4	3%	12%	47%	8%	29%	73%	77
		2011	£2.03	18.2	9%	8%	38%	72%	29%	86%	194
	Earning > £2.50	2007	£5.84	19.5	1%	16%	45%	6%	67%	31%	1,736
		2011	£5.95	21.1	8%	25%	28%	54%	64%	63%	1,834
Retail	Earning < £2.50	2007	+	+	+	+	+	+	+	+	+
		2011	+	+	+	+	+	+	+	+	+
	Earning > £2.50	2007	£5.41	20.5	61%	7%	7%	21%	43%	32%	243
		2011	£6.42	32.6	73%	70%	3%	92%	12%	93%	531
Care	Earning < £2.50	2007	+	+	+	+	+	+	+	+	+
		2011	+	+	+	+	+	+	+	+	+
	Earning > £2.50	2007	£5.47	21.4	90%	8%	11%	22%	51%	30%	269
		2011	£6.48	34.4	84%	49%	4%	86%	41%	87%	506

| Sector | Group | Year | Hourly wage$ | Age | Female | Percentage shares of apprenticeships with following characteristics | | | | | |
						With employer at least one year before course	Started apprenticeship from school/ non-HE college	In year one	Level 3	Eligible to NMWAR	Observations
Childcare	Earning < £2.50	2007	£1.86	18.2	98%	5%	51%	32%	41%	73%	59
		2011	£2.11	18.6	92%	10%	40%	81%	33%	90%	48
	Earning > £2.50	2007	£5.08	20.0	97%	16%	29%	20%	82%	39%	344
		2011	£5.14	23.7	95%	30%	20%	79%	61%	82%	470
Hospitality	Earning < £2.50	2007	+	+	+	+	+	+	+	+	+
		2011	+	+	+	+	+	+	+	+	+
	Earning > £2.50	2007	£5.44	20.6	50%	11%	6%	21%	53%	37%	321
		2011	£5.95	26.6	51%	55%	5%	88%	25%	88%	477
Hairdressing&	Earning < £2.50	2007	£2.00	17.9	91%	15%	36%	21%	11%	87%	214
		2011	£2.19	17.8	91%	13%	38%	66%	4%	91%	169
	Earning > £2.50	2007	£3.65	18.6	90%	15%	31%	14%	27%	63%	261
		2011	£3.97	19.6	93%	32%	21%	67%	33%	84%	322
Other low&	Earning < £2.50	2007	£1.90	18.8	73%	15%	55%	55%	18%	70%	33
		2011	£2.21	19.2	60%	6%	43%	92%	4%	92%	53
	Earning > £2.50	2007	£5.53	20.2	73%	17%	26%	24%	54%	42%	557
		2011	£7.49	30.1	68%	60%	8%	87%	40%	88%	1,506

Notes: *Sectors adjusted to LPC definition (DIUS and BIS surveys),
$Number of observations slightly smaller for this variable
&Other low pay: Customer Service, Business Admin., Team Leading and Management

Sources: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

Table 3.5 Characteristics of alternative DiD-samples broken down by sectors$^{\text{S}}$ (unweighted, apprentices under the age of 25)

						Percentage shares of apprenticeships with following characteristics					
Sector	Group	Year	Hourly wage$^{\text{S}}$	Age	Female	With employer at least one year before course	Started apprenticeship from school/ non-HE college	In year one	Level 3	Eligible to NMWAR	Observations
All	Earning < £2.50	2007	£1.95	18.2	73%	12%	42%	24%	21%	79%	417
		2011	£2.11	18.0	53%	10%	39%	74%	17%	89%	488
	Earning > £2.50	2007	£5.48	19.7	41%	15%	33%	14%	59%	37%	3,592
		2011	£5.42	19.6	44%	29%	23%	69%	45%	76%	3,699
Non-Low*	Earning < £2.50	2007	£1.91	18.4	3%	12%	47%	8%	29%	73%	77
		2011	£2.03	18.1	8%	7%	38%	72%	29%	86%	192
	Earning > £2.50	2007	£5.81	19.4	1%	16%	46%	6%	67%	32%	1,708
		2011	£5.66	19.3	6%	20%	32%	53%	64%	63%	1,621
Retail	Earning < £2.50	2007	+	+	+	+	+	+	+	+	+
		2011	+	+	+	+	+	+	+	+	+
	Earning > £2.50	2007	£5.40	20.3	61%	7%	8%	21%	42%	33%	233
		2011	£5.90	20.5	61%	54%	7%	89%	12%	90%	234
Care	Earning < £2.50	2007	+	+	+	+	+	+	+	+	+
		2011	+	+	+	+	+	+	+	+	+
	Earning > £2.50	2007	£5.45	20.9	91%	8%	12%	22%	49%	32%	239
		2011	£5.86	20.5	88%	34%	13%	82%	26%	84%	167

Sector	Group	Year	Hourly wage$^\$$	Age	Female	Percentage shares of apprenticeships with following characteristics					Observations
						With employer at least one year before course	Started apprenticeship from school/ non-HE college	In year one	Level 3	Eligible to NMWAR	
Childcare	Earning < £2.50	2007	£1.86	18.2	98%	5%	51%	32%	41%	73%	59
		2011	£2.11	18.6	92%	10%	40%	81%	33%	90%	48
	Earning > £2.50	2007	£5.06	19.7	97%	16%	31%	21%	82%	41%	324
		2011	£4.76	19.4	96%	23%	26%	76%	54%	81%	356
Hospitality	Earning < £2.50	2007	+	+	+	+	+	+	+	+	+
		2011	+	+	+	+	+	+	+	+	+
	Earning > £2.50	2007	£5.30	20.2	50%	12%	7%	22%	50%	39%	301
		2011	£5.50	20.1	44%	48%	7%	84%	20%	85%	303
Hairdressing&	Earning < £2.50	2007	£2.00	17.9	91%	15%	36%	22%	11%	87%	213
		2011	£2.19	17.7	90%	13%	38%	65%	4%	91%	168
	Earning > £2.50	2007	£3.65	18.6	90%	15%	31%	14%	27%	63%	260
		2011	£3.87	18.6	93%	30%	23%	68%	30%	86%	300
Other low&	Earning < £2.50	2007	£1.90	18.8	73%	15%	55%	55%	18%	70%	33
		2011	£2.21	18.3	61%	4%	45%	94%	4%	94%	51
	Earning > £2.50	2007	£5.48	19.9	73%	17%	28%	24%	53%	43%	527
		2011	£5.53	20.1	68%	36%	17%	88%	27%	90%	718

Notes: *Sectors adjusted to LPC definition (DIUS and BIS surveys),
$^\$$Number of observations slightly smaller for this variable
&Other low pay: Customer Service, Business Admin., Team Leading and Management

Sources: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

3.3 Empirical estimation of the impact of the NMWAR introduction

3.3.1 Basic DiD specification

The DiD specification chosen in the following estimates the relative changes in apprentice wages from the surveys 2007 and 2011 for England compared to a group of other learners qualifying towards level two and level three qualifications, whose economic status in LFS data is recorded as employed, but not as an apprentice. The group of non-apprentices with the same learning aims represent the counterfactual outcome for apprentices, who were ineligible to the NMWAR, but eligible to the other, age-specific rates of the NMW.

DiD requires repeated cross-sections of both groups (apprentices/non-apprentices) before and after the introduction of the NMWAR, eg the various groups as defined in Tables 3.1 and 3.2, as well as consistently recorded gross hourly wages for both groups' information before and after the NMWAR introduction. Our basic DiD specification estimates a simple OLS regression model using the repeated cross-sections of apprentices and other non-apprentice learners, for whom earnings can be observed before and after the NMWAR introduction:

$$Y_{it} = \alpha + \beta T_t + \delta P_i + \gamma T_t P_i + \varepsilon_{it}$$

where α, β, δ and γ are unknown parameters and need to be estimated. Y represents the gross wages per hour of apprentices and non-apprentices, which vary across individuals i and over time t. T is a dummy variable coded 0 if an observation in the data set is observed before the NMWAR introduction (2007) and 1 if the observation is observed after (2011). Note that the estimation in practice will be based on apprentice pay survey data collected in April-June 2007 and April-June 2011 as well as pooled LFS data for the group of people not affected by the introduction of the NMWAR.

The variable P is a dummy variable, coded 1 for an apprentice and 0 for other employees aiming for similar vocational qualifications. An interaction term is created by multiplying the variables T and P together. The resulting variable takes the value 1 for an apprentice in the period following the NMWAR introduction and all other observations take the value 0. ε represents the residuals that will be used in order to estimate the variance of the least squares estimator.

We estimate the DiD model as a conditional model, including further covariates to control for observed differences in characteristics such as gender, age and sector characteristics. The resulting DiD estimator of such a model controls for the differences in observable characteristics over time, particularly the substantial

changes in age and sector composition as discussed in the descriptive analysis before. As LFS data do not allow identification of the year of learning/apprenticeship, a restriction to people with NMWAR eligibility cannot be achieved using these data. Alternatively, we estimate models using subgroups of young apprentices and other learners of similar age, for whom the assumption could be justified that learning is for both aligned to the same academic year.

The key parameter of the model is γ, which represents an estimate of the impact of the NMWAR introduction. We can write γ as:

$$\hat{\gamma} = \left[\bar{y}_{T=1}^{P=1} - \bar{y}_{T=0}^{P=1} \right] - \left[\bar{y}_{T=1}^{P=0} - \bar{y}_{T=0}^{P=0} \right]$$

The first term inside the square bracket $\bar{y}_{T=1}^{P=1}$ represents observed mean hourly wages of apprentices (P=1) after the introduction of the NMWAR in 2011 (T=1). $\bar{y}_{T=0}^{P=1}$ represents the same outcomes of apprentices (again P=1) but in the period before the NMWAR introduction, ie 2007 (T = 0). Therefore, the term inside the first bracket represents the before and after difference in earnings outcomes for apprentices. The second square bracket contains an analogous term for other groups of learners with the same learning aims between 2011 and 2007 (P=0) .

The DiD estimator involves subtracting the difference in an outcome observed both before and after the programme, among those not being affected by the change in the regulation (other learners/non-apprentices) from the same measure of difference of apprentices.

3.4 Results

3.4.1 Control groups based on non-apprentices

Average findings

As shown previously, changes in the characteristics of apprentices, sector composition and other important variables are likely to affect the average observed difference-in-differences as much as did the NMWAR introduction and rule out unconditional DiD. In the following, we discuss findings controlling for such differences by:

■ adding relevant variables to outcome estimates; and

■ providing separate estimates for young (less than 25 years old) and mature apprentices.

These conditional impacts are shown in Table 3.6.[1] These models find statistically significantly reductions in hourly wages of apprentices younger than 25 years of -£0.34, ie wages have gone down as a result of the NMWAR introduction. There are no significant estimates found for the group of apprentices aged 25 years and over.

Table 3.6 Impact of the NMWAR introduction

	Difference-in-differences (in £)	Standard error (Robust)	t	P>t
Group >= 25	-0.18	0.57	-0.31	0.76
Group < 25	-0.34	0.16	-2.19	0.03

Note: Full specification in Table A5.1

Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Such an impact would be at odds with any predictions of standard microeconomic models. Although sector composition and other characteristics have been controlled for as much as possible in conditional DiD models, this seems insufficient to control for the recent growth of apprenticeships, changes in apprentice sectors like business administration and changes in the apprentices wage distribution, in particular to much lower wages for the very young apprentices.

In the light of this and based on further sensitivity[2] extending the DiD-approach to more flexibly account for dynamic differences over time, we have reservations as to whether an impact of the NMWAR can be estimated at the level of the aggregate economy with available data. In fact, we believe that this model is not flexible enough to account for the huge compositional changes with regards to the sector composition of apprenticeships and to deliver robust evidence. Therefore, we will focus on impacts at sector level in the following for the aggregate level.

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[1] Full specification in Appendix 5, Table A5.1.

[2] As one of the sensitivity tests, we test the usual assumption of common trends, ie differences between apprentices and non-apprentices should be insignificant based on two periods predating the introduction of the NMWAR. As this assumption is violated for models estimating the impact of the NMWAR introduction on average apprentice pay, an extended DiD-model capturing such differences in trends was implemented, which then resulted in an insignificant impact estimate, see Appendix 6. This is further evidence that the economy-wide estimate is not credible.

Sectors

DiD specified as a parametric regression model makes functional form assumptions, for example that the impact of the NMWAR introduction, the respective time and group effects and the further characteristics included in the model are linear and additive in parameters. We exploit this set-up and extend the analysis by estimating group specific impact estimates of the NMWAR introduction by interacting T_tP_i with dummy variables for specific sectors.

The resulting specification allows us to derive the sector specific impact from a joint model, in which other covariates (like age/gender) control for compositional changes for the full samples. The resulting impact estimates show sector specific deviations from an overall impact. The full impact of the introduction of the NMWAR can then be 'fitted out' by adding coefficients of base category impacts and sector specific increments, which will then subject to a joint hypothesis test.

The findings[1] (Table 3.7) are in most cases insignificant, although decreasing apprentices wages remain for young apprentices outside the low pay sector and in care/business administration and team leading, where wages also decreased for the group of mature apprentices. In contrast, some positive coefficients were found for young people in sectors paying close to the NMWAR like health care and hairdressing. In our view, an increase following NMWAR introduction would have been expected for these sectors as this would be consistent with the descriptive analysis indicating they had a substantial bite. However, these impacts are not statistically significant because of relative small effect sizes and statistical uncertainty of an impact based on relatively small numbers of observations.

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[1]   Full specification in Appendix 5, Table A5.2.

Table 3.7 Sector-specific impacts

DiD impact at sector levels	Age group >= 25		Age group < 25	
	DiD estimate$^\$$	Standard error (Robust)	DiD estimate$^\$$	Standard error (Robust)
Non-low Pay Engineering, construction, electro-technical, other)	-0.53	0.56	-0.54*	0.17
Retail	-0.92	1.43	0.01	0.20
Health and Social Care	-0.53	0.61	0.34	0.30
Children's Care, Learning and Development	-0.31	0.69	-0.34	0.27
Hospitality and catering	-0.84	0.96	-0.13	0.20
Hair care	0.03	1.07	0.15	0.18
Other low pay (Customer service, business administration, team leading)	1.73*	0.65	-0.45*	0.19

$^\$$ Estimates derived from joint models, full specification are shown in Table A5.2
* Significant impacts (95% confidence)

Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

3.4.2 Groups of apprentices earning below or above NMWAR-levels

Sectors

The findings obtained from the estimation of DiD based on data for apprentices below and above the NMWAR threshold in 2007 and 2011 is shown in Table 3.8

The impact estimates found on the basis of this approach show that the hourly wages in hairdressing were increasing by £0.86, which is a higher point estimate than found in the alternative empirical specifications and is statistically significant. This specification also confirms that wages in the non-low pay sectors were decreasing significantly by £0.70 (compared to £0.54 in the alternative approach). [1]

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[1]   Full specification in Appendix 5, Table A5.3.

Table 3.8 Sector-specific impacts$^\$$ of NMWAR for young apprentices in England (< 25 years)

DiD impact at sector levels	Impact estimate	Standard error
Non-low Pay (Engineering, construction, electro-technical, other)	-0.70*	0.11
Retail	-0.36	0.22
Health and Social Care	-0.37	0.32
Children's Care, Learning and Development	0.08	0.17
Hospitality and catering	-0.27	0.21
Hairdressing	0.86*	0.10
Other low pay (Customer service, business administration, team leading)	-0.16	0.14

$^\$$ Estimates derived from joint models, full specification are shown in Table A5.3X
* Significant impacts (95% confidence)

Source: DIUS 2007/BIS 2011 Surveys on apprentice pay, own calculations

The picture at sector level is quite similar to the alternative specification, showing widely no impact of the NMWAR introduction apart from in hairdressing.

4 Conclusion

Summary of the findings

This paper provided evidence on the impact of the introduction of the NMWAR based on descriptive analyses and econometric impact models, ie whether introducing a specific NMW rate for this group had a significant impact on pay levels.

Based on the descriptive analysis, we can summarise the main findings:

■ The bite of the rate differs by sectors. Low pay sectors, hairdressing in particular, show a bite near 100 per cent. The lower quartile for hairdressing is only £2.30, which suggests that there may be substantial non-compliance in this sector. An impact of the NMWAR introduction for some sectors is therefore very likely.

■ The bite is substantial for young apprentices (under 25 years of age): Young apprentices, in particular when starting multi-year programmes, are often paid very close to the NMWAR rate. This is consistent with expectations as the value of the contribution of apprentices (ie the increase in firm production is not sufficient to recover the full costs of apprentices and hence firms usually face net costs on completion of an apprenticeship). This upfront investment by employers is only recovered over time as apprenticeship achievers remain with the firm and are temporarily paid below their productivity.

■ In contrast, mature apprentices have generally higher pay, which indicates the higher value contribution on the apprenticeships. While in both cases, net costs on completion of an apprenticeship are likely, the higher value contribution of mature apprentices may already "repay" some of the employers' investments while people are on programmes and in fact may be one of the reasons why "adult apprenticeships" grew so substantially over the last years.

■ When looking into average apprentice wages over time, based on the BIS apprentice pay surveys of 2007 and 2011, we observe that apprentice pay was on average rising. However, this increase was primarily caused by a growing segment of mature apprentices and substantial changes in the characteristics of the apprenticeship population. It is very likely that these older apprentices may have had pre-apprenticeship work experience (in fact, a substantial proportion had been working with the employer for some time, see Hogarth et al. 2012) and it is not surprising that average apprentice pay levels increased compared to 2007 averages (when apprentices were on average much younger).

■ In contrast, hourly wages of young apprentices were actually decreasing over the period 2007 to 2011.

This all suggests that an impact assessment of the introduction of the NMWAR needs to account for the different segments of young and older apprentices and those working in specific sectors. This was implemented using two alternative control-group based approaches and resulted in the following main findings:

■ Mature apprentices were hardly affected by introduction of the NMWAR. However, in empirical models based on LFS comparison groups of non-apprentices, we found significant pay increases for apprentices above the age of 25 years in customer service, business administration and team leading. We believe these findings result from the substantial increases in apprentice numbers in these sectors, which we cannot be fully controlled for. The nature of apprenticeships in these sectors has changed over the last five years and many more people with substantial work experience are now undertaking apprenticeships and start such programmes with higher pre-apprenticeship wages than before. Such developments resulted from policy changes in funding for further education and cannot be attributed to the impact of the NMWAR introduction.

■ In contrast, we believe that some more credible conclusions can be drawn from the finding for young people:

   i.   Apprentice wages of young workers were decreasing in traditional non-low pay sectors following the introduction of the NMWAR. However, the question of whether the introduction of the NMWAR may have helped wages not decrease any further cannot be understood with available data, although this is quite likely for some sectors, which have shown quite substantial decreases in apprentice wages. The youngest apprentices (aged 16 to18) experienced dramatic decreases in apprentice pay in popular frameworks such as construction (where observed median hourly wages decreased from £4.20 to £3.25) and business administration, where median pay decreased from £4.20 to £2.86.

ii.   However, there is also evidence that pay increased following the introduction of the NMWAR in hairdressing (for the group of apprentices below the age of 25). This is very plausible because pay was around the NMWAR levels before its introduction and would have been increased by many businesses for their apprentices to remain compliant with minimum pay regulation.

Implications

We recommend continuing to recognise the heterogeneity of apprentices with respect to age and year of apprenticeship, in particular of young and mature apprentices, when providing recommendations for the Apprentice Rate for 2013.

As was written in Fuller and Unwin's (2010) evidence on adult apprenticeships to Parliament[1], apprentices increasingly consist of mature learners with previous work experience, many of them working for their apprenticeship employer before (see eg Hogarth et al. 2012). These apprentices very often have wages well above the NMWAR, because employers recognise previous employment, work experience and potential/known higher productivity, which then results in a higher value contribution when undertaking apprenticeships. They also represent the higher end of the wage distribution, ie the second cluster of the increasingly bimodal wage distribution of apprentices.

Then, there is the second segment of young apprentices, which Fuller and Unwin (2010) describe as

> '… a programme of skill formation for school leavers. It takes the form of a supported journey during which an individual matures and becomes a recognised member of an occupational community (…) In creating an apprenticeship vacancy, an employer sends a strong signal that they are investing in and are committed to the creation of a highly trained workforce, and that apprenticeship is seen an integral part of a whole workforce development strategy.'

For young apprentices in particular, employers accept high net costs on completion of a successful apprenticeship as the apprentices' value contribution is not sufficient to recover the full costs of the apprenticeship, see Hogarth et al. (2012). This is a finding relevant to almost all apprenticeships, suggesting that upfront investment can only be recovered by post-apprenticeship employment for people who continue to work for their employer. In our view, this leads to two important conclusions:

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[1]   http://www.publications.parliament.uk/pa/cm201012/cmselect/cmpubacc/c1875-i/mem02.htm

1. An NMWAR uprating would increase the existing net costs of apprenticeship to employers, which are only recovered in post-apprenticeship employment (see Hogarth et al. 2012). Any recommended increase in the Apprentice Rate needs to carefully consider whether there might be any adverse effect on the supply of apprenticeship places, particularly for the younger age groups and in sectors most affected by the wage.

2. There is some evidence that the introduction of the NMWAR did not have much of an impact on the pay levels of mature apprentices (those aged 25 and over). Employers pay mature apprentices higher wages, and one reason may be that they have sufficient information about their productivity because they were already their employees. We therefore conclude that eligibility to the age specific rates for these learners should be retained in second and subsequent years. A further conclusion could be to restrict the NMWAR completely to the younger apprentice age groups as it seems that the Apprentice Rate does not affect the growing segment of mature apprentices.

In order to make better informed recommendations about the future development of the NMWAR, we suggest that improved empirical data needs to be collected. In particular:

■ When comparing apprentices and other employees, a microeconomic link between wages and productivity as suggested by the standard microeconomic theory of the labour market (ie wages link to marginal productivities of workers) cannot be applied to apprentices, in particular young apprentices, whose initial value contribution is low and evolves as they qualify over time. A more dynamic perspective is required here and must cover both wage costs and additionally costs to the firm when engaging in apprenticeships.

■ In order to come to better informed recommendations than on the basis of an analysis of the wage impact, improved information is needed about the value of the contribution of young people in- and post-apprenticeship, and about other crucial parameters like employer costs for supervision and administration. This would help improve understanding of the true costs and benefits of apprenticeships for employers and how a specific NMWAR impacts on their decision to supply apprenticeship places.

■ One conclusion of such further research could be that the apprentice wage is set more dynamically so as to align it to productivity development. Continuously increasing rates in years of skills acquisition and as people mature into occupational roles would support learning and skills development, which is the key objective of apprenticeships, in particular for young learners.

5 References

Bryan M, Salvatori A, Taylor M (2012), *The impact of the National Minimum Wage on Earnings, Employment and Hours through the recession*, Research report for the Low Pay Commission

Buscha F, Maurel A, Page L, Speckesser S (2012)., 'The Effect of High School Employment on Educational Attainment', *Oxford Bulletin of Economics and Statistics*, 73, Published online (early view), DOI: 10.1111/j.1468-0084.2011.00650.x

Card D, Krueger A (1993), *Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania*, NBER Working Papers 694, Cambridge: National Bureau for Economic Research

Denvir A, Pearmain D, Cox A (2009), *LPC 2008 Survey of Employers: Apprentice Exemptions*, Report 466, Institute for Employment Studies

Dickens R, Riley R, Wilkinson D (2009), *The Employment and Hours of Work Effects of the Changing National Minimum Wage*, Research Report for the Low Pay Commission

Dickens R, Riley R, Wilkinson D (2010), *The impact on employment of the age related increases in the National Minimum Wage*, Research Report for the Low Pay Commission

Dorsett R, Haile G, Speckesser S (2006), *Work-Focused Interviews for Partners WFIP) and enhanced New Deal for Partners NDP): Quantitative Impact Assessment*, Research Report DWPRR 352, Department for Work and Pensions

Fong B, Phelps A (2008), *Apprenticeship Pay: 2007 Survey of Earnings by Sector*, DIUS Research Report 08 05

Heckman J, Hotz J (1989), 'Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: The Case of Manpower Training', *Journal of the American Statistical Association*, 84 (408), 862-74

Heckman J, Vytlacil E (2007), 'Econometric Evaluation of Social Programs, Part I: Causal Models, Structural Models and Econometric Policy Evaluation', Chapter 70 in Heckman, J and Leamer, E ed. *Handbook of Econometrics*, Volume 6B, Amsterdam: Elsevier

Heckman J, Vytlacil E (2007), 'Econometric Evaluation of Social Programs, Part II: Using the Marginal Treatment Effect to Organize Alternative Economic Estimators to Evaluate Social Programs and to Forecast Their Effects in New Environments', Chapter 71 in Heckman, J and Leamer, E ed. *Handbook of Econometrics*, Volume 6B, Amsterdam: Elsevier

Higton J, Hirst A, Klahr R, Lefaucheux M, Salmon C (2012a), *An Assessment of the Introduction of the Apprentice Rate*, Report for the Low Pay Commission

Higton J, Kaur-Ballagan K, Navin Shah J, Medien K (2012b), *Apprenticeship Pay Survey 2011*, Research report 64, Department for Business, Innovation and Skills

HM Government (2009), *White Paper: Skills for Growth - the National Skills Strategy*, London

Hogarth T, Gambin L, Winterbotham M, Baldauf B, Briscoe G, Gunstone B, Hasluck C, Koerbitz C, Taylor C (2012), *Employer Investment in Apprenticeships and Workplace Learning: The Fifth Net Benefits of Training to Employers Study*, Research paper 67, Department for Business, Innovation and Skills

IFF Research and the Institute of Employment Research (2012), *Evaluation of apprenticeships: employers*, Research paper 77, Department for Business, Innovation and Skills

Lawton, K, Norris, E (2010), *A Qualitative Study of Apprenticeship Pay: an IPPR Report*, Report for the Low Pay Commission

Leitch S (2006), *Review of Skills: Prosperity for all in the global economy - world class skills*, Final Report for HM Treasury

Low Pay Commission (2009), *National Minimum Wage Report 2009*, London: Low Pay Commission

Low Pay Commission (2010), *National Minimum Wage Report 2010*, London: Low Pay Commission

Low Pay Commission (2011), *National Minimum Wage Report 2011,* London: Low Pay Commission

Low Pay Commission (2012), *National Minimum Wage Report 2012*, London: Low Pay Commission

Rubin D (1974), 'Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies', *Journal of Educational Psychology*, 66, 688-701

Stewart M (2004), 'The Impact of the Introduction of the UK Minimum Wage on the Employment Probabilities of Low Wage Workers', *Journal of European Economic Association*, 2, 67-97

Stewart M, Swaffield J (2004), *The other margin: do minimum wages cause working hours adjustments for lowwage workers?,* Report for the Low Pay Commission.

Stewart M, Swaffield J (2008), 'The other margin: do minimum wages cause working hours adjustments for low-wage workers?' *Economica*, 75, 148-167

Swaffield J (2009), *Estimating the Impact of the 7th NMW Uprating on the Wage Growth of Low-Wage Workers in Britain*, Report for the Low Pay Commission

Wiseman J, Roe P, Parry E (2011), *An evaluation of the Apprentice Grant for Employers (AGE) programme*, Report for the National Apprenticeship Service

Appendix 1: Framework Mapping

Table A1.1 Classification of low and high pay sectors

	Individualised Learner Records (England)	Lifelong Learning Records (Wales)	National Training Programmes Statistics (Scotland)
Retail	Carry and Deliver Goods	Retail	Distribution and warehousing
	Driving Goods Vehicles	Sales and Telesales	Distribution and warehousing
	Retail	Warehousing and Storage	Driving goods Vehicles
	Sales and Telesales	Wholesale, Distribution, Warehousing and Storage	Retail
	Storage and Warehousing		Retail Distribution
	Vehicle Sales		Road Haulage and Distribution*
	Warehousing and Storage		Sales and Telesales
	Wholesale, Distribution, Warehousing and Storage		Storage and Warehousing
			Vehicle sales
			Warehousing and Distribution
Hospitality	Hospitality and Catering	Hospitality	Hospitality

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Table A1.1 Classification of low and high pay sectors

	Individualised Learner Records (England)	Lifelong Learning Records (Wales)	National Training Programmes Statistics (Scotland)
Leisure, Travel and Sport	Active Leisure and Learning	Active Leisure and Learning	Achieving Excellence in Sports Performance (Football)
	Sporting Excellence	Travel Services	Active Leisure and Learning
	Travel and Tourism Services Leisure and Business		Active Leisure, Learning and Wellbeing
			Sport and Recreation
			Sport, Recreation and Allied Occupations
			Travel Services
Hairdressing	Barbering	Barbering	Beauty Therapy
	Beauty Therapy	Beauty Therapy	Hairdressing
	Hairdressing	Hairdressing	Hairdressing and Barbering
			Spa Therapy
	Nail Services		
	Spa Therapy		
Cleaning	Cleaning and Support Service Industry	Cleaning and Support Service Industry	Cleaning Management
Employment agencies	(Not represented in any of the frameworks)		
Security	Providing S. Services	Security Industry	Security
	Security Industry		Security Systems
	Security Systems		
Food processing	Bakery	Bakery	Bakery
	Food and Drink Manufacturing Operations	Food and Drink Manufacturing Operations	Craft Bakery
	Food Manufacture	Food Manufacture	Food and Drink Manufacture
	Meat and Poultry Processing	Meat and Poultry Processing	Food Manufacture
			Meat and Poultry Pr.
			Meat Industry

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Table A1.1 Classification of low and high pay sectors (continued)

	Individualised Learner Records (England)	Lifelong Learning Records (Wales)	National Training Programmes Statistics (Scotland)
Agriculture	Agricultural Crops and Livestock	Agriculture Crops and Livestock	Agricultural and Commercial Horticulture
	Amenity Horticulture	Amenity Horticulture	Agricultural and Garden Machinery
	Horticulture		Agricultural Crops and Livestock Agriculture
	Production Horticulture		
	Sea Fishing		
			Agriculture and Garden Machinery Servicing
			Agriculture, Commercial horticulture
			Amenity Horticulture
			Horticulture
			Production Horticulture
			Sea Fishing (Catching)
Textiles, clothing	Apparel	Clothing Industry (Wales only)	Apparel, Footwear, Textiles and Associated Businesses
	Fashion and Textiles	Man-Made Fibres	Clothing and Apparel Manufacture
	Man-Made Fibres		
	Textiles		Fashion and Textile Heritage
			Textile Industry
Social care	Health and Social Care	Health and Social Care	Health and Social Care
Childcare	Children and Young People's Workforce	Early Years Care and Education (Wales)	Early Years Care and Education
	Children's Care Learning and Development		Learning and Development
			Youth Work
			Youth Worker
Office Work	Business Administration	Business Administration	Business and Administration
		Call Handling (Wales only)	

Explanatory notes:
Scotland: Two slightly different frameworks before 2007 representing the Highlands and Islands and Scottish Enterprise areas. Sector frameworks are time-varying and subsequently merged to one nationwide systematic. The classification accounts for current and historic frameworks, although some of them are no longer in use today.

Northern Ireland: Coding based on sectors, available on request.

Sources: ILR, LLL Records Wales, SDS National Training Programme Statistics

Appendix 2: Analysis of Learner Data

Table A2.1 Apprentice starts in England

	Non-low pay	Low pay	All
2002	73,150	94,550	167,700
2003	87,430	106,170	193,600
2004	93,150	95,850	189,000
2005	88,670	86,340	175,010
2006	96,180	88,320	184,500
2007	118,470	106,320	224,790
2008	121,150	118,870	240,020
2009	128,690	151,040	279,730
2010	201,340	255,880	457,220
2011	230,810	271,770	502,580

Source: ILR

Table A2.2 Apprentice starts in Wales

	Non-low pay	Low pay	All
2004	11,925	12,600	24,525
2005	14,295	13,695	27,990
2006	10,235	9,355	19,590
2007	10,675	10,855	21,530
2008	9,445	8,655	18,100
2009	7,900	8,455	16,355
2010	8,780	9,800	18,580

Source: LLL Records Wales

Table A2.3 Apprentice starts in Scotland

	Non-low pay	Low pay	All
2005	14,950	5,246	20,196
2006	10,703	6,210	16,913
2007	10,524	5,279	15,803
2008	7,586	2,993	10,579
2009	6,434	10,221	16,655
2010	9,843	11,718	21,561
2011	11,273	15,154	26,427

Source: SDS National Training Programme Statistics

Table A2.4 Apprentice starts in Northern Ireland

	Non-low pay	Low pay	All
2007	3,598	1,989	5,587
2008	2,496	4,876	7,372
2009	2,192	4,781	6,973
2010	2,348	7,016	9,364
2011	1,779	6,616	8,395

Source: Department for Employment & Learning, Training Programmes Branch

Table A2.5 Apprentice starts in low pay sectors in England

	2006	2008	2011
Non-low pay sector	96,180	121,150	230,810
Retail	12,260	20,210	49,320
Hospitality	13,230	16,790	34,840
Leisure Travel and Sport	5,750	10,570	18,760
Hairdressing	17,880	17,790	19,550
Cleaning	20	160	3,830
Security	1,080	840	2,990
Food processing	380	410	3,640
Agriculture	1,450	1,730	3,440
Textiles clothing	150	50	190
Social care	7,390	12,270	67,020
Childcare	13,210	17,250	25,490
Office Work	15,520	20,800	42,700

Source: ILR

Table A2.6 Apprentices starts in low pay sectors in Wales

	2006	2008	2010
Non-low pay sector	10,235	9,445	8,780
Retail	1,070	625	495
Hospitality	1,380	1,025	1,150
Leisure, Travel and Sport	340	305	390
Hairdressing	1,020	775	970
Cleaning	15	35	65
Security	0	5	5
Food processing	555	260	215
Agriculture	195	85	70
Textiles clothing	0	0	0
Social care	2,120	2,965	3,785
Childcare	805	1,230	1,215
Office Work	1,855	1,345	1,440

Source: LLL Records Wales

Table A2.7 Apprentices starts in low pay sectors in Scotland

	2006	2008	2011
Non-low pay sector	10,703	7,586	11,273
Retail	1,605	330	3,413
Hospitality	1,097	337	3,520
Leisure Travel and Sport	253	233	297
Hairdressing	297	238	1,163
Cleaning	0	0	
Security	105	28	28
Food processing	17	18	1,310
Agriculture	189	110	272
Textiles clothing	0	0	237
Social care	1,099	75	1,926
Childcare	77	651	1,191
Office Work	1,471	973	1,797

Source: SDS National Training Programme Statistics

Table A2.8 Apprentices starts in low pay sectors in Northern Ireland

	2007	2008	2011
Non-low pay sector	3,598	2,496	1,779
Retail	614	1,233	1,476
Hospitality	515	928	1,485
Leisure Travel and Sport	24	12	33
Hairdressing	0	0	0
Cleaning	0	0	0
Security	0	0	0
Food processing	0	0	0
Agriculture	46	44	76
Textiles clothing	0	0	0
Social care	438	1,481	1,247
Childcare	88	375	332
Office Work	264	803	1,967

Source: Department for Employment & Learning, Training Programmes Branch

Appendix 3: Analysis of BIS Pay Surveys

Table A3.1 BIS Apprentice Pay Survey (2011)

Country	Freq.	Per cent	Cum.
England	6,140	55.72	55.72
Scotland	2,041	18.52	74.24
Wales	1,997	18.12	92.36
Northern Ireland	842	7.64	100.0
Total	11,020	100.0	

Source: BIS Apprentice Pay Survey

Table A3.2 Sample sizes in 2011 survey of by age groups

Age	Year 1	Year 2	Year 3+	Total
16	203	7	0	210
17	849	95	2	946
18	1,006	**433**	**39**	1,478
19	937	**370**	**197**	1,504
20	578	339	201	1,118
21	367	164	169	700
22+	3,569	1,218	277	5,064
Total	7,509	2,626	885	11,020

Source: BIS Apprentice Pay Survey

Table A3.3 Sample sizes in 2007 survey of by age groups

Age	Year 1	Year 2+	Total
16	23	8	31
17	103	237	340
18	118	797	915
19	125	846	971
20	81	568	649
21	46	395	441
22+	112	617	729
Total	608	3,468	4,076

Source: DIUS Apprentice Pay Survey 2007 (England only)

Table A3.4 Apprentice wage distribution by age groups

	England						UK		
	2007			2011			2011		
Age groups	**16-18**	**19-24**	**25+**	**16-18**	**19-24**	**25+**	**16-18**	**19-24**	**25+**
Percentiles									
1%	0.99	1.60	1.50	1.25	1.83	3.17	1.25	1.83	3.08
5%	1.85	2.68	3.60	1.93	2.28	4.50	1.92	2.28	4.50
10%	2.05	3.58	4.36	2.11	2.53	5.43	2.11	2.55	5.43
25%	2.67	4.35	4.90	2.44	4.05	6.10	2.44	4.06	6.10
50%	4.03	5.18	6.43	2.90	5.63	7.00	3.00	5.63	7.00
75%	5.03	6.43	7.69	4.65	6.70	8.75	4.65	6.72	8.75
90%	6.21	7.68	9.14	6.08	8.38	11.18	6.08	8.40	11.28
95%	7.30	8.63	10.50	6.88	9.50	13.46	6.88	9.50	13.46
99%	12.67	11.35	26.10	12.00	11.33	17.86	11.88	11.33	18.19
Mean	4.21	5.55	6.87	3.73	5.57	7.81	3.74	5.58	7.85
Unweighted base	1,188	2,285	82	1,396	2,257	1,512	2,346	3,916	3,006

Source: DIUS 2007/BIS 2011 Surveys on apprentice pay. Results are weighted.

Table A3.5 Apprentice wage distribution by sector and age 2007

	Customer service	Business Adm.	Retail	Health and Care	Eng. (all)	Childc. and L&D	Hospit.	Haird.	Const.	Team Leading	Electro	Other
					All 16-18							
1%	1.85	0.75	1.85	1.40	1.36	0.87	1.69	0.46	1.15		0.99	1.85
5%	2.49	2.16	2.01	1.40	2.75	1.23	2.16	1.57	2.00		2.50	2.22
10%	3.10	2.25	2.01	2.00	3.13	1.85	3.13	1.77	2.05		2.97	2.37
25%	3.24	3.07	2.87	2.31	4.04	2.30	4.03	2.00	2.80		4.03	3.46
50%	4.18	4.20	4.14	2.77	4.78	3.49	4.74	2.35	4.20		5.02	3.83
75%	5.24	5.05	5.05	4.55	5.69	4.62	5.26	2.88	5.13		6.19	4.41
90%	6.24	5.60	5.92	5.06	6.72	5.43	6.03	4.08	6.37		7.73	4.91
95%	20.62	7.80	8.96	6.24	7.35	6.48	6.25	4.48	7.44		9.02	5.03
99%	20.62	15.14	10.16	6.24	9.74	58.87	7.59	5.34	10.23		15.36	8.38
Mean	5.21	4.47	4.32	3.40	4.89	4.24	4.60	2.61	4.27		5.30	3.95
Obs	32	119	34	23	105	109	62	292	210		115	87
					All under 25							
1%	1.80	1.08	1.88	1.35	1.36	1.05	1.17	0.69	1.60	1.60	1.85	1.80
5%	2.57	2.24	2.13	2.00	3.28	1.85	3.13	1.68	2.05	2.95	2.65	2.57
10%	3.24	2.75	3.30	2.49	3.89	2.25	3.75	1.85	2.35	3.71	3.33	3.24
25%	4.50	4.00	4.61	3.96	4.59	3.58	4.47	2.05	3.69	4.61	3.88	4.50
50%	5.70	4.95	5.19	4.95	5.44	4.41	5.09	2.62	5.00	5.77	4.47	5.70
75%	6.67	6.25	6.16	5.95	6.85	5.13	6.00	3.84	6.09	7.23	5.19	6.67
90%	7.68	7.34	7.33	7.21	8.09	5.89	7.12	4.47	7.54	9.00	6.51	7.68
95%	8.65	7.80	7.86	7.86	9.25	6.72	7.88	4.94	8.90	9.68	7.52	8.65
99%	20.62	12.67	10.16	9.78	12.69	15.69	8.65	6.06	10.38	12.53	9.81	20.62
Mean	5.86	5.16	5.31	5.17	5.97	4.62	5.24	2.96	5.03	6.13	4.80	5.86
Obs	163	266	142	171	397	332	229	423	434	462	454	163

	Customer service	Business Adm.	Retail	Health and Care	Eng. (all)	Childc. and L&D	Hospit.	Haird.	Const.	Team Leading	Electro	Other
					All 25+							
1%	5.38	6.40	5.18	4.04	6.24	3.95	1.50	2.40	5.40	4.41	4.62	5.38
5%	5.38	6.40	5.18	4.04	6.24	3.95	1.50	2.40	5.40	4.41	4.62	5.38
10%	6.43	6.40	5.18	4.36	6.24	4.10	3.52	2.40	5.50	4.41	4.62	6.43
25%	6.72	6.76	5.18	4.45	7.54	4.61	4.69	2.40	5.76	5.69	4.62	6.72
50%	7.69	7.41	6.02	5.08	7.77	4.80	6.50	2.40	6.06	7.19	4.62	7.69
75%	8.25	7.41	6.15	7.10	8.00	6.72	8.00	2.40	6.85	8.00	4.62	8.25
90%	9.89	8.25	6.15	7.68	10.50	6.72	26.10	2.40	9.02	9.14	4.62	9.89
95%	9.89	8.25	6.15	8.14	10.50	10.77	26.10	2.40	11.75	9.14	4.62	9.89
99%	9.89	8.25	6.15	8.14	10.50	10.77	26.10	2.40	11.75	9.14	4.62	9.89
Mean	7.60	7.18	5.80	5.67	7.97	5.60	8.52	2.40	6.75	7.02	4.62	7.60
Obs	7	4	4	13	6	13	12	1	10	11	1	7

Source: DIUS 2007 survey on apprentice pay. Results are weighted.

Table A3.6 Apprentice wage distribution by sector and age 2011

	Customer service	Business Adm.	Retail	Health and Care	Eng. (all)	Childc. and L&D	Hospit.	Haird.	Const.	Team Leading	Electro	Other
					All 16-18							
1%	1.67	1.70	2.38	1.00	1.89	0.94	1.16	1.50	0.94	1.97	1.39	1.25
5%	2.03	2.26	2.38	1.88	2.08	2.00	2.11	1.92	1.61	1.97	2.11	1.89
10%	2.26	2.33	2.50	2.44	2.38	2.09	2.39	2.02	2.02	2.22	2.50	2.08
25%	2.64	2.57	2.71	3.06	2.85	2.44	3.06	2.22	2.50	2.36	3.41	2.38
50%	4.00	2.86	4.63	4.59	4.09	2.70	4.50	2.50	3.25	6.00	4.64	2.90
75%	4.92	4.40	5.93	6.01	5.72	4.82	5.63	2.88	4.57	6.00	6.08	4.62
90%	6.29	5.41	6.28	6.43	7.05	5.93	6.14	3.50	5.86	6.00	7.28	6.25
95%	6.92	6.58	6.71	7.50	8.60	6.10	6.75	4.40	6.88	6.00	8.84	6.76
99%	12.00	14.18	7.42	7.81	15.11	11.88	8.33	11.88	8.57	6.00	15.00	14.32
Mean	4.18	3.68	4.45	4.42	4.58	3.49	4.39	2.80	3.67	4.76	5.00	3.77
Obs	90	230	118	43	242	212	142	475	339	5	179	271
					All under 25							
1%	2.03	1.97	2.31	1.11	2.00	1.25	1.90	1.71	1.04	2.50	2.00	1.25
5%	2.50	2.28	2.70	2.63	2.50	2.07	2.43	1.98	1.94	5.00	2.60	2.00
10%	2.79	2.38	3.89	3.72	3.09	2.32	3.06	2.09	2.22	5.65	3.57	2.25
25%	4.22	2.67	5.24	5.51	4.25	2.50	4.57	2.33	2.79	6.03	4.92	2.71
50%	5.94	4.00	6.00	6.09	5.68	4.54	5.56	2.57	4.29	6.98	6.45	4.51
75%	7.00	6.20	6.47	6.65	7.03	5.90	6.10	3.60	5.83	8.00	8.90	6.00
90%	8.13	7.50	7.50	7.58	8.95	6.58	7.00	5.35	7.69	9.69	10.05	7.69
95%	9.30	8.84	7.95	8.33	10.00	7.43	8.33	6.25	8.50	10.98	10.80	9.36
99%	12.84	14.68	9.72	10.00	12.99	9.62	9.46	11.88	10.71	14.03	13.16	11.32
Mean	5.78	4.68	5.83	5.97	5.91	4.38	5.40	3.29	4.58	7.17	6.79	4.76
Obs	370	514	426	234	767	510	465	731	725	118	702	700

	Customer service	Business Adm.	Retail	Health and Care	Eng. (all)	Childc. and L&D	Hospit.	Haird.	Const.	Team Leading	Electro	Other
					All 25+							
1%	4.84	2.97	4.29	3.71	2.91	2.50	2.50	1.82	2.08	3.33	2.86	2.19
5%	5.93	5.77	5.17	4.76	5.63	3.44	4.17	2.33	3.46	5.52	4.17	4.00
10%	6.00	6.25	5.65	5.34	5.92	4.09	5.00	3.13	3.77	6.00	4.60	5.31
25%	6.73	7.28	6.02	5.95	6.76	5.29	5.93	3.77	5.90	7.01	6.41	6.27
50%	7.75	8.16	6.32	6.49	8.89	6.00	6.28	4.88	6.98	9.12	8.50	7.81
75%	9.20	9.58	7.00	7.30	10.91	7.00	7.34	6.50	10.15	12.12	10.53	9.10
90%	11.28	11.64	8.36	8.83	14.29	9.00	8.54	7.81	11.25	14.79	11.36	11.54
95%	13.51	13.53	9.62	10.00	24.09	10.83	9.43	8.10	12.57	17.58	12.00	14.29
99%	16.22	18.19	12.82	13.51	24.09	18.52	12.65	13.60	14.24	27.78	14.53	15.59
Mean	8.30	8.98	6.83	6.88	9.79	6.50	6.62	5.35	7.64	10.25	8.35	8.05
Obs	358	235	324	556	79	204	314	31	48	550	92	215

Source: BIS 2011 survey on apprentice pay. Results are weighted.

Appendix 4: Wage Distribution of DiD Samples

Table A4.1 Description of the wage distribution

	Non-Apprentices		Apprentices	
	2007	2011	2007	2011
1%	1.62	2.04	1.15	1.70
5%	2.86	3.07	2.00	2.22
10%	3.45	3.75	2.31	2.50
25%	4.50	5.00	3.75	3.65
50%	**5.82**	**6.25**	**4.88**	**5.90**
75%	8.24	8.68	6.03	7.00
90%	11.50	11.89	7.48	9.16
95%	14.17	14.53	8.41	10.91
99%	24.05	24.53	12.53	15.00
Obs	1,385.00	1,095.00	3,555.00	5,165.00
Mean	**6.94**	**7.42**	**5.09**	**5.86**
Std. Dev.	4.07	5.33	2.92	3.34
Skewness	2.55	9.36	7.75	6.84

Source: DIUS 2007/BIS 2011 Surveys on Apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Table A4.2 Description of the wage distribution (under 25 year olds)

	Non-Apprentices		Apprentices	
	2007	2011	2007	2011
1%	1.31	1.80	1.15	1.50
5%	2.50	2.70	2.00	2.11
10%	3.03	3.31	2.31	2.38
25%	4.00	4.14	3.72	2.84
50%	5.00	5.31	4.82	4.93
75%	6.00	6.53	6.00	6.25
90%	7.70	8.56	7.46	7.83
95%	9.31	9.85	8.40	9.15
99%	15.50	16.00	12.53	12.22
Obs	796	626	3,473	3,653
Mean	5.36	5.78	5.06	4.98
Std. Dev.	2.77	2.80	2.92	2.42
Skewness	4.63	3.41	7.90	1.60

Source: DIUS 2007/BIS 2011 Surveys on Apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Table A4.3 Description of the wage distribution (LFS only samples)

	Non-Apprentices		Apprentices	
	2007	2011	2007	2011
1%	1.62	2.04	2.00	1.88
5%	2.86	3.07	2.16	2.37
10%	3.45	3.75	2.50	2.50
25%	4.50	5.00	3.75	3.00
50%	5.82	6.25	5.12	4.72
75%	8.24	8.68	7.05	6.73
90%	11.50	11.89	9.68	9.35
95%	14.17	14.53	13.06	10.92
99%	24.05	24.53	18.19	17.41
Obs	1,385.00	1,095.00	207.00	172.00
Mean	6.94	7.42	5.86	5.44
Std. Dev.	4.07	5.33	3.51	3.21
Skewness	2.55	9.36	2.15	1.97

Source: UK Labour Force Survey data, Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Figure A4.1 Apprentices and non-apprentices (LFS only samples, no age restriction)
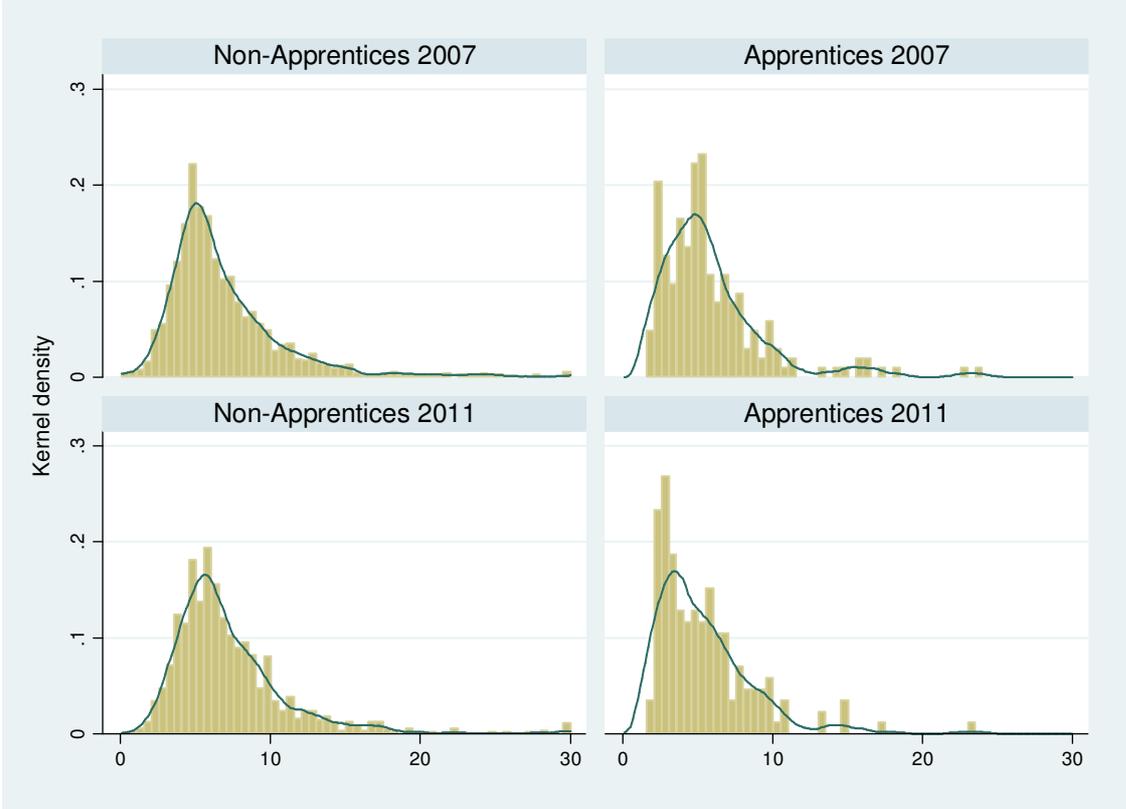
Source: UK Labour Force Survey data, Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Appendix 5: Regression Specifications

Table A5.1 DiD estimates for impact of NMWAR on hourly pay

	Group >= 25				Group < 25			
	Coef.	S.E.	t	P>t	Coef.	S.E.	t	P>t
Pre-/post	0.47	0.36	1.32	0.19	0.31	0.14	2.18	0.03
Non-Apprentices/Apprentices	-1.40	0.41	-3.44	0.00	-1.06	0.13	-8.44	0.00
Difference-in-Differences	-0.18	0.57	-0.31	0.76	-0.34	0.15	-2.19	0.03
Age	0.31	0.07	4.45	0.00	1.59	0.22	7.25	0.00
Age squared	0.00	0.00	-3.88	0.00	-0.03	0.01	-5.24	0.00
Sector (left-out: Other)								
Retail	-0.22	1.65	-0.13	0.89	-0.33	0.13	-2.61	0.01
Care	-1.98	0.40	-4.96	0.00	-0.51	0.22	-2.35	0.02
Childcare	-1.34	0.79	-1.70	0.09	-1.00	0.33	-3.02	0.00
Hospitality	-2.13	0.44	-4.88	0.00	-0.41	0.12	-3.39	0.00
Hairdressing	-2.01	0.68	-2.97	0.00	-1.58	0.15	-10.82	0.00
Other low	0.72	0.48	1.51	0.13	-0.37	0.13	-2.96	0.00
Gender (left-out: men)								
Women	-1.77	0.33	-5.38	0.00	-0.36	0.15	-2.47	0.01
Gender/Sector interaction (left-out: Other)								
Retail*female	-0.84	1.55	-0.54	0.59	0.34	0.20	1.66	0.10
Care*female	1.15	0.47	2.45	0.01	0.26	0.30	0.87	0.38
Childcare*female	0.00	0.86	0.00	1.00	0.22	0.38	0.58	0.56
Hospitality*female	1.40	0.55	2.53	0.01	0.17	0.21	0.80	0.43
Other low*female	0.71	0.60	1.19	0.23	0.40	0.20	1.98	0.05
Intercept	3.55	1.42	2.51	0.01	-13.36	2.14	-6.24	0.00
Number of obs	2652.00				8548.00			
F(17, 2634/8530))	20.73				139.30			
Prob > F	0.00				0.00			
R-squared	0.10				0.18			
Root MSE	4.66				2.46			

Robust standard errors.

Source: DIUS 2007/BIS 2011 Surveys on Apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Table A5.2 DiD estimates for sector impacts of NMWAR on hourly pay

	Group >= 25				Group < 25			
	Coef.	S.E.	t	P>t	Coef.	S.E.	t	P>t
Pre-/post	0.48	0.36	1.33	0.18	-0.54	0.17	-3.20	0.00
Non-Apprentices/Apprentices	-1.32	0.42	-3.16	0.00	0.31	0.14	2.12	0.03
Difference-in-Differences X Sector (left-out: Other)								
Difference-in-Differences	-0.53	0.56	-0.94	0.35	-1.11	0.13	-8.67	0.00
DiD X Retail	-0.40	1.22	-0.32	0.75	0.55	0.16	3.48	0.00
DiD X Care	-0.01	0.42	-0.02	0.98	0.89	0.27	3.27	0.00
DiD X Childcare	0.21	0.66	0.32	0.75	0.20	0.24	0.83	0.41
DiD X Hospitality	-0.32	0.83	-0.38	0.70	0.41	0.16	2.52	0.01
DiD X Hairdressing	0.56	1.06	0.53	0.60	0.69	0.14	5.04	0.00
DiD X Other low	2.26	0.55	4.11	0.00	0.09	0.16	0.56	0.58
Age	0.30	0.07	4.30	0.00	1.57	0.22	7.17	0.00
Age squared	0.00	0.00	-3.77	0.00	-0.03	0.01	-5.18	0.00
Sector (left-out: Other)								
Retail	0.11	2.28	0.05	0.96	-0.54	0.15	-3.56	0.00
Care	-1.89	0.49	-3.86	0.00	-0.87	0.24	-3.66	0.00
Childcare	-1.40	0.93	-1.50	0.13	-1.10	0.35	-3.13	0.00
Hospitality	-1.75	0.88	-1.98	0.05	-0.60	0.16	-3.83	0.00
Hairdressing	-2.29	0.75	-3.05	0.00	-1.87	0.15	-12.44	0.00
Other low	-1.06	0.54	-1.97	0.05	-0.41	0.16	-2.49	0.01
Gender (left-out: men)								
Women	-1.82	0.34	-5.39	0.00	-0.41	0.15	-2.79	0.01
Gender/Sector interaction (left-out: Other)								
Retail*female	-0.70	1.48	-0.47	0.64	0.38	0.20	1.89	0.06
Care*female	1.20	0.48	2.51	0.01	0.30	0.29	1.02	0.31
Childcare*female	0.06	0.87	0.06	0.95	0.28	0.38	0.74	0.46
Hospitality*female	1.43	0.56	2.55	0.01	0.23	0.21	1.08	0.28
Other low*female	0.65	0.60	1.08	0.28	0.45	0.20	2.22	0.03
Intercept	3.80	1.49	2.55	0.01	-13.02	2.15	-6.07	0.00
Number of obs	2652.00				8548.00			
F(23, /8524	17.61				120.42			
Prob > F	0.00				0.00			
R-squared	0.10				0.18			
Root MSE	4.65				2.45			

Robust standard errors.

Source: DIUS 2007/BIS 2011 Surveys on Apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Table A5.3 Full specification of new DiD estimates for sector impacts based on alternative control group

	Group >= 25				Group < 25*
	Coef.	S.E.	t	P>t	
Pre-/post	0.12	0.07	1.60	0.11	
Non-Apprentices/Apprentices	-2.29	0.08	-27.91	0.00	
Difference-in-Differences X Sector (left-out: Other)					
Difference-in-Differences	-0.70	0.11	-6.20	0.00	
DiD X Retail	0.35	0.21	1.63	0.10	
DiD X Care	0.33	0.32	1.02	0.31	
DiD X Childcare	0.78	0.18	4.25	0.00	
DiD X Hospitality	0.43	0.20	2.13	0.03	
DiD X Hairdressing	1.56	0.11	14.57	0.00	
DiD X Other low	0.54	0.13	4.24	0.00	
Age	0.54	0.22	2.44	0.02	
Age squared	-0.01	0.01	-1.01	0.31	
Apprentice characteristics					
Worked for employer at least one year before course	0.37	0.07	5.25	0.00	
Started apprenticeship from school/non-HE college	-0.10	0.06	-1.69	0.09	
In year one	-0.22	0.07	-3.20	0.00	
Level 3	0.48	0.07	7.33	0.00	
Sector (left-out: Other)					
Retail	-0.15	0.15	-0.98	0.33	
Care	-0.35	0.20	-1.72	0.09	
Childcare	-0.74	0.28	-2.69	0.01	
Hospitality	-0.41	0.10	-4.18	0.00	
Hairdressing	-0.99	0.18	-5.37	0.00	
Other low	-0.32	0.11	-2.90	0.00	
Gender (left-out: men)					
Women	-0.27	0.18	-1.49	0.14	
Gender/Sector interaction (left-out: Other)					
Retail*female	0.22	0.24	0.90	0.37	
Care*female	0.22	0.31	0.71	0.48	
Childcare*female	0.07	0.34	0.22	0.83	
Hospitality*female	0.23	0.21	1.10	0.27	
Other low*female	0.36	0.22	1.66	0.10	
Intercept	-3.02	2.24	-1.35	0.18	
Number of obs	7126.00				

	Group >= 25	Group < 25*
F(23, /8524	366.13	
Prob > F	0.00	
R-squared	0.28	
Root MSE	2.27	

*   Model for sectors not estimated due to empty cells
     Robust standard errors

Source: DIUS 2007/BIS 2011 Surveys on Apprentice pay, UK Labour Force Survey data Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

Appendix 6: Data Scoping

Data scoping

With three apprentice pay surveys undertaken over the last six years, good data on apprentice payment are available for England, but corresponding wage information for the other countries of the UK was only collected with the 2011 survey. With few other resources, the data availability (or more specifically lack thereof) rules out use of areas-based DiD designs:

- The only source for descriptive statistics of apprentice pay in Wales, Scotland and Northern Ireland is the **UK LFS**. However, with only 20,000-30,000 apprentices located outside England, the cell sizes of the LFS for this population are small and observations are reduced further because the variable on hourly gross wages shows missing values for many observations. Another caveat is the potential underreporting of apprenticeship status, and thus bias of the LFS, compared to administrative data. Some apprentices, particularly in non-traditional apprenticeship schemes, may not be aware that they are actually undertaking an apprenticeship and self-report their status as "employed" instead.

- Implementing DiD, either using area-based designs or with control groups, requires consistent information over time across the countries of the UK. Since the two previous **apprentice pay surveys** were only undertaken in England, there is no corresponding information for these areas.

With no consistent information available for the non-English areas, we undertook a lengthy data scoping exercise based on all available research data that could be used for DiD. The most important findings are:

- For an analysis of the impact of the NMWAR introduction on apprentice take-up and achievement, the only available consistent data can be taken from the **ILR (for England) and similar learner record data** in the other countries of the UK. However, besides the difficulties in estimating the impact on such

outcomes because of continuous further regulatory changes on apprenticeships, this would have required microdata for full cohorts of learners for time series from 2005 to 2011, which had not been made available for this project.

■ Generic research data for full UK coverage is limited to the **BHPS and Understanding Society** data. However, if at all, apprentices can only be identified ex-post based on educational achievement, which implies that any information of gross hourly pay while undertaking the apprenticeship cannot be obtained.

■ The two relevant cohort studies for Young People in the UK (the **Youth Cohort Study** and the **Longitudinal Study of Young People in England**) are both limited geographically. In addition, as shown in Tables 6.14-6.17 sample sizes are small. Yet, YCS and LYSPE offer acceptable sample sizes to identify a control group of non-apprentices, but wage information is only collected for categories in 2010 and information sufficiently accurate to estimate the impact of the NMWAR introduction is not available.
In addition, the longitudinal element of these studies would not allow us to monitor the development of apprentice hourly wages over time as they are either restricted to specific cohorts (YCS) or provide only snapshot information at the time of NMWAR introduction in 2010 (LYSPE).

■ In contrast to this, **HMRC P45 data**, which are collected through the annual employer returns, provide very precise information about annual earnings for UK employment. However, these data do not provide any information about the hours worked, which would be essential in order to calculate the hourly pay variable. In addition, the pay information is incomplete for annual incomes below the threshold of national insurance contributions (currently £108 per week) and these are not consistently recorded because there is no requirement for employers to do this. This would affect apprentices disproportionately more because their weekly incomes based on the NMWAR (£95 for 38 hours work in October 2010) would be well below this threshold.

■ This also rules out the option of using **ASHE** data as the sampling frame for these data are derived from HMRC P14 and P45 data. In addition, ASHE data does allow the identification of apprentices for only the last couple years and not for the whole period covered in this report, ie 2006/7 to 2010 (although this would in principle be possible by merging ILR data to ASHE in the ONS VML).

■ The only sources offering consistent information on hourly pay for apprentices in the UK are **the surveys** carried out on behalf of BIS (England 2005 and 2007 and UK 2011), and the LFS, which is available for many more years. They allow identification of area-based control groups (Scotland, Wales and Northern Ireland) as well as control groups of non-apprentices.

The sample sizes of the apprentice pay surveys are substantial, in particular in 2011, when more than 11,000 apprentices were interviewed, and 6,140 of them were in England. The 2007 survey for English apprentices only had a sample size of 4,076.

In contrast to this, LFS sample sizes are small. With the LFS representing about 0.2 per cent of the resident population in the UK, there were only about 236 people in the third quarter of 2011, who reported that an apprenticeship was part of their main employment, and only 43 of these individuals were from outside England. The effective sample sizes are much smaller than this because of missing values in the variable of gross hourly pay. We concluded that this lack of observations ruled out the use of an area-based DiD approach as the treatment groups of non-English apprentices would have been too small, even when pooling all available waves of the LFS in a year.

However, LFS data can be used for a control group-based DiD approach as it allows us to select a group of non-apprentices, ie employees engaged in further vocational education and training leading to similar qualifications as apprenticeships. The construction of such a group of non-apprentices benefits from hourly wage information included in LFS data, which is derived from gross weekly pay in main job, paid overtime hours and total usual working hours excluding overtime. This information is very similar to hourly gross earnings available from the apprentice pay surveys[1].

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[1] See Higton et al. (2012): In the apprentice pay surveys, details of pay were collected using two questions in which an apprentice could state either gross or net pay in hourly, weekly, monthly or yearly amounts. The data was then processed so a 'per hour' amount was derived for every record giving a figure for pay and a figure for the average number of hours worked per week where a per hour figure was not provided by the respondent.

Appendix 7: Pre-programme Dynamics and Extended LFS-Analysis

An important assumption of the DiD estimator is that the before-after estimate for the group of other/non-apprentice learners is the same as would have been estimated for apprentices had the NMWAR not been introduced. Some insight into the plausibility of this 'common trends assumption' can be achieved through pre-programme tests (Heckman and Hotz, 1987). This involves estimating effects based on two periods of time that wholly pre-date the treatment. If the groups of apprentices and other learners are affected equally by general economic conditions and other influences, such estimates should be insignificant. If they are not, it suggests that using DiD to evaluate treatment effects will result in biased estimates (see Dorsett, Haile and Speckesser 2006 for further discussion).

Since equivalent information on hourly wages was not included in the 2005 apprentice pay survey, these tests were entirely based on LFS data for apprentices and non-apprentices. The wage distribution of apprentices and non-apprentices as found in LFS data is shown in Figure 3.3 and shows the following main characteristics:

■ In LFS data, both apprentices and non-apprentices show unimodal, positively skewed wage distributions, both for the entire group of apprentices and other people learning to level two and level three qualifications as well as the subgroup of under 25 year olds.

■ The mean hourly wage of apprentices increases from £4.56 in 2005 to £5.86 in 2007 and then decreases to £5.44. The median wage decreases from £5.12 to £4.71 between 2007 and 2011.

■ Wages of non-apprentice learners increase from £6.62 in 2005 to £6.92 in 2007 and then further increase to £7.41 in 2011. There are also consistent increases in median wages for this group.

Figure A7.1 Apprentices and Non-Apprentices (LFS only, England)
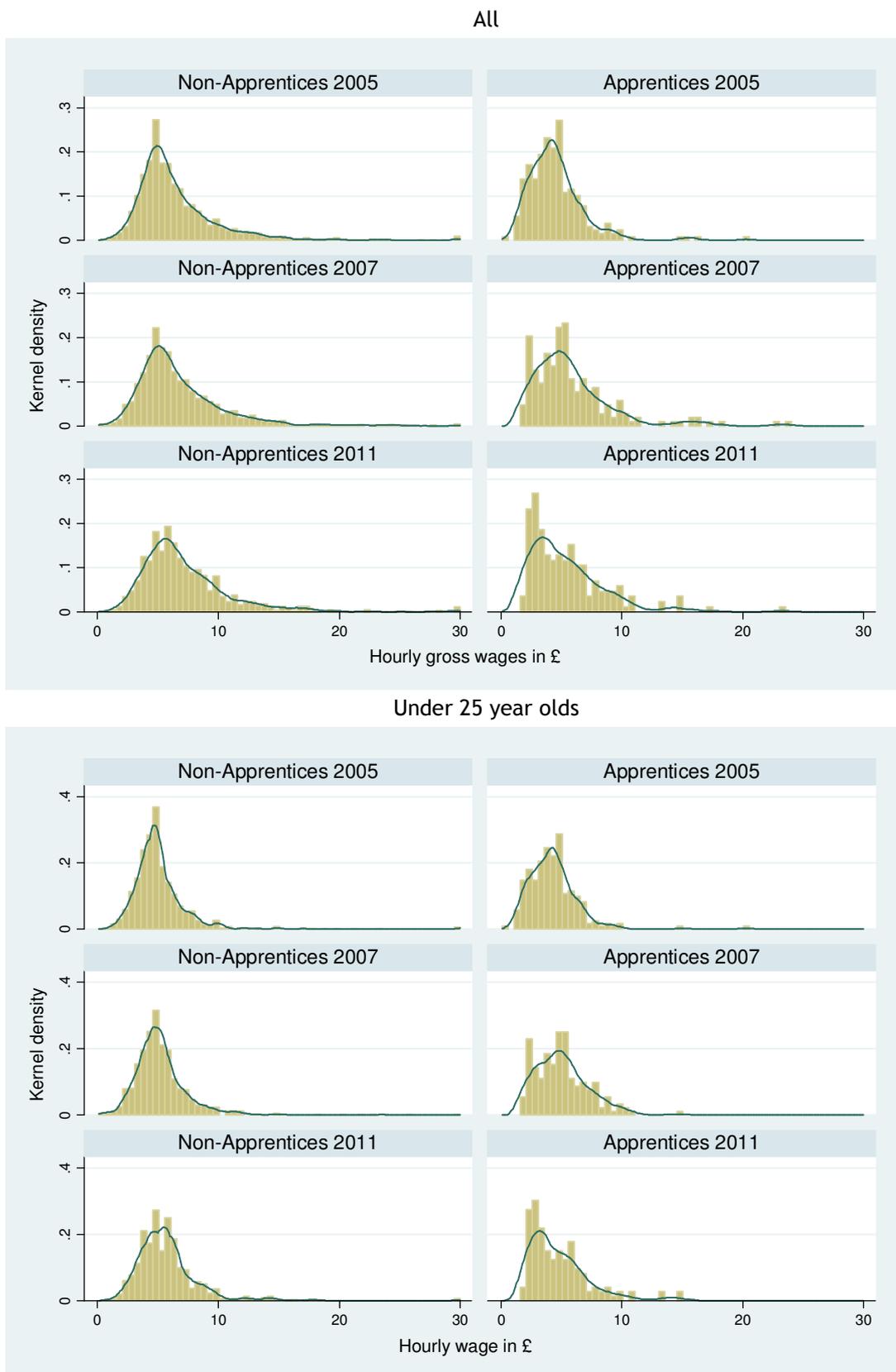
Source: UK Labour Force Survey data, Q1-Q4 2007 and Q1-Q4 2011 (pooled), own calculations

The pre-programme tests on the basis of these samples for the two years prior to the introduction of the NMWAR (2005 and 2007) as shown in Table A7.1 violate the common trends assumption as they indicate that the group of younger apprentices had a more positive trend before the introduction of the NMWAR. The pre-programme differences found for the group of mature apprentices are not statistically significantly different from zero.

Table A7.1 Pre-introduction differences in hourly pay (2005-2007), group < 25 only

	Coef.	S.E.	t	P>t
Pre-/post	0.18	0.13	1.39	0.16
Non-Apprentices/Apprentices	-1.61	0.21	-7.69	0
Difference-in-Differences	0.41	0.22	1.85	0.07
Age	0.41	0.46	0.89	0.37
Age squared	0	0.01	-0.19	0.85
Sector (left-out: Other)				
Retail	-1.11	0.23	-4.9	0
Care	-1.08	0.49	-2.2	0.03
Childcare	-1.94	0.55	-3.52	0
Hospitality	-1.24	0.28	-4.47	0
Hairdressing	4.54	4.7	0.97	0.33
Other low	0.44	0.64	0.69	0.49
Gender (left-out: men)				
Women	-1	0.25	-4.03	0
Gender/Sector interaction (left-out: Other)				
Retail*female	1.02	0.27	3.74	0
Care*female	1.1	0.67	1.64	0.1
Childcare*female	0.87	0.63	1.38	0.17
Hospitality*female	1.11	0.35	3.22	0
Other low*female	-0.49	0.69	-0.72	0.47
Intercept	-0.45	4.47	-0.1	0.92
Number of obs	2251			
F(17, 2634/8530))	17.22			
Prob > F	0			
R-squared	0.12			
Root MSE	2.55			

Robust standard errors.

Source: UK Labour Force Survey data Q1-Q4 2005 and Q1-Q4 2011 (pooled), own calculations

Following this test, we added an analysis on the basis of an additional augmented DiD model, which removes these differences in trends for young apprentices and non-apprentices. The results of this extended DiDiD-model (see Buscha et al. 2012 for details), which captures the group specific trends over time, are shown in Table A7.2. In this specification, the negative impact of the NMWAR introduction for the younger age group is no longer statistically significant.

Table A7.2 DiDiD Estimates based on LFS data (group < 25 only)

	Coef.	S.E.	t	P>t
Pre-/post	0.27	0.07	4.09	0
Non-Apprentices/Apprentices	-1.44	0.17	-8.26	0
Difference-in-Differences	-0.08	0.25	-0.33	0.74
Age	0.37	0.39	0.95	0.34
Age squared	0	0.01	-0.07	0.95
Sector (left-out: Other)				
Retail	-1.04	0.21	-4.92	0
Care	-1.05	0.42	-2.49	0.01
Childcare	-1.67	0.54	-3.1	0
Hospitality	-0.97	0.3	-3.28	0
Hairdressing	-0.45	0.98	-0.46	0.65
Other low	0.14	0.49	0.28	0.78
Gender (left-out: men)				
Women	-0.93	0.24	-3.8	0
Gender/Sector interaction (left-out: Other)				
Retail*female	0.93	0.26	3.55	0
Care*female	1.23	0.61	2.02	0.04
Childcare*female	0.54	0.61	0.88	0.38
Hospitality*female	0.68	0.35	1.94	0.05
Other low*female	-0.09	0.55	-0.17	0.87
Intercept	0.93	0.26	3.55	0
Number of obs	3023			
F(17, 2634/8530))	28.66			
Prob > F	0			
R-squared	0.12			
Root MSE	2.57			

Robust standard errors.

Source: UK Labour Force Survey data Q1-Q4 2005 and Q1-Q4 2011 (pooled), own calculations