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**MODELLING DEMAND FOR
LOW SKILLED/LOW PAID
LABOUR:
EXPLORING THE
EMPLOYMENT TRADE-OFFS
OF A LIVING WAGE**

MODELLING DEMAND FOR LOW SKILLED/LOW PAID LABOUR: EXPLORING THE EMPLOYMENT TRADE-OFFS OF A LIVING WAGE¹

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Abstract

This paper analyses labour demand for low skill/low pay labour in order to explore the potential employment trade-offs associated with moving to a Living Wage. Using industry sector panel data we model demand for labour classified into 5 groups defined by age and highest educational qualification. Low pay is most prevalent amongst the less skilled and the young. Amongst the 11 market sector industry groups we consider, the three sectors that would face the largest rise in their wage bill were all employers to sign up to the Living Wage are: Wholesale & Retail, Hotels & Catering; Other Community, Social & Personal Services; and less skill intensive manufacturing industries. Our calculations suggest that, conditional on the level of output and worker effort, these cost increases would reduce employers' demand for young low-skilled employees in the private sector by approximately 300,000. The analysis highlights the importance of allowing for labour substitution in considering the employment demand effects of exogenous shifts in wages. We find that in aggregate the reduction in conditional labour demand with the Living Wage is around 160,000; this is around half the reduction in the demand for young lower-skilled employees because employers substitute younger with more experienced workers. The number of employees who would see their earnings rise with a Living Wage far outweighs the estimated reduction in labour demand.

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1. Introduction

This paper analyses labour demand so as to explore what the potential employment trade-offs might be were all employers to sign up to the Living Wage. The Living Wage is significantly higher than the National Minimum Wage (NMW), the legally binding pay floor. The NMW applies nationally and at the time of writing is set at £6.08 per hour for employees age 21 or above, £4.98 for employees age 18-20 and £3.68 for employees age 16-17²; the Living Wage is £7.20 per hour, and for London workers £8.30. Thus, for many low paid people a Living Wage would represent a substantial increase in pay, particularly for younger workers in London paid at the NMW.

To be able to say something about the labour demand response to a wider adoption of the Living Wage it is necessary first to work out which types of employees might be affected by a Living Wage and how this might impact upon employers' labour costs. As illustrated in the next section the Living Wage is set relatively high up the wage distribution. Around a fifth to a quarter of employees are paid less than the Living Wage. These employees are more likely to be female, young, working in retail, catering or the agricultural industries, and with fewer qualifications than employees paid at or above the Living Wage.

To gauge how the increase in labour costs associated with the Living Wage might affect employers' demand for labour we split workers into five distinct age/qualification groups and 11 industry groups. These groupings are in part dictated by the data that is available, but enable us to separate out those workers who are more likely to see a sharp rise in wages if they received a Living Wage. For each of these groups we assess the rise in average hourly labour costs that would result if all employers were to sign up to the Living Wage. Next we estimate the wage elasticity of labour demand for each of these groups. We then use these elasticities to calculate a labour demand response to a Living Wage that is wide in coverage. The more sensitive is labour demand to wages, the more we might be concerned that moving to a Living Wage could harm employment if implemented without, for example, increases in labour quality (worker effort, skills) or tax changes to offset the rise in labour costs to employers from paying a Living Wage. The modelling approach takes into account potential substitution of workers less

² Various exemptions apply. For example, apprentices may receive lower rates.

affected by the Living Wage for workers whose pay increases more substantially with a Living Wage.

It is worth bearing in mind that the labour demand impacts calculated in this paper are not to be confused with the employment effects of moving to a Living Wage. For example, we do not model possible endogenous changes in labour efficiency that might occur with a Living Wage (e.g. via a reduction in absenteeism³) and that might offset to some extent the potentially adverse employment demand effects of a Living Wage. Also, our approach calculates labour demand conditional on the level of real output. That means we do not take into account any potential scale effects on labour demand (e.g. if cost increases with a Living Wage led some employers to reduce the scale of their operations). These caveats are important.

The paper is organized as follows. The next section maps out the incidence of pay below the Living Wage using the Labour Force Survey. Section 3 outlines the data used for the modelling exercise and discusses the choice of groups for analysis. Section 4 analyses the change in employers' labour costs that might arise with a widely adopted Living Wage and section 5 sets out our model of labour demand. In section 6 we use this model to illustrate the potential implications for labour demand of a widely adopted Living Wage. A final section concludes.

2. Mapping low pay

The Labour Force Survey (LFS) and the Annual Survey of Hours and Earnings (ASHE) provide, for different types of employee, a picture of the incidence of pay below the Living Wage and of how far wages would need to rise to reach Living Wage levels. There are a number of problems in measuring the extent of low pay using either data source. In this paper we use the LFS rather than the ASHE because this links better to the data we use to model labour demand. In particular, the LFS includes information on pay for different skill groups. With the LFS it is well known that the variable HOURPAY, which is derived from reported gross earnings and hours of work, measures hourly pay with

³ In a survey of employers who have adopted the Living Wage many employers report that the Living Wage has been associated with a reduction in absenteeism and an improvement in the quality of staff (*An independent study of the business benefits of implementing a Living Wage Policy in London*, 2009, London Economics, Report for the Greater London Authority).

substantial error. For example, there is no spike in the distribution of HOURPAY at the NMW (see e.g. Dickens and Manning, 2004) and it overstates the number of individuals paid less than the NMW (Skinner *et al.*, 2002). The LFS also includes a variable that provides a more precise measure of hourly pay called HRRATE, but it is only asked of individuals who are paid by the hour and therefore tends to miss out the higher end of the wage distribution in particular. For these reasons, an assessment of the rise in the wage bill associated with a universal move to the Living Wage based on either of these LFS variables is biased upwards.

To mitigate these biases we impute a measure of hourly pay following a similar procedure to that described in Skinner *et al.* (2002). This involves: regressing the logarithm of HRRATE on the logarithm of HOURPAY and other survey variables⁴ using the sample of observations for which both pay measures are available; using this regression model to predict hourly pay for all LFS observations for which HOURPAY is available; imputing a value of hourly pay for each observation where HRRATE is missing, but HOURPAY is available, based on observed values of HRRATE for observations that are similar in terms of predicted hourly pay⁵. The new measure of hourly pay is set to this imputed value for observations where HRRATE is missing, but HOURPAY is not, and equals HRRATE for observations where it is non-missing.

The incidence of pay below the Living Wage shown in this section and the estimated rise in labour costs associated with a universal Living Wage in section 4 are based on this imputed measure of hourly pay. As in Skinner *et al.* (2002) the imputed measure of hourly pay introduces as spike at the NMW and significantly reduces the extent of pay below the NMW in the LFS.⁶ This turns out to be important for the estimate of the rise in the wage bill resulting from a Living Wage floor, as discussed in section 4.

⁴ Variables include gender, a quadratic in age, two youth dummies, a quadratic in log HOURPAY, whether last pay was the same as usual and an interaction term between log HOURPAY and whether last pay was the same as usual, whether paid weekly or monthly, whether additions to basic pay, ever worked overtime, temporary contract, part-time indicator, small workplace, married, proxy response, a quadratic in tenure, and dummy variables for industry, region, qualification, and occupation.

⁵ We use the fractional imputation method also described in Hicks *et al.* (2009). We match observations within age bands and in or outside London to reflect differences in the NMW and Living Wage on these dimensions, and where possible within qualification and industry groups consistent with the unit of analysis used to model labour demand (see section 3).

⁶ For example, on the HOURPAY measure we find that 10% of employees are paid less than the NMW. With the imputed measure this reduces to 2% of employees. Using the LFS for financial year 2007-8,

Table 1. Percentage of workers paid less than the Living Wage

All employees	27.2%
Female	32.7%
Male	21.8%
<i>Qualifications</i>	
University Degree	10.4%
Intermediate	33.7%
None	58.8%
Source: Labour Force Survey October 2010 - September 2011	
Notes: Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB	

Table 1 shows the percentage of employees paid less than the Living Wage. The data are collected from the LFS October 2010 – September 2011. According to these data just over a quarter of employees in Great Britain are paid less than the Living Wage.⁷ This can be compared to the results obtained by Resolution Foundation using the ASHE 2010 (April 2010 figures; calculated using the £7.85 London rate), which shows that 21% of GB employees are paid less than the Living Wage. Although these figures are different, they both show that the Living Wage is set high up the wage distribution, so that between a fifth and a quarter of all employees are paid below it.⁸

Table 1 also demonstrates the well-known pattern that low pay is more common amongst women employees and less common amongst the highly educated. According to the LFS figures used, one in ten employees with a university degree earns less than

Brewer *et al.* (2009) find that the extent of pay below the NMW reduces from 8% using HOURPAY to 2% using an imputed measure calculated using a similar procedure to that used here. This is higher than the extent of pay below the NMW calculated using ASHE, which is typically around 1% (see annual reports by the Low Pay Commission).

⁷ Using the variable HOURPAY the share of workers paid less than the Living Wage is 25.4% rather than the 27.2% shown in Table 1.

⁸ These estimates concord with published statistics on the wage distribution. ONS calculations suggest that the 20th and 25th percentiles of gross hourly pay in the ASHE 2011 (Table 1.5a) are £7.26 and £7.81; LFS estimates from the same time period put the 25th percentile of gross hourly pay at £7 (Table EARN08).

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the Living Wage, in comparison to approximately one in three employees with qualifications below degree level (this is a very broad group) and more than half of employees without any qualifications.

Figure 1. Percentage of workers paid less than the Living Wage by age

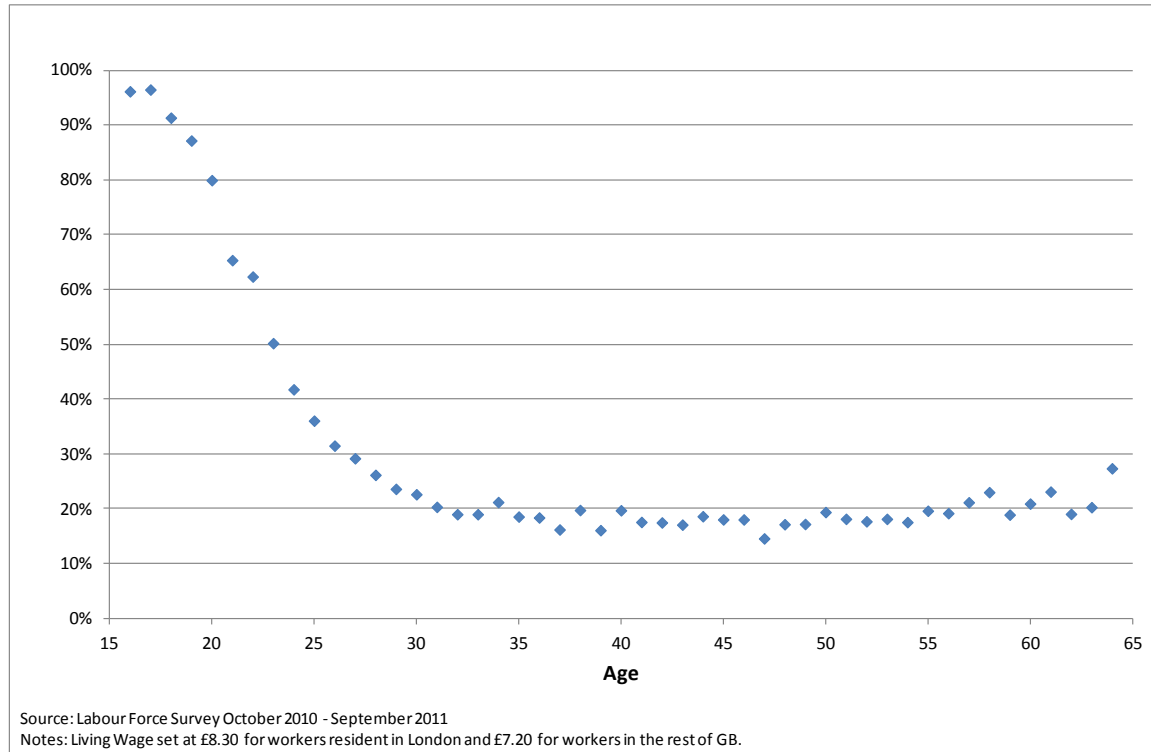


Figure 1 illustrates the percentage of employees paid less than the Living Wage by age. Clearly, pay below the Living Wage is far more prevalent amongst the young. Almost all individuals of school leaving age are paid less than the Living Wage. The incidence of low pay then declines steeply until age 30. After that the incidence of low pay remains broadly constant. Amongst individuals of working age 30+ just under one in five receives a wage that is less than the Living Wage.

There is substantial variation in the extent of pay below the Living Wage across industry sectors (Table 2). The incidence of pay below the Living Wage is highest amongst employees in the Hotels & Restaurants industry, where, according to our calculations using the LFS, three quarters of employees receive less than the Living Wage. Low pay is also prevalent amongst employees in the Agriculture, Hunting & Forestry; Wholesale, Retail & Motortrade; Other Community, Social & Personal; and Private Households

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industries, where between 39% and 58% of employees are paid less than the Living Wage.⁹ The number of employees paid less than the Living Wage is smallest in the Mining and Quarrying; Utilities; Financial Intermediation; and Public Administration and Defence industries, where fewer than one in ten employees is paid less than the Living Wage.

Table 2. Percentage of workers paid less than the Living Wage by industry

<i>Industry section (SIC07)</i>		<i>Industry section (SIC92)</i>	
A Agriculture, forestry and fishing	45.0%	A Agriculture, hunting & forestry	45.5%
B Mining and quarrying	4.8%	B Fishing	17.2%
C Manufacturing	19.8%	C Mining, quarrying	4.8%
D Electricity, gas, air cond supply	7.1%	D Manufacturing	19.4%
E Water supply, sewerage, waste	18.7%	E Electricity gas & water supply	6.8%
F Construction	13.3%	F Construction	13.3%
G Wholesale, retail, repair of vehicle:	57.8%	G Wholesale, retail & motor trade	57.7%
H Transport and storage	19.3%	I Transport, storage & communication	18.2%
I Accommodation and food services	76.5%	H Hotels & restaurants	76.5%
J Information and communication	9.6%	J Financial intermediation	8.3%
K Financial and insurance activities	8.4%	K Real estate, renting & business activities	19.4%
L Real estate activities	17.5%	L Public administration & defence	5.9%
M Prof, scientific, technical activ.	10.8%	M Education	16.3%
N Admin and support services	40.3%	N Health & social work	24.2%
O Public admin and defence	5.9%	O Other community, social & personal	38.8%
P Education	16.2%	P Priv. households with employed persons	44.9%
Q Health and social work	24.2%	Q Extra-territorial organisations, bodies	4.8%
R Arts, entertainment and recreation	42.1%		
S Other service activities	41.7%		
T Households as employers	44.9%		
U Extraterritorial organisations	4.8%		

Source: Labour Force Survey October 2010 - September 2011
Notes: Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB

⁹ Using the variable HOURPAY the share of workers paid less than the Living Wage in the Hotels & Restaurants (Wholesale, Retail & Motortrade) industry is 68.4% (48.7%) rather than the 76.5% (57.7%) shown in Table 2.

3. Data

For the purposes of developing labour demand models for groups of workers who are likely to be paid less than the Living Wage we require data on output, wages and employment of workers in particular skill or occupation groups, as well as other production inputs, by sector. We use the data available in EUKLEMS¹⁰, as described in O'Mahony & Timmer (2009), which provides for the UK (and other countries) annual information on gross value added, capital stocks and the information necessary to calculate the usercost of capital, and labour input by broad sector (SIC1992/2003 rather than SIC2007) for 1970-2007. EUKLEMS also provides the distribution of employment hours and labour costs across age (15-29, 30-49, and 50+), skill (no qualifications, intermediate level qualifications, university degree) and sex for years 1970-2005. We update the UK data to 2007 using the LFS, which is the original source of information underlying the skill and age disaggregations in EUKLEMS.

The information for the UK in EUKLEMS on the labour input disaggregated by age/skill/sex is available for 31 industry groups. But, in reality there is much less variation in the labour input than these 31 industry groups suggest. For example, SIC divisions within a SIC sector may each be assigned the same distribution of hours worked and labour costs across age/skill/sex. When industries are aggregated to reflect genuine variation in the data we are left with 16 industry groups. Following common practice we exclude industry sectors dominated by public sector employers due to measurement issues (these are Public Administration and Defence, Education and Health; see e.g. van Ark *et al.*, 2008), as well as private households with employed persons and extra-territorial organisations. Cell size restrictions in updating the data to 2007 lead to some further aggregation of industry groups. We are left with 11 market sector industry groups.

As shown in Figure 1 above, variation in low pay is not explained by variation across the 30-49 and 50+ age groups and so we aggregate these. For this age group (30+) we use all three skill groups available in EUKLEMS. For younger employees we group together employees with no qualifications and intermediate level qualifications due to small cell sizes in the "no qualifications" category. We group together male and female employees, such that we end up with five types of labour.

¹⁰ <http://www.euklems.net/>

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Table 3. Descriptive statistics - production

		Mean	Standard Deviation	Minimum	Maximum
Descriptive statistics - Production					
COST SHARES					
<i>Age:</i>	<i>Qualifications:</i>				
15-29	University Degree	0.015	0.008	0.004	0.035
	Intermediate/None	0.151	0.068	0.038	0.277
30+	University Degree	0.072	0.038	0.013	0.188
	Intermediate	0.348	0.127	0.081	0.620
	None	0.110	0.051	0.035	0.243
HOURLY WAGES					
<i>Age:</i>	<i>Qualifications:</i>				
15-29	University Degree	13.1	4.4	4.9	29.1
	Intermediate/None	8.0	2.6	2.9	16.5
30+	University Degree	21.2	7.8	7.2	40.1
	Intermediate	11.9	4.0	4.2	21.1
	None	8.2	3.0	2.9	15.8
USERCOST OF CAPITAL		0.238	0.144	0.001	0.760
GVA (1995 prices)		42110	11635	26107	66924
Observations: 120 = 5 sectors X 24 years					

Table 4. Descriptive statistics – market services

		Mean	Standard Deviation	Minimum	Maximum
Descriptive statistics - Market Services					
COST SHARES					
<i>Age:</i>	<i>Qualifications:</i>				
15-29	University Degree	0.028	0.016	0.000	0.076
	Intermediate/None	0.157	0.064	0.042	0.343
30+	University Degree	0.118	0.068	0.008	0.272
	Intermediate	0.335	0.118	0.132	0.590
	None	0.083	0.056	0.010	0.315
HOURLY WAGES					
<i>Age:</i>	<i>Qualifications:</i>				
15-29	University Degree	13.1	5.6	2.8	36.0
	Intermediate/None	8.3	3.4	2.6	16.3
30+	University Degree	22.4	9.5	4.5	51.1
	Intermediate	12.5	5.0	3.5	25.5
	None	8.1	3.8	2.6	19.3
USERCOST OF CAPITAL		0.151	0.104	0.001	0.458
GVA (1995 prices)		57333	41521	10416	190240
Observations: 144 = 6 sectors X 24 years					

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Descriptive statistics are provided in Tables 3 and 4 for the production and market services sectors. These cover the estimation period 1984-2007 and all variables used in estimating labour demand: cost shares (labour costs relative to total production costs) and hourly labour costs for the five different labour types analysed, the user cost of capital¹¹, and gross value added. Calculation of the change in labour costs with the Living Wage is discussed in the next section and is based on LFS data 2010-2011.

4. Changes in labour costs

Table 5 shows the estimated change in labour costs associated with the five different groups of workers if all employers signed up to the Living Wage. These are calculated by comparing the total wage bill within each industry-labour type cell with the total wage bill that arises when we assign the Living Wage to employees with hourly wages less than the Living Wage. In these calculations the quantity and the distribution of hours worked across individuals remains unchanged. As such, these percentage changes in total labour costs provide an estimate of the change in average hourly pay without any employment adjustment. We make no allowance for adjustments to wages above the Living Wage; e.g. to restore wage differentials between different types of workers.

Table 5. Increase in labour costs with full sign-up to the Living Wage

Industry group	Age		15-29		30+		Industry total
	Qualifications	University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE		-	3.5%	0.3%	1.1%	-	1.2%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		5.7%	7.8%	0.9%	2.7%	5.2%	3.4%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.9%	4.6%	0.1%	0.6%	3.0%	1.0%
Manufacturing: Machinery & Equipment; D: 29-35		0.6%	3.5%	0.0%	0.5%	4.3%	0.7%
Construction; F		0.5%	3.9%	0.2%	0.4%	-	1.1%
Wholesale & Retail; Hotels & Catering; G,H		7.6%	13.7%	1.4%	4.3%	8.7%	6.5%
Transport & Storage; I: 60-63		2.0%	4.3%	0.3%	1.1%	-	1.3%
Post & Telecommunications; I: 64		-	4.0%	0.1%	1.0%	-	1.0%
Financial Intermediation; J		1.2%	1.5%	0.0%	0.2%	-	0.4%
Real Estate, Renting & Business Activities; K		0.9%	4.4%	0.2%	1.3%	6.8%	1.0%
Other Community, Social & Personal Services; O		2.7%	12.4%	0.4%	2.1%	11.8%	3.5%
Other industries; L,M,N,P,Q		0.5%	4.9%	0.1%	1.2%	4.8%	0.9%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is assumed unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

¹¹ The usercost of capital is calculated as the product of the investment deflator and the sum of the real internal rate of return and the depreciation rate. In calculating the real internal rate of return we assume expected inflation in the investment deflator equals average inflation in the investment deflator over the previous two years (as in Bakhshi *et al.*, 2003). We use the nominal internal rates of return provided in EUKLEMS, which are described in Timmer *et al.* (2007).

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The picture that emerges from these calculations is that the cost of young employees, particularly those without university degrees, and the cost of adult employees (employees age 30+) with no qualifications would increase very substantially if all employers signed up to the Living Wage. Cost increases for less skilled workers are especially high in the two industry groups where the incidence of pay below the Living Wage amongst these workers is very high. For example, the average cost of young workers without degrees rises by 14% in the Wholesale & Retail, Hotels & Catering sector and by 12% in the Other Community, Social & Personal Services sector. In the other sectors considered costs for this group rise by between 4% and 8% (with the exception of Financial Intermediation where cost increases are lower). As shown in Table 6, the likelihood that a young employee without a degree is paid less than the Living Wage is around 83% in the Wholesale & Retail, Hotels & Catering sector and around 70% in the Other Community, Social & Personal Services sector, much higher than in other sectors. The average cost of adult workers without qualifications also rises substantially, but this group accounts for a relatively small proportion of total industry employment (see Table 12) and so contributes less to the rise in the total industry wage bill. The increase in the industry total wage bill with the Living Wage is most significant in the Wholesale & Retail, Hotels & Catering sector and the Other Community, Social & Personal Services sector, followed by the Manufacturing of Food & beverages, Tobacco and Textiles sector. The overall incidence of pay below the Living Wage is highest in these three sectors (see Table 6).

Table 6. Incidence of pay below the Living Wage

Industry group	Age 15-29		Age 30+			Industry total
	University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE	-	32.8%	10.4%	19.2%	-	20.5%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	47.9%	61.0%	13.4%	32.8%	64.5%	38.1%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	12.6%	43.3%	2.0%	12.5%	36.0%	16.9%
Manufacturing: Machinery & Equipment; D: 29-35	11.5%	36.1%	0.9%	8.3%	42.9%	11.6%
Construction; F	10.5%	33.5%	3.3%	6.0%	-	13.3%
Wholesale & Retail; Hotels & Catering; G,H	65.4%	83.4%	28.3%	51.5%	75.5%	62.6%
Transport & Storage; I: 60-63	31.4%	39.8%	8.5%	15.7%	-	19.8%
Post & Telecommunications; I: 64	-	34.2%	2.8%	14.2%	-	14.9%
Financial Intermediation; J	16.4%	22.0%	0.8%	6.1%	-	8.3%
Real Estate, Renting & Business Activities; K	13.3%	47.6%	4.7%	20.5%	67.7%	19.4%
Other Community, Social & Personal Services; O	35.0%	70.2%	11.2%	29.0%	68.4%	38.8%
Other industries; L,M,N,P,Q	11.8%	45.5%	3.6%	20.6%	50.5%	17.5%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

Tables 5 and 6 show missing values for some labour type/industry group cells. This is due to small cell sizes. Based on similar calculations for calendar year 2010 (with the London Living Wage set at £7.85), where there are more observations in some of these labour type/industry group cells, it appears that the rise in cost of employees age 30+ with no qualifications in the Other Production sector (which includes the Agriculture industry) is comparatively large, with smaller rises in the Construction sector and the three service industry sectors for which missing values are shown.

The cost increases with a Living Wage shown in Table 5 are based on an imputed measure of hourly pay (as described in section 2) and are smaller than those that would result had the calculations been based on the LFS derived hourly pay measure, HOURPAY. For example, the imputation reduces the estimated cost increase by 1.2-1.8 %-points in the most affected industry groups, and by 2.4-5.5 %-points for young employees without a university degree in these industries. This is because the imputed measure gets rid of the long tail of very low pay rates observed with HOURPAY.^{12,13} Despite the attempt here to deal with the upward bias in estimated cost increases with the Living Wage resulting from measurement error in the LFS, our estimates may still exaggerate the magnitude of these cost increases. For example, Durrant & Skinner (2006) suggest that alternate imputation methods reduce the tail of very low pay rates in the LFS further still. Certainly, it seems likely that the estimated cost increases here are larger than those that might be obtained using the ASHE. As discussed in section 2, the incidence of pay below the Living Wage and of pay below the NMW is less in the ASHE than in the LFS (on either the HOURPAY or imputed measure).

Observed pay below the NMW may be due to legitimate exemptions from standard NMW rates (for example, rates may be lower for apprentices and pay may be reduced through accommodation offsets), to non-compliance with the NMW, and to measurement error in hourly pay, despite the efforts made to overcome the latter. It seems reasonable to assume that non-compliance with the NMW will not be eradicated with a move to the Living Wage and legitimate exemptions to the NMW are likely to be

¹² In fact, the cost increases shown in Table 5 are not very different from the cost increases that would result using an hourly pay measure that was equal to HOURPAY for HOURPAY values at or above the NMW, but equal to the NMW for HOURPAY values below the NMW.

¹³ It is likely that the estimated cost increases with a Living Wage will differ with the precise interpolation method used; an assessment of these sensitivities is beyond the scope of this paper.

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perceived as legitimate exemptions to the Living Wage. With this in mind we repeat the calculations in Table 5 assuming that pay for those earning less than the NMW is unchanged with a move to the Living Wage. In other words, in calculating the wage bill change with the Living Wage, we assign the Living Wage only to employees paid less than the Living Wage but at least the NMW. The resulting rise in labour costs is shown in Table 7. The distribution of cost increases across workers types and industries is similar to that shown in Table 5, but the magnitudes of these cost increases are slightly smaller. In illustrating the labour demand effects of full sign-up to the Living Wage in section 6 we evaluate the labour demand response to the labour cost increases shown in Table 7, where we ignore pay below the NMW.

Table 7. Increase in labour costs with the Living Wage ignoring pay below the NMW

Industry group	Age		15-29		30+		Industry total
	Qualifications	University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE		-	2.9%	0.3%	0.9%	-	1.0%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		5.1%	7.0%	0.9%	2.6%	3.5%	3.2%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.9%	3.3%	0.1%	0.6%	2.6%	0.9%
Manufacturing: Machinery & Equipment; D: 29-35		0.6%	3.3%	0.0%	0.4%	2.6%	0.6%
Construction; F		0.5%	3.1%	0.1%	0.3%	-	0.8%
Wholesale & Retail; Hotels & Catering; G,H		6.0%	12.0%	1.3%	3.7%	7.4%	5.6%
Transport & Storage; I: 60-63		2.0%	4.2%	0.3%	1.0%	-	1.3%
Post & Telecommunications; I: 64		-	3.1%	0.1%	0.8%	-	0.8%
Financial Intermediation; J		1.1%	1.4%	0.0%	0.2%	-	0.3%
Real Estate, Renting & Business Activities; K		0.8%	4.0%	0.2%	1.2%	5.2%	0.9%
Other Community, Social & Personal Services; O		2.6%	9.2%	0.3%	1.8%	7.4%	2.8%
Other industries; L,M,N,P,Q		0.5%	4.2%	0.1%	1.0%	4.0%	0.8%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes; workers paid less than the NMW receive no wage change in these calculations.

Obviously, the assumptions underlying the calculations in Table 7 imply that the number of employees who would see a pay rise with universal adoption of the Living Wage is also a bit smaller than that shown in Table 6. Table 8 shows the incidence of pay below the Living Wage but above or equal to the NMW. This suggests that approximately 58% of employees in the Wholesale & Retail, Hotels & Catering sector are paid less than the Living Wage but at least the NMW. In contrast, Table 6 suggests that 63% of employees in the Wholesale & Retail, Hotels & Catering sector are paid less than the Living Wage. The difference between the figures in Table 6 and Table 8 provides an estimate of the incidence of pay below the NMW. So, based on these figures, 5% of employees in the Wholesale & Retail, Hotels & Catering sector are paid less than the NMW. The estimated incidence of pay below the NMW is much less in other sectors.

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Table 8. Incidence of pay below the Living Wage and above or equal to the NMW

Percentage of workers paid less than the Living Wage, but at least the National Minimum Wage							
Industry group	Age	15-29		30+		None	Industry total
	Qualifications	University Degree	Intermediate/None	University Degree	Intermediate		
Other production; ABCE		-	31.3%	10.4%	17.8%	-	19.2%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		44.5%	57.3%	13.4%	31.9%	51.6%	36.3%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		12.6%	38.6%	2.0%	12.2%	33.7%	15.8%
Manufacturing: Machinery & Equipment; D: 29-35		11.0%	35.7%	0.9%	7.6%	33.7%	10.9%
Construction; F		10.4%	30.0%	1.7%	5.3%	-	11.7%
Wholesale & Retail; Hotels & Catering; G,H		57.3%	77.4%	25.7%	47.6%	65.2%	57.6%
Transport & Storage; I: 60-63		31.4%	38.6%	7.5%	15.2%	-	19.1%
Post & Telecommunications; I: 64		-	28.7%	2.8%	13.6%	-	13.7%
Financial Intermediation; J		15.9%	21.8%	0.8%	5.7%	-	8.0%
Real Estate, Renting & Business Activities; K		12.6%	44.4%	4.5%	19.5%	57.6%	18.2%
Other Community, Social & Personal Services; O		34.5%	61.8%	10.0%	26.5%	50.3%	34.7%
Other industries; L,M,N,P,Q		11.5%	42.0%	3.3%	19.7%	44.8%	16.5%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

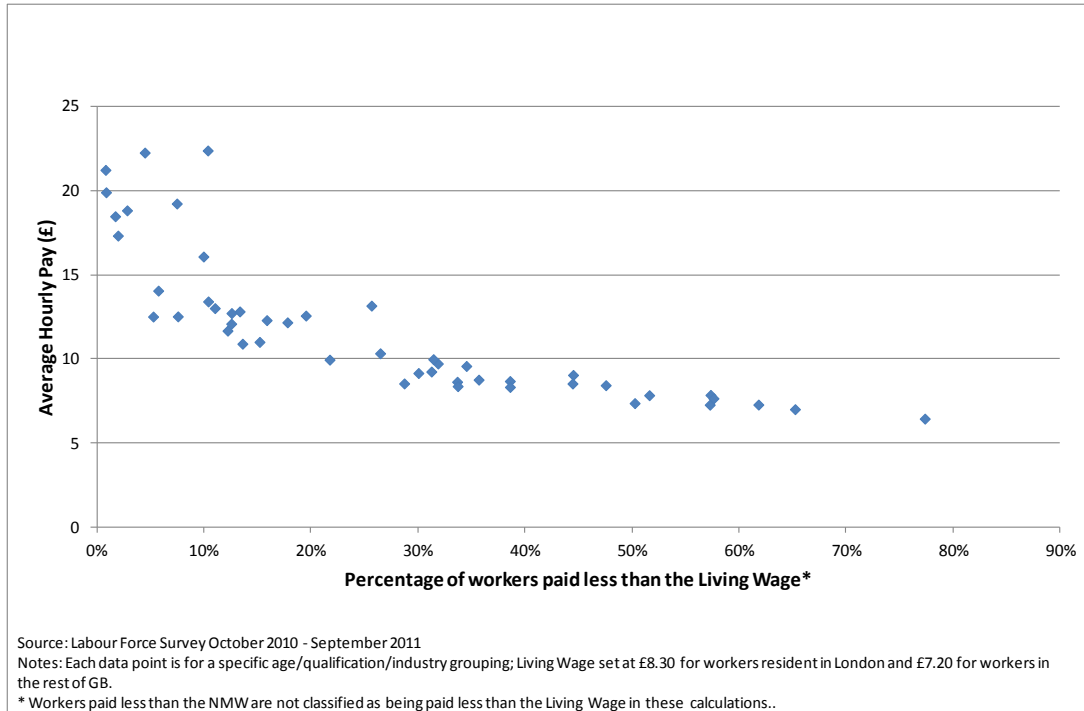
The Tables in Annex 1 provide estimates of labour cost changes with a move towards, but not to, the Living Wage. Estimates are shown with a move to 90% and 80% of the Living Wage. In the latter case the Living Wage is above the NMW for workers age 16-20 and for workers in London only. Estimates are also shown where we assume that the Living Wage applies only to the older group of workers. As in this section, two sets of estimates are provided making different assumptions about measured pay below the NMW. In Annex 2 we report the incidence of pay below the Living Wage under these alternate scenarios, as well as the incidence of pay below the Living Wage and above or equal to the NMW.

In modelling labour demand we estimate the relationship between the number of employee hours used in production and average hourly labour costs. We then evaluate the labour demand impacts of the Living Wage by changing average hourly pay according to the average labour cost changes (by labour type and sector) discussed in this section. For each labour type and sector these cost changes depend on the distance of the Living Wage from average hourly pay, the distribution of hours worked across people with different levels of pay and the share of people with pay below the Living wage, as well as the wage distribution. For example, the cost change with a Living Wage for a particular type of worker in one industry may differ from that in another industry even if the incidence of low pay and average hourly pay are the same in the two industries, as long as the wage distribution differs. Figures 2-4 illustrate the relationship between the average labour cost change with the Living Wage, average hourly pay, and

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the incidence of pay below the Living Wage across our units of analysis (sector/labour type). These show the expected patterns.

Figure 2. Average hourly pay and the incidence of pay below the Living Wage



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Figure 3. Increase in labour costs with full sign-up to the Living Wage and the incidence of pay below the Living Wage

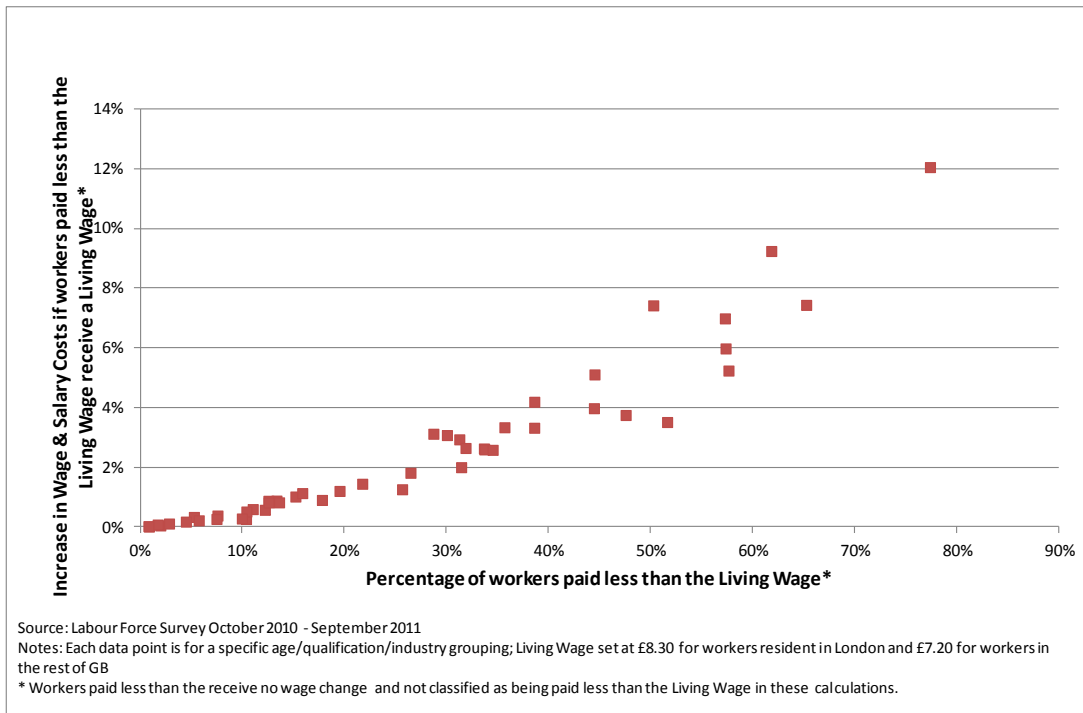
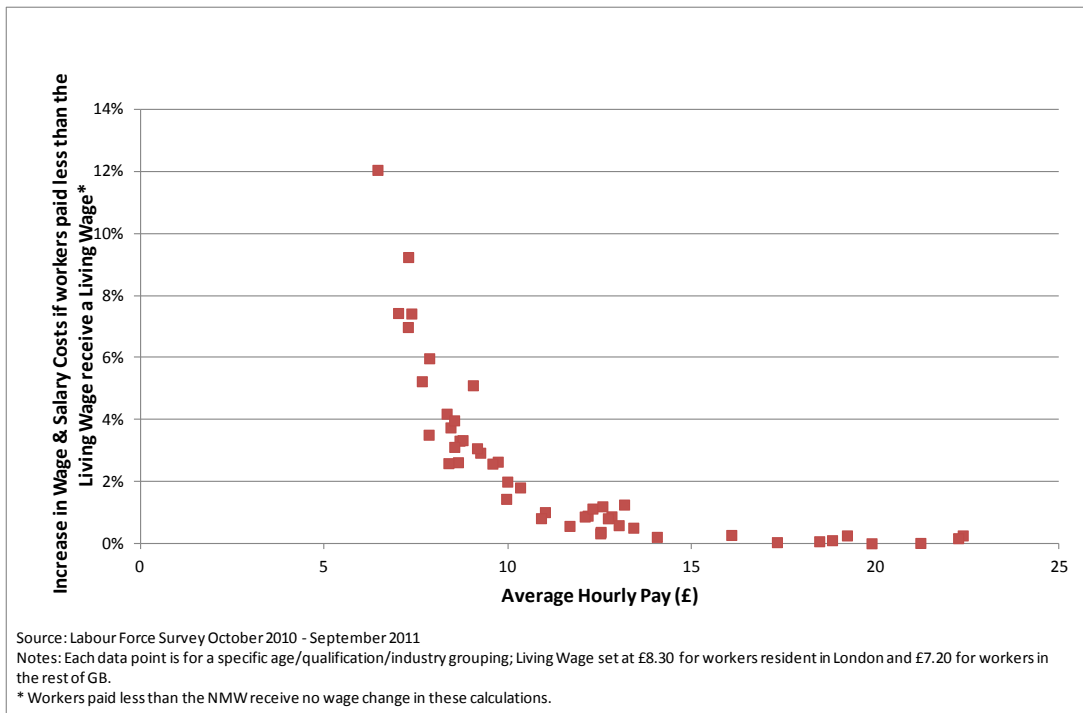


Figure 4. Increase in labour costs with full sign-up to the Living Wage and average hourly pay



5. Labour demand

The translog production and cost function is a widely adopted framework used to explore the empirical properties of production with many inputs. The function is very flexible and allows direct estimates of a variety of elasticities of factor demand to be calculated. Usually, as in this paper, the parameters of the production function are recovered from a system of factor share equations that includes input prices as the exogenous variables, derived from a translog cost function. Bias in the estimated parameters arising because of the possible endogeneity of input prices is mitigated by the dynamic estimation framework that we adopt.

We specify a translog cost function in six inputs (capital and five types of labour), imposing the standard symmetry and homogeneity constraints and allowing for bias of scale and factor-biased technical progress. Our production function results in the following factor share system:

$$S_i^k = \alpha_i^k + \sum_j \gamma_{ij} (\ln W_j^k - \ln R^k) + \gamma_{iY} \ln Y^k + \gamma_{iT}^k T + \varepsilon_i, \quad i = 1 \dots 5 \quad (1)$$

where S_i^k denotes the share of labour type i in total costs for industry k , W_j^k is the hourly cost of labour type j in industry k , R denotes the usercost of capital, Y is real value added and T is a time trend. Symmetry implies that $\gamma_{ij} = \gamma_{ji}$. The ε_i is an error term with zero mean and variance σ_i^2 ; the rest are parameters to be estimated. The constant term and the coefficient on the time trend are allowed to vary across industries to allow for heterogeneity in technology levels and in the factor bias of technical change.

Within this set up the own-price elasticity of conditional labour demand (conditional on the level of output and the price of other inputs) is derived as (see e.g. Berndt & Wood, 1975):

$$\eta_{ii}^k = \frac{\partial \ln H_i^k}{\partial \ln W_i^k} = \frac{\gamma_{ii} + (S_i^k)^2 - S_i^k}{S_i^k} \quad (2)$$

where H_i^k is hours worked by labour type i in industry k , and the cross-price elasticity of labour demand as:

$$\eta_{ij}^k = \frac{\partial \ln H_i^k}{\partial \ln W_j^k} = \frac{\gamma_{ij} + S_i^k S_j^k}{S_i^k}. \quad (3)$$

The own-price elasticity measures the percentage change in demand for a particular type of labour with a 1 per cent change in the average cost of that type of labour. The cross-price elasticity measures the percentage change in demand for a particular type of labour with a 1 per cent change in the average cost of a different type of labour. Note that as specified here these wage elasticities of labour demand vary by industry because of differences in factor shares across industry only (a standard approach in pooled models; see e.g. Griffin & Gregory, 1976). In estimation the factor share system in (1) is evaluated separately for the production sector industries and market service industries, and thus another difference in the wage elasticities of labour demand between these two sector groups arises because of differences in the estimated coefficients on the wage terms in (1). The wage elasticities of labour demand are evaluated at the sample weighted mean value of actual factor shares to facilitate statistical inference (Anderson & Thursby, 1986). The sample is restricted to 1984-2007, rather than 1970-2007, so that sample mean factor shares are relatively recent, but we retain sufficiently long time-series, and because the data before 1984 is based in part on interpolation.

Equation (1) specifies a set of long-run relationships. This is estimated in an error-correction framework including up to three lags to avoid problems of spurious correlation. Dynamic terms in the lagged dependent variable are allowed to vary across industry groups to facilitate short-run parameter heterogeneity (in the spirit of the pooled mean group estimator (Pesaran *et al.*, 1999)). This system is estimated by iterated feasible generalised nonlinear least squares, which converges to maximum likelihood estimates. System estimation is more efficient than estimating the share equations independently because the share equations, once they are specified in dynamic form, include different right-hand side variables. System estimation also allows us to impose the cross-equation symmetry constraints. Cross-sectional means of the dependent and lagged dependent variables are included to correct for cross-sectional correlation within the share equations. Observations are weighted by the sample average industry share of total labour costs.

Estimates of the own- and cross-price elasticities of labour demand in the production and service sectors are shown in Tables 9 and 10. (For the purposes of these tables evaluated at weighted mean factor shares, where the weights reflect average industry

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shares of total labour costs.¹⁴) These are long-run estimates. Dynamic adjustment varies across industries, but largely takes place over two to four years. The error-correction coefficient for each share equation is also shown. This always appears negative and significant, indicating the existence of a long-run relationship as specified in (1).¹⁵

Table 9: Estimated wage elasticities of labour demand – production sectors

		TOTAL HOURS				
		15-29		30+		
WAGES	Age: Qualification:	University Degree	Intermediate/None	University Degree	Intermediate	None
Age: 15-29	Qualifications: University Degree	-1.052*** (-5.74)	0.0721** (2.48)	-0.171*** (-3.44)	0.0467*** (3.34)	-0.0153 (-0.44)
	Intermediate/None	0.701** (2.48)	-1.318*** (-8.33)	0.274* (1.68)	0.254*** (4.54)	0.458*** (3.96)
Age: 30+	Qualifications: University Degree	-0.799*** (-3.44)	0.132* (1.68)	0.215 (0.91)	-0.0992* (-1.81)	-0.0319 (-0.39)
	Intermediate	1.047*** (3.34)	0.587*** (4.54)	-0.476* (-1.81)	-0.419*** (-4.19)	0.0419 (0.24)
	None	-0.101 (-0.44)	0.310*** (3.96)	-0.0450 (-0.39)	0.0123 (0.24)	-0.683*** (-4.67)
Other share system estimation results:						
	R-squared	0.70	0.84	0.79	0.77	0.83
	Error-correction term	-0.961*** (-7.44)	-0.614*** (-7.32)	-0.722*** (-8.18)	-0.533*** (-6.71)	-0.778*** (-11.14)
Notes: t-statistics in parentheses; statistical significance *10% level **5% level and ***1% level; elasticities shown are long-run elasticities.						

Own-price elasticities are reported along the diagonal in Tables 9 and 10 and are shaded in grey. These are negative and statistically significant as expected, i.e. a rise in the wage for a particular type of labour reduces demand for it. The exception is for the 30+ group with university degrees in the production sectors, for which the estimated own-price elasticity is no different from zero (this is similar to the results of Falk & Koebel (2004) for German manufacturing). In the production sectors the estimated own-price elasticity of labour demand is larger in magnitude for the lower skilled in comparison to the higher skilled (this pattern is also observed for the young in the services sectors). This means that the demand for low skilled labour is reduced by relatively more than the

¹⁴ In deriving industry-specific labour demand responses in the next section factor shares are averaged over time only.

¹⁵ The error correction term is less than -1 in market services for workers age 30+ with university degrees, implying some short run over-adjustment to deviations from long-run equilibrium. However, the error correction term is not statistically different from -1.

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demand for high skilled labour in response to an exogenous shift in wages (own wages). Others have found similar patterns in the own-price elasticity of labour demand across skill groups (see e.g. Roberts & Skoufias, 1997, for Colombian manufacturing; Peichl & Siegloch, 2012, German industries). However, these differences are generally not statistically significant. We also find that, with the exception of workers with university degrees in the service sectors, the own-price elasticity of labour demand is larger in magnitude for the young than the old. In other words, labour demand for younger workers is more sensitive than labour demand for older workers to exogenous shifts in wages. Similar to the study of German industries by Falk & Koebel (2004), the results in this paper suggest that the wage sensitivity of labour demand is greater in the service sectors than in the production sectors. Again, these differences are not necessarily statistically significant.

Table 10: Estimated wage elasticities of labour demand – market services

Elasticity of labour demand by age and qualification with respect to labour input prices - Service sectors						
		TOTAL HOURS				
		Age: 15-29		Age: 30+		
WAGES	Qualification:	University Degree	Intermediate/None	University Degree	Intermediate	None
Age: 15-29	Qualifications: University Degree	-1.174*** (-5.44)	0.151*** (2.72)	0.0994*** (2.93)	0.0317 (1.02)	-0.191*** (-2.64)
	Intermediate/None	0.819*** (2.72)	-1.610*** (-4.96)	0.229** (2.21)	0.366*** (2.92)	0.418** (2.40)
Age: 30+	University Degree	0.410*** (2.93)	0.175** (2.21)	-1.208*** (-8.97)	0.223*** (4.46)	0.0838 (1.23)
	Intermediate	0.349 (1.02)	0.742*** (2.92)	0.595*** (4.46)	-0.877*** (-5.78)	0.190 (0.86)
	None	-0.544*** (-2.64)	0.220** (2.40)	0.0580 (1.23)	0.0492 (0.86)	-0.835*** (-4.70)
Other share system estimation results:						
	R-squared	0.72	0.72	0.77	0.69	0.88
	Error-correction term	-0.723*** (-8.09)	-0.388*** (-3.67)	-1.135*** (-7.15)	-0.636*** (-8.33)	-0.452*** (-11.22)
Notes: t-statistics in parentheses; statistical significance *10% level **5% level and ***1% level; elasticities shown are long-run elasticities.						

In many cases estimated cross-price elasticities (off-diagonal elements in Tables 9 and 10) are positive. This means that there is an extent to which employers regard different types of labour as substitutable. So, for example, if the price of unskilled adult labour rises then, all else being equal, the demand for lower skilled young labour rises as employers substitute older workers with younger workers. The results show a negative

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cross-price elasticity between some factor pairs (e.g. in the production sectors between the 30+ with university degrees group and the 30+ with intermediate qualifications group), suggesting a degree of complementarity between these.

6. Implications of moving to a Living Wage

The estimated labour demand elasticities in the previous section can be used to gauge the labour demand response to the wage changes that might occur with a more widely adopted Living Wage. We use the wage changes shown in Table 7 for this illustration (ignoring the changes shown for the "Other industries" sector, which is excluded from the model of labour demand). Responses are long-term responses and employment adjusts over 2 to 4 years. There is no allowance for inter-industry effects.

Table 11: Relative change in conditional labour demand with a Living Wage

Industry group	Age:					Industry total
	Qualification:	15-29		30+		
	University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE	0.0244 (1.50)	-0.0384*** (-3.95)	-0.00951 (-1.19)	-0.000846 (-0.23)	-0.00632 (-1.00)	-0.00893*** (-7.29)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	0.0118 (0.88)	-0.0601*** (-8.22)	-0.00589 (-0.52)	0.0103*** (3.18)	0.00358 (0.91)	-0.00591*** (-4.72)
Manufacturing: Wood, Pulp&Paper, Chemicals, Minerals & Metals; D: 20-28	0.0117* (1.93)	-0.0325*** (-7.11)	0.00478 (1.16)	0.00618*** (2.90)	-0.000997 (-0.21)	-0.000446 (-0.56)
Manufacturing: Machinery & Equipment; D: 29-35	0.0140** (2.08)	-0.0343*** (-6.89)	0.00591 (1.36)	0.00696*** (3.52)	-0.00158 (-0.34)	0.00106 (1.22)
Construction; F	0.0317** (2.28)	-0.0332*** (-8.59)	0.00664 (1.17)	0.00690*** (5.98)	0.0104*** (2.99)	-0.00219*** (-3.62)
Wholesale & Retail; Hotels & Catering; G,H	0.0309 (0.74)	-0.121*** (-5.35)	0.0680*** (3.31)	0.0245** (2.50)	-0.0140 (-1.30)	-0.0263*** (-6.09)
Transport & Storage; I: 60-63	0.0145 (0.78)	-0.0478*** (-4.78)	0.0231*** (3.27)	0.00854*** (3.63)	-0.00264 (-0.52)	0.00141 (1.60)
Post & Telecommunications; I: 64	0.00818 (0.68)	-0.0431*** (-4.58)	0.0161*** (3.27)	0.00438* (1.69)	0.000856 (0.25)	0.000150 (0.16)
Financial Intermediation; J	-0.0115*** (-3.42)	-0.0158*** (-4.37)	0.00502*** (4.63)	0.00417* (1.85)	-0.00819 (-0.70)	-0.000537 (-0.83)
Real Estate, Renting & Business Activities; K	-0.00488 (-0.73)	-0.0658*** (-3.44)	0.00923*** (3.55)	0.00293 (0.43)	-0.0144 (-0.68)	-0.00556*** (-3.79)
Other Community, Social & Personal Services; O	0.0126 (0.79)	-0.107*** (-4.80)	0.0352*** (5.80)	0.0242*** (2.89)	-0.0233* (-1.75)	-0.0139*** (-4.09)

Notes: percentage changes (0.02 = 2 per cent); t-statistics in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.

Table 11 shows the relative change in conditional labour demand for each of the five types of labour considered in each of 11 industry sectors. Industry total employment changes are also shown. Statistical significance is indicated by the asterisks. Demand for young employees with intermediate or no qualifications drops in all industry sectors. These effects are statistically significant. The largest reductions are in the Wholesale & Retail, Hotels & Catering sector and the Other Community, Social & Personal Services

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sector, where labour demand for less skilled young workers falls by around 12 and 11 per cent respectively. It is also in these sectors where the costs of young employees with intermediate or no qualifications rise by the most (Table 7). Demand for employees age 30+ with intermediate level skills rises in most industries. This is despite the rise in average labour costs for this group and occurs because employers shift demand away from younger towards older workers in response to the increase in the relative cost of young less skilled workers. We find mixed results for employees age 30+ with no qualifications. This groups experiences a substantial rise in average labour costs, which tends to reduce demand, but these are partially or wholly offset by substitution away from younger workers. In the service sectors demand for high-skilled employees age 30+ rises. This occurs because of the rise in the relative cost of young high-skilled workers and more experienced workers with intermediate level skills. These substitution effects are not apparent in the production sectors, where the demand for high skilled, experienced workers remains unchanged. Results for high skilled young workers are mixed. The rise in average labour costs for this group tends to reduce demand, but, in the majority of industry groups these effects are either offset or more than offset by substitution effects that occur due to relative price movements so that the net effect on labour demand for this group is either negligible (statistically) or positive and statistically significant. In industries where the Living Wage leads to substantial increases in the average cost of high-skilled young workers labour demand remains unchanged for this group of workers.

Table 12: Employees by industry, age and qualification (thousands)

GB employees (thousands)	Qualifications	15-29		30+			All Employees
		University Degree	Intermediate/None	University Degree	Intermediate	None	
<i>Industry group</i>							
Other production; ABCE		13.4	89.6	82.6	273.9	8.8	468.3
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		22.8	109.3	62.8	330.3	15.3	540.5
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		61.9	185.2	189.3	635.8	23.4	1095.5
Manufacturing: Machinery & Equipment; D: 29-35		44.5	138.1	178.5	589.1	14.1	964.2
Construction; F		46.5	299.1	144.8	683.6	16.9	1191.0
Wholesale & Retail; Hotels & Catering; G,H		287.3	1626.3	333.3	2074.2	100.7	4421.8
Transport & Storage; I: 60-63		35.8	146.4	109.1	622.0	14.4	927.7
Post & Telecommunications; I: 64		23.0	64.2	95.3	252.8	7.7	442.8
Financial Intermediation; J		120.7	168.1	308.5	466.6	2.8	1066.7
Real Estate, Renting & Business Activities; K		325.6	381.3	858.9	1222.7	39.7	2828.2
Other Community, Social & Personal Services; O		101.1	353.1	233.3	497.4	15.4	1200.3
All Industries (Market Sector)		1082.4	3560.6	2596.4	7648.4	259.3	15147.1

Source: Labour Force Survey October 2010 - September 2011

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The last column of Table 11 shows the change in total labour demand for each industry group. Reductions in total labour demand are statistically significant in Other Production; low-skill intensive manufacturing; Construction; the Wholesale & Retail, Hotels & Catering sector; Real Estate, Renting & Business Activities; and Other Community, Social and Personal Services. Statistically speaking total labour demand in the five other market sector industry groups is unchanged. Somewhat unsurprisingly, the largest impact occurs in the Wholesale & Retail, Hotels & Catering sector, where total labour demand falls by 2.6%.

Table 13: Absolute change in conditional labour demand with a Living Wage

Absolute change in labour demand if workers paid less than the Living Wage receive a Living Wage						
Industry group	Age: 15-29		Age: 30+			Industry total
	Qualification: University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE	327 (218)	-3436*** (870)	-786 (661)	-232 (996)	-56 (56)	-4183*** (573)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	269 (306)	-6564*** (798)	-370 (714)	3413*** (1075)	55 (60)	-3197*** (677)
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	725* (377)	-6025*** (848)	906 (779)	3929*** (1353)	-23 (111)	-489 (873)
Manufacturing: Machinery & Equipment; D: 29-35	624** (301)	-4736*** (687)	1054 (775)	4097*** (1165)	-22 (66)	1018 (835)
Construction; F	1475** (646)	-9940*** (1157)	962 (821)	4716*** (788)	176*** (59)	-2612*** (722)
Wholesale & Retail; Hotels & Catering; G,H	8877 (11958)	-197192*** (36826)	22679*** (6855)	50840** (20297)	-1408 (1081)	-116204*** (19082)
Transport & Storage; I: 60-63	519 (668)	-6997*** (1464)	2516*** (769)	5311*** (1464)	-38 (73)	1311 (822)
Post & Telecommunications; I: 64	188 (278)	-2764*** (604)	1530*** (468)	1106* (656)	7 (26)	67 (428)
Financial Intermediation; J	-1390*** (407)	-2656*** (608)	1549*** (335)	1947* (1053)	-23 (33)	-573 (694)
Real Estate, Renting & Business Activities; K	-1589 (2178)	-25074*** (7283)	7927*** (2232)	3583 (8254)	-573 (844)	-15724*** (4152)
Other Community, Social & Personal Services; O	1274 (1618)	-37923*** (7898)	8207*** (1416)	12060*** (4170)	-360* (206)	-16742*** (4090)

Notes: absolute changes; standard errors in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.

Table 12 reports LFS estimates of the number of employees in each of the five skill groups and 11 industry sectors. Together with the estimates of the percentage change in conditional labour demand in Table 11 these figures can be used to gauge the absolute change in conditional labour demand with the Living Wage, as shown in Table 13. Assuming that average hours worked remain unchanged, these are simply the product of the percentage change in labour demand and the number of employees in each group. The standard errors in parentheses are calculated assuming that employment levels are non-stochastic. These can be used to derive approximate 95% confidence intervals for the absolute change in conditional labour demand in response to the wage changes described in Table 7. For example, in Table 13, the central estimate for the change in labour demand in the Wholesale & Retail, Hotels & Catering sector is a

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reduction of 116,204. This estimate has a standard error of 19,082, so that based on this model we are 95% confident that the conditional labour demand response to the estimated wage changes from a universally adopted Living Wage lies between -153,605 and -78,803 (this is equivalent to $-116,204 \pm 1.96 * 19,082$).

The biggest absolute change in total labour demand with the Living Wage is in the Wholesale & Retail, Hotels & Catering sector; this is a relatively large sector in terms of employment and it experiences the largest percentage change in labour demand. Aggregating across all 11 sectors considered, the reduction in conditional labour demand comes to approximately 160,000. The reduction in labour demand for employees age 15-29 with intermediate or no qualifications is much larger at approximately 300,000. The labour demand impacts discussed so far are long-run (2-4 years after the initial change in wages) effects. The initial effect on conditional labour demand is smaller in magnitude than the longer term effect. For example, aggregating across all 11 sectors, in the first year the reduction in total labour demand is a little above 90,000 and the reduction in demand for younger employees with intermediate or no qualifications is around 170,000.

Annex 3 provides estimates of relative and absolute labour demand impacts with a move towards, but not to, the Living Wage. Estimates are shown with a move to 90% and 80% of the Living Wage, and when the Living Wage applies only to the older group of workers. The wage changes underlying these responses are shown in Annex 1 and are calculated assuming that pay below the NMW is unchanged, in the same manner as the wage changes in Table 7 underlying the example in this section. A move to 90% of the Living Wage results in a significantly smaller reduction in labour demand than a move to the Living Wage as is. In aggregate the reduction in labour demand in the 90% case is less than half the reduction in labour demand in the 100% case discussed in this section. In the scenario where the Living Wage applies only to employees age 30+ the change in total labour demand across all sectors is negligible. But, in this case labour demand for workers age 30+ with intermediate or no qualifications is reduced by approximately 90,000. Instead employers increase their demand for younger workers with similar qualifications by a roughly equivalent amount.

7. Discussion and conclusions

This paper considers what might happen to labour demand if all employers signed up to the Living Wage. To this end labour demand models are developed for workers in five different groups, distinguished by age and qualifications. Because the Living Wage represents a substantial rise in average wages and labour costs for younger employees, particularly those with intermediate or no qualifications, and because labour demand for younger less skilled workers is relatively elastic we find that a move to the Living Wage could significantly reduce employers' demand for this group. Aggregate labour demand is reduced by less because employers substitute more experienced workers for younger workers.

It is important to keep in mind that the labour demand effects calculated in this paper are conditional on both the scale of output, labour force participation and labour efficiency. This means that the labour demand effects discussed here do not necessarily provide estimates of the employment effects of the Living Wage. One way of illustrating this is to consider the evidence on the introduction of the NMW, which led to an increase in wages for the lowest paid and a rise in hourly labour costs. A simple labour demand model would predict that the introduction of the NMW led to a reduction in labour demand. Indeed, the labour demand model presented in this paper would suggest that the introduction of the NMW led to a reduction in conditional labour demand of approximately 22,000 employees in the private sector.¹⁶ While this is little more than 0.1% of private sector employees it amounts to just under 2% of low paid employees. In contrast, the majority of empirical research to date, which analyses the impacts of the NMW in an ex-post natural experiment approach, finds little evidence to suggest that the NMW has reduced employment significantly amongst low paid workers (Butcher, 2012). These separate pieces of evidence are not obviously inconsistent; the adverse effects on labour demand calculated here may, for example, be offset to some extent by other changes in the labour market brought about by the NMW.

¹⁶ The change in labour costs underlying this example is based on the coverage of the NMW in each industry/qualification/age cell in the LFS 2010-2011, which may differ somewhat from coverage upon introduction of the NMW. We assume that each covered worker receives an increase in their hourly wage of 10% due to the NMW (in line with the estimates of wage growth amongst covered workers due to the introduction of the NMW in Swaffield (2009)).

The reduction in labour demand associated with the NMW, implied by the model in this paper, is significantly smaller than the reduction in labour demand associated with a wage floor set at the Living Wage. This is because a pay floor set at the Living Wage would reach much higher up the wage distribution than the NMW, potentially increasing wages for more than three times the number of workers who benefit from the NMW and for many by a more significant amount than with the NMW. Indeed, assuming employment and hours worked were unchanged, the calculations using the LFS in this paper suggest that more than 4 million employees in the market sector would see a rise in their earnings with widespread adoption of the Living Wage; on average, earnings would rise by 15% for these employees. The estimated reduction in labour demand is small in comparison, equivalent to less than 4% per cent of the number who might benefit .

The labour demand effects discussed in this paper are calculated under the assumption that pay below the NMW would not change with a Living Wage, which seems a reasonable assumption. Alternative assumptions result in slightly higher wage increases with a Living Wage and more significant reductions in labour demand, although these would not be very different to those reported. An upward bias in our estimate of labour cost increases and labour demand reductions with a Living Wage may arise because the analysis of wage bill changes is based on the LFS. The LFS tends to exaggerate the extent of low pay in comparison to alternate data sources such as the ASHE (not used here because it is less comparable to the data used to model labour demand). Indeed, a key difficulty for this analysis is working out what would actually happen to employers' labour costs if they signed up to the Living Wage. This is primarily because of the difficulty in accurately measuring hourly pay in the LFS. In this paper measurement error is minimised by using an imputation method similar to that used elsewhere in the literature. Further research is necessary to test the sensitivity of these estimates.

References

- Anderson, R., and Thursby, J. (1986), 'Intervals for Elasticity Estimators in Translog Models', *Review of Economics and Statistics*, Vol. 68, No. 4, pp. 647-656.
- Bakhshi, H., Oulton, N. and Thompson, J. (2003) 'Modelling investment when relative prices are trending: theory and evidence for the United Kingdom', Bank of England Working Paper No. 189.

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- Berndt, E., and Wood, D. (1975), 'Technology, Prices, and the Derived Demand for Energy', *Review of Economics and Statistics*, Vol. 57, No. 3, pp. 259-268.
- Brewer, M., May, R., and Phillips, D. (2009), 'Taxes, Benefits and the National Minimum Wage', Report to the Low Pay Commission.
- Butcher, T. (2012), 'Still Evidence-Based? The Role of Policy Evaluation in Recession and Beyond: The Case of the National Minimum Wage', *National Institute Economic Review*, Vol. 219(1), pp. R26-R40.
- Durrant, G. and Skinner, C. (2006), 'Using data augmentation to correct for non-ignorable non-response when surrogate data are available: an application to the distribution of hourly pay', *Journal of the Royal Statistical Society A*, Vol. 169, pp. 605-623.
- Falk, M., and Koebel, B. (2004), 'The impact of office machinery and computer capital on the demand for heterogeneous labour', *Labour Economics*, Vol. 11, pp. 99-117.
- Griffin, J., and Gregory, P. (1976), 'An Intercountry Translog Model of Energy Substitution Responses', *American Economic Review*, Vol. 66, No. 5, pp. 845-857.
- Hicks, S., Conn, S., and Johnson, J. (2009), 'Characteristics of those paid below the National Minimum Wage', *Economic and Labour Market Review*, Vol. 3(1), pp. 67-73.
- O'Mahony, M. and Timmer, M. (2009), 'Output, Input and Productivity Measures at the Industry Level: the EU KLEMS Database', *Economic Journal*, Vol. 119, pp. F374-F403.
- Peichl, A., and Siegloch, S. (2012), 'Accounting for labor demand effects in structural labor supply models', *Labour Economics*, Vol. 19, pp. 129-138.
- Pesaran, H., Shin, Y. and Smith, R. (1999), 'Pooled Mean Group Estimation of Dynamic Heterogeneous Panels', *Journal of the American Statistical Association*, Vol. 94, pp. 621-634.
- Roberts, E., and Skoufias, E. (1997), 'The Long-Run Demand for Skilled and Unskilled Labor in Colombian Manufacturing Plants', *Review of Economics and Statistics*, Vol. 79, No. 2, pp. 330-334.
- Skinner, C., Studdard, N., Beissel-Durrant, G., and Jenkins, J. (2002), 'The Measurement of Low Pay in the UK Labour Force Survey', *Oxford Bulletin of Economics and Statistics*, No. 64, pp. 633-652.
- Swaffield, J. (2009), 'Estimating the Impact of the 7th NMW Uprating on the Wage Growth of Low-Wage Workers in Britain', Report to the Low Pay Commission.
- Timmer, M., Van Moergastel, T., Stuivenwold, E., Ypma, G., O'Mahony, M., and Kangasniemi, M. (2007) *EU KLEMS Growth and Productivity Accounts*, Version 1.0, PART I Methodology.
- van Ark, B., O'Mahony, M. and Timmer, M. (2008) 'The Productivity Gap between Europe and the United States: Trends and Causes', *Journal of Economic Perspectives*, Vol. 22, No. 1, pp. 25-44.

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ANNEX 1

WAGE AND SALARY CHANGES UNDER ALTERNATE LIVING WAGE ASSUMPTIONS

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Increase in Wage & Salary Costs* if workers paid less than 90% of the Living Wage receive 90% of the Living Wage

Industry group	Age	15-29		30+		None	Industry total
	Qualifications	University Degree	Intermediate/None	University Degree	Intermediate		
Other production; ABCE		-	1.4%	0.1%	0.3%	-	0.4%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		2.2%	3.1%	0.3%	0.8%	1.6%	1.2%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.4%	2.2%	0.0%	0.1%	0.8%	0.4%
Manufacturing: Machinery & Equipment; D: 29-35		0.2%	1.3%	0.0%	0.1%	1.6%	0.2%
Construction; F		0.2%	1.9%	0.1%	0.1%	-	0.5%
Wholesale & Retail; Hotels & Catering; G,H		3.1%	6.5%	0.5%	1.4%	3.2%	2.7%
Transport & Storage; I: 60-63		0.6%	1.6%	0.1%	0.3%	-	0.4%
Post & Telecommunications; I: 64		-	1.7%	0.0%	0.3%	-	0.4%
Financial Intermediation; J		0.5%	0.4%	0.0%	0.1%	-	0.1%
Real Estate, Renting & Business Activities; K		0.3%	1.6%	0.1%	0.4%	2.5%	0.4%
Other Community, Social & Personal Services; O		0.9%	6.7%	0.1%	0.7%	5.1%	1.7%
Other industries; L,M,N,P,Q		0.2%	2.0%	0.0%	0.3%	1.7%	0.3%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is assumed unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

Increase in Wage & Salary Costs* if workers paid less than 80% of the Living Wage receive 80% of the Living Wage

Industry group	Age	15-29		30+		None	Industry total
	Qualifications	University Degree	Intermediate/None	University Degree	Intermediate		
Other production; ABCE		-	0.5%	0.0%	0.0%	-	0.1%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		0.2%	0.6%	0.0%	0.0%	0.0%	0.1%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.0%	0.8%	0.0%	0.0%	0.1%	0.1%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	0.3%	0.0%	0.0%	0.1%	0.0%
Construction; F		0.0%	0.7%	0.0%	0.0%	-	0.2%
Wholesale & Retail; Hotels & Catering; G,H		0.7%	2.1%	0.1%	0.2%	0.4%	0.7%
Transport & Storage; I: 60-63		0.0%	0.3%	0.0%	0.0%	-	0.1%
Post & Telecommunications; I: 64		-	0.2%	0.0%	0.1%	-	0.1%
Financial Intermediation; J		0.1%	0.1%	0.0%	0.0%	-	0.0%
Real Estate, Renting & Business Activities; K		0.0%	0.4%	0.0%	0.0%	0.3%	0.1%
Other Community, Social & Personal Services; O		0.1%	3.0%	0.0%	0.1%	0.9%	0.6%
Other industries; L,M,N,P,Q		0.0%	0.5%	0.0%	0.0%	0.1%	0.0%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is assumed unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

Increase in Wage & Salary Costs* if workers paid less than the Living Wage receive a Living Wage (age 30+ only)

Industry group	Age	15-29		30+		None	Industry total
	Qualifications	University Degree	Intermediate/None	University Degree	Intermediate		
Other production; ABCE		0.0%	0.0%	0.3%	1.1%	-	0.7%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		0.0%	0.0%	0.9%	2.7%	5.2%	1.9%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.0%	0.0%	0.1%	0.6%	3.0%	0.4%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	0.0%	0.0%	0.5%	4.3%	0.3%
Construction; F		0.0%	0.0%	0.2%	0.4%	-	0.3%
Wholesale & Retail; Hotels & Catering; G,H		0.0%	0.0%	1.4%	4.3%	8.7%	2.6%
Transport & Storage; I: 60-63		0.0%	0.0%	0.3%	1.1%	-	0.8%
Post & Telecommunications; I: 64		0.0%	0.0%	0.1%	1.0%	-	0.5%
Financial Intermediation; J		0.0%	0.0%	0.0%	0.2%	-	0.1%
Real Estate, Renting & Business Activities; K		0.0%	0.0%	0.2%	1.3%	6.8%	0.6%
Other Community, Social & Personal Services; O		0.0%	0.0%	0.4%	2.1%	11.8%	1.1%
Other industries; L,M,N,P,Q		0.0%	0.0%	0.1%	1.2%	4.8%	0.5%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is assumed unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

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Increase in Wage & Salary Costs* if workers paid less than 90% of the Living Wage receive 90% of the Living Wage - ignoring pay below NMW

Industry group	Age Qualifications	15-29		30+			Industry total
		University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE		-	0.9%	0.1%	0.2%	-	0.2%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		1.8%	2.6%	0.3%	0.8%	0.8%	1.1%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.4%	1.3%	0.0%	0.1%	0.6%	0.3%
Manufacturing: Machinery & Equipment; D: 29-35		0.2%	1.2%	0.0%	0.1%	0.8%	0.2%
Construction; F		0.2%	1.4%	0.0%	0.1%	-	0.3%
Wholesale & Retail; Hotels & Catering; G,H		2.0%	5.4%	0.4%	1.1%	2.6%	2.2%
Transport & Storage; I: 60-63		0.6%	1.6%	0.0%	0.3%	-	0.4%
Post & Telecommunications; I: 64		-	1.2%	0.0%	0.2%	-	0.3%
Financial Intermediation; J		0.5%	0.4%	0.0%	0.0%	-	0.1%
Real Estate, Renting & Business Activities; K		0.3%	1.4%	0.1%	0.4%	1.7%	0.3%
Other Community, Social & Personal Services; O		0.9%	4.3%	0.1%	0.6%	2.6%	1.1%
Other industries; L,M,N,P,Q		0.1%	1.6%	0.0%	0.3%	1.3%	0.2%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes; workers paid less than the NMW receive no wage change in these calculations.

Increase in Wage & Salary Costs* if workers paid less than 80% of the Living Wage receive 80% of the Living Wage - ignoring pay below NMW

Industry group	Age Qualifications	15-29		30+			Industry total
		University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE		-	0.2%	0.0%	0.0%	-	0.0%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		0.1%	0.5%	0.0%	0.0%	0.0%	0.1%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.0%	0.3%	0.0%	0.0%	0.0%	0.0%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	0.3%	0.0%	0.0%	0.0%	0.0%
Construction; F		0.0%	0.4%	0.0%	0.0%	-	0.1%
Wholesale & Retail; Hotels & Catering; G,H		0.2%	1.6%	0.1%	0.1%	0.4%	0.5%
Transport & Storage; I: 60-63		0.0%	0.3%	0.0%	0.0%	-	0.0%
Post & Telecommunications; I: 64		-	0.2%	0.0%	0.0%	-	0.0%
Financial Intermediation; J		0.1%	0.1%	0.0%	0.0%	-	0.0%
Real Estate, Renting & Business Activities; K		0.0%	0.3%	0.0%	0.0%	0.1%	0.0%
Other Community, Social & Personal Services; O		0.1%	1.4%	0.0%	0.1%	0.1%	0.3%
Other industries; L,M,N,P,Q		0.0%	0.3%	0.0%	0.0%	0.1%	0.0%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes; workers paid less than the NMW receive no wage change in these calculations.

Increase in Wage & Salary Costs* if workers paid less than the Living Wage receive a Living Wage (age 30+ only) - ignoring pay below NMW

Industry group	Age Qualifications	15-29		30+			Industry total
		University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE		0.0%	0.0%	0.3%	0.9%	-	0.6%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		0.0%	0.0%	0.9%	2.6%	3.5%	1.8%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.0%	0.0%	0.1%	0.6%	2.6%	0.4%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	0.0%	0.0%	0.4%	2.6%	0.2%
Construction; F		0.0%	0.0%	0.1%	0.3%	-	0.2%
Wholesale & Retail; Hotels & Catering; G,H		0.0%	0.0%	1.3%	3.7%	7.4%	2.3%
Transport & Storage; I: 60-63		0.0%	0.0%	0.3%	1.0%	-	0.7%
Post & Telecommunications; I: 64		0.0%	0.0%	0.1%	0.8%	-	0.5%
Financial Intermediation; J		0.0%	0.0%	0.0%	0.2%	-	0.1%
Real Estate, Renting & Business Activities; K		0.0%	0.0%	0.2%	1.2%	5.2%	0.5%
Other Community, Social & Personal Services; O		0.0%	0.0%	0.3%	1.8%	7.4%	0.9%
Other industries; L,M,N,P,Q		0.0%	0.0%	0.1%	1.0%	4.0%	0.5%

Source: Labour Force Survey October 2010 - September 2011

Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; *Wage & Salary Costs exclude employers' pension contributions and National Insurance Contributions; the distribution and quantity of hours worked is unchanged in this calculation; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes; workers paid less than the NMW receive no wage change in these calculations.

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ANNEX 2

COVERAGE OF LIVING WAGE UNDER ALTERNATE LIVING WAGE ASSUMPTIONS

**MODELLING DEMAND FOR LOW SKILLED/LOW PAID LABOUR:
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Percentage of workers paid less than 90% of the Living Wage

Industry group	Age Qualifications	15-29		University Degree	30+ Intermediate	None	Industry total
		University Degree	Intermediate/None				
Other production; ABCE		-	19.4%	5.1%	8.0%	-	9.9%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		32.6%	37.7%	10.2%	21.6%	28.8%	24.4%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		8.9%	26.8%	0.7%	5.5%	15.3%	9.0%
Manufacturing: Machinery & Equipment; D: 29-35		6.5%	22.1%	0.5%	4.0%	25.3%	6.4%
Construction; F		5.9%	21.5%	3.1%	3.3%	-	8.3%
Wholesale & Retail; Hotels & Catering; G,H		46.1%	66.6%	16.7%	33.5%	51.5%	45.3%
Transport & Storage; I: 60-63		12.3%	21.8%	3.9%	7.0%	-	9.4%
Post & Telecommunications; I: 64		-	24.1%	2.3%	8.3%	-	9.1%
Financial Intermediation; J		9.2%	11.5%	0.6%	2.3%	-	4.1%
Real Estate, Renting & Business Activities; K		7.2%	26.3%	3.2%	12.8%	48.1%	11.6%
Other Community, Social & Personal Services; O		19.8%	53.6%	5.8%	18.3%	48.5%	27.0%
Other industries; L,M,N,P,Q		5.5%	28.7%	1.6%	10.8%	35.4%	9.6%

Source: Labour Force Survey October 2010 - September 2011
Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

Percentage of workers paid less than 80% of the Living Wage

Industry group	Age Qualifications	15-29		University Degree	30+ Intermediate	None	Industry total
		University Degree	Intermediate/None				
Other production; ABCE		-	6.0%	0.0%	0.7%	-	1.6%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		5.4%	7.7%	0.5%	1.1%	0.0%	2.6%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		2.9%	8.8%	0.0%	0.1%	0.7%	1.8%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	5.0%	0.0%	0.1%	1.1%	0.8%
Construction; F		0.3%	9.3%	0.1%	0.5%	-	2.8%
Wholesale & Retail; Hotels & Catering; G,H		9.3%	25.3%	3.4%	3.6%	8.5%	11.9%
Transport & Storage; I: 60-63		0.8%	4.1%	1.5%	0.9%	-	1.5%
Post & Telecommunications; I: 64		-	6.6%	0.0%	1.3%	-	1.8%
Financial Intermediation; J		2.8%	2.2%	0.0%	0.1%	-	0.7%
Real Estate, Renting & Business Activities; K		0.5%	9.2%	0.5%	1.4%	5.7%	2.2%
Other Community, Social & Personal Services; O		2.8%	23.1%	0.2%	2.5%	8.6%	8.3%
Other industries; L,M,N,P,Q		0.5%	7.2%	0.2%	0.9%	4.0%	1.3%

Source: Labour Force Survey October 2010 - September 2011
Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

Percentage of workers paid less than the Living Wage (age 30+ only)

Industry group	Age Qualifications	15-29		University Degree	30+ Intermediate	None	Industry total
		University Degree	Intermediate/None				
Other production; ABCE		0.0%	0.0%	10.4%	19.2%	-	14.4%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		0.0%	0.0%	13.4%	32.8%	64.5%	22.6%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.0%	0.0%	2.0%	12.5%	36.0%	8.3%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	0.0%	0.9%	8.3%	42.9%	5.9%
Construction; F		0.0%	0.0%	3.3%	6.0%	-	4.0%
Wholesale & Retail; Hotels & Catering; G,H		0.0%	0.0%	28.3%	51.5%	75.5%	28.3%
Transport & Storage; I: 60-63		0.0%	0.0%	8.5%	15.7%	-	12.1%
Post & Telecommunications; I: 64		0.0%	0.0%	2.8%	14.2%	-	8.9%
Financial Intermediation; J		0.0%	0.0%	0.8%	6.1%	-	3.0%
Real Estate, Renting & Business Activities; K		0.0%	0.0%	4.7%	20.5%	67.7%	11.1%
Other Community, Social & Personal Services; O		0.0%	0.0%	11.2%	29.0%	68.4%	14.7%
Other industries; L,M,N,P,Q		0.0%	0.0%	3.6%	20.6%	50.5%	11.8%

Source: Labour Force Survey October 2010 - September 2011
Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

**MODELLING DEMAND FOR LOW SKILLED/LOW PAID LABOUR:
EXPLORING THE EMPLOYMENT TRADE-OFFS OF A LIVING WAGE**

Percentage of workers paid less than 90% of the Living Wage, but at least the National Minimum Wage

Industry group	Age Qualifications	15-29		University Degree	30+		Industry total
		University Degree	Intermediate/None		Intermediate	None	
Other production; ABCE		-	17.8%	5.1%	6.7%	-	8.6%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		29.3%	33.9%	10.2%	20.6%	15.9%	22.6%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		8.9%	22.0%	0.7%	5.3%	13.0%	8.0%
Manufacturing: Machinery & Equipment; D: 29-35		6.1%	21.8%	0.5%	3.3%	16.1%	5.8%
Construction; F		5.8%	18.0%	1.5%	2.5%	-	6.7%
Wholesale & Retail; Hotels & Catering; G,H		38.0%	60.6%	14.1%	29.6%	41.2%	40.3%
Transport & Storage; I: 60-63		12.3%	20.7%	2.9%	6.5%	-	8.7%
Post & Telecommunications; I: 64		-	18.6%	2.3%	7.7%	-	8.0%
Financial Intermediation; J		8.7%	11.2%	0.6%	1.9%	-	3.8%
Real Estate, Renting & Business Activities; K		6.4%	23.1%	2.9%	11.7%	38.0%	10.4%
Other Community, Social & Personal Services; O		19.3%	45.2%	4.6%	15.9%	30.3%	22.9%
Other industries; L,M,N,P,Q		5.2%	25.2%	1.3%	9.8%	29.7%	8.6%

Source: Labour Force Survey October 2010 - September 2011
Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

Percentage of workers paid less than 80% of the Living Wage, but at least the National Minimum Wage

Industry group	Age Qualifications	15-29		University Degree	30+		Industry total
		University Degree	Intermediate/None		Intermediate	None	
Other production; ABCE		-	4.4%	0.0%	0.2%	-	0.9%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		4.3%	6.7%	0.5%	0.8%	0.0%	2.2%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		2.9%	6.3%	0.0%	0.0%	0.5%	1.3%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	4.6%	0.0%	0.1%	0.8%	0.7%
Construction; F		0.3%	6.8%	0.1%	0.2%	-	1.9%
Wholesale & Retail; Hotels & Catering; G,H		3.7%	21.4%	2.1%	2.1%	6.2%	9.2%
Transport & Storage; I: 60-63		0.8%	4.0%	0.5%	0.3%	-	1.0%
Post & Telecommunications; I: 64		-	3.8%	0.0%	0.7%	-	1.0%
Financial Intermediation; J		2.5%	2.0%	0.0%	0.1%	-	0.7%
Real Estate, Renting & Business Activities; K		0.4%	7.1%	0.5%	1.1%	2.1%	1.7%
Other Community, Social & Personal Services; O		2.7%	16.2%	0.2%	1.3%	3.6%	5.7%
Other industries; L,M,N,P,Q		0.3%	5.2%	0.2%	0.4%	2.2%	0.9%

Source: Labour Force Survey October 2010 - September 2011
Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

Percentage of workers paid less than the Living Wage, but at least the National Minimum Wage (age 30+ only)

Industry group	Age Qualifications	15-29		University Degree	30+		Industry total
		University Degree	Intermediate/None		Intermediate	None	
Other production; ABCE		0.0%	0.0%	10.4%	17.8%	-	13.3%
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37		0.0%	0.0%	13.4%	31.9%	51.6%	21.8%
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28		0.0%	0.0%	2.0%	12.2%	33.7%	8.1%
Manufacturing: Machinery & Equipment; D: 29-35		0.0%	0.0%	0.9%	7.6%	33.7%	5.3%
Construction; F		0.0%	0.0%	1.7%	5.3%	-	3.3%
Wholesale & Retail; Hotels & Catering; G,H		0.0%	0.0%	25.7%	47.6%	65.2%	26.0%
Transport & Storage; I: 60-63		0.0%	0.0%	7.5%	15.2%	-	11.5%
Post & Telecommunications; I: 64		0.0%	0.0%	2.8%	13.6%	-	8.5%
Financial Intermediation; J		0.0%	0.0%	0.8%	5.7%	-	2.8%
Real Estate, Renting & Business Activities; K		0.0%	0.0%	4.5%	19.5%	57.6%	10.4%
Other Community, Social & Personal Services; O		0.0%	0.0%	10.0%	26.5%	50.3%	13.2%
Other industries; L,M,N,P,Q		0.0%	0.0%	3.3%	19.7%	44.8%	11.2%

Source: Labour Force Survey October 2010 - September 2011
Notes: Industry codes SIC92; Living Wage set at £8.30 for workers resident in London and £7.20 for workers in the rest of GB; weighted with PIWT09/10; - indicates small cell size, result not reported; young workers with no qualifications not reported separately because of small cell sizes.

MODELLING DEMAND FOR LOW SKILLED/LOW PAID LABOUR:
EXPLORING THE EMPLOYMENT TRADE-OFFS OF A LIVING WAGE

ANNEX 3

LABOUR DEMAND IMPACTS UNDER ALTERNATE LIVING WAGE ASSUMPTIONS

**MODELLING DEMAND FOR LOW SKILLED/LOW PAID LABOUR:
EXPLORING THE EMPLOYMENT TRADE-OFFS OF A LIVING WAGE**

Relative change in labour demand if workers paid less than 90% of the Living Wage receive 90% of the Living Wage

<i>Industry group</i>	Age: 15-29		University Degree	30+ Intermediate	None	Industry total
	Qualification: University Degree	Intermediate/None				
Other production; ABCE	0.00906** (2.02)	-0.0173*** (-5.21)	-0.000483 (-0.22)	0.00106 (1.20)	0.00253* (1.73)	-0.00247*** (-8.70)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	0.00391 (0.73)	-0.0255*** (-8.45)	-0.000439 (-0.10)	0.00458*** (3.60)	0.00461*** (2.85)	-0.00212*** (-4.45)
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	0.00389* (1.69)	-0.0146*** (-7.67)	0.00222 (1.43)	0.00288*** (3.68)	0.00235 (1.40)	-0.000136 (-0.49)
Manufacturing: Machinery & Equipment; D: 29-35	0.00475** (2.00)	-0.0130*** (-7.15)	0.00224 (1.47)	0.00264*** (3.82)	0.000458 (0.29)	0.000388 (1.31)
Construction; F	0.0144** (2.24)	-0.0157*** (-8.72)	0.00350 (1.36)	0.00321*** (6.10)	0.00551*** (3.43)	-0.00104*** (-3.72)
Wholesale & Retail; Hotels & Catering; G,H	0.0274 (1.29)	-0.0611*** (-5.36)	0.0266*** (2.75)	0.0146*** (2.92)	-0.000223 (-0.04)	-0.0118*** (-5.70)
Transport & Storage; I: 60-63	0.0104 (1.37)	-0.0198*** (-4.91)	0.00791*** (2.91)	0.00345*** (3.68)	0.00172 (0.86)	0.000545 (1.61)
Post & Telecommunications; I: 64	0.00538 (1.04)	-0.0182*** (-4.57)	0.00553*** (2.81)	0.00228** (2.05)	0.00136 (0.91)	0.000155 (0.39)
Financial Intermediation; J	-0.00500*** (-4.68)	-0.00447*** (-4.21)	0.00146*** (4.58)	0.00148** (2.19)	-0.00322 (-0.95)	-0.000209 (-1.12)
Real Estate, Renting & Business Activities; K	-0.00131 (-0.59)	-0.0227*** (-3.49)	0.00306*** (3.51)	0.00114 (0.50)	-0.00420 (-0.60)	-0.00186*** (-3.82)
Other Community, Social & Personal Services; O	0.0111 (1.44)	-0.0541*** (-4.92)	0.0147*** (5.18)	0.0123*** (3.05)	-0.00388 (-0.64)	-0.00708*** (-4.31)

Notes: percentage changes (0.02 = 2 per cent); t-statistics in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.

Absolute change in labour demand if workers paid less than 90% of the Living Wage receive 90% of the Living Wage

<i>Industry group</i>	Age: 15-29		University Degree	30+ Intermediate	None	Industry total
	Qualification: University Degree	Intermediate/None				
Other production; ABCE	121** (60)	-1549*** (297)	-40 (181)	289 (241)	22* (13)	-1156*** (133)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	89 (123)	-2790*** (330)	-28 (271)	1511*** (420)	71*** (25)	-1147*** (258)
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	241* (143)	-2697*** (351)	420 (294)	1832*** (498)	55 (39)	-149 (305)
Manufacturing: Machinery & Equipment; D: 29-35	211** (106)	-1798*** (251)	400 (273)	1554*** (407)	6 (23)	374 (287)
Construction; F	669** (299)	-4700*** (539)	506 (373)	2195*** (360)	93*** (27)	-1237*** (333)
Wholesale & Retail; Hotels & Catering; G,H	7880 (6097)	-99449*** (18563)	8881*** (3231)	30379*** (10401)	-22 (542)	-52331*** (9174)
Transport & Storage; I: 60-63	370 (270)	-2900*** (591)	863*** (296)	2148*** (584)	25 (29)	506 (314)
Post & Telecommunications; I: 64	124 (119)	-1169*** (256)	527*** (187)	577*** (281)	10 (11)	69 (177)
Financial Intermediation; J	-604*** (129)	-752*** (179)	452*** (99)	690** (315)	-9 (9)	-223 (199)
Real Estate, Renting & Business Activities; K	-427 (724)	-8674*** (2487)	2625*** (749)	1394 (2780)	-167 (276)	-5248*** (1375)
Other Community, Social & Personal Services; O	1120 (778)	-19116*** (3885)	3430*** (662)	6130*** (2013)	-60 (93)	-8496*** (1971)

Notes: absolute changes; standard errors in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.

**MODELLING DEMAND FOR LOW SKILLED/LOW PAID LABOUR:
EXPLORING THE EMPLOYMENT TRADE-OFFS OF A LIVING WAGE**

Relative change in labour demand if workers paid less than 80% of the Living Wage receive 80% of the Living Wage

<i>Industry group</i>	Age: 15-29		University Degree	30+ Intermediate	None	Industry total
	Qualification: University Degree	Intermediate/None				
Other production; ABCE	0.00208** (2.19)	-0.00369*** (-5.24)	0.000297 (0.68)	0.000370** (2.09)	0.000881*** (2.82)	-0.000361*** (-6.04)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	0.00230* (1.70)	-0.00663*** (-8.50)	0.00128 (1.28)	0.00136*** (4.21)	0.00199*** (4.79)	-0.000207* (-1.78)
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	0.00111** (2.14)	-0.00356*** (-8.05)	0.000616* (1.84)	0.000708*** (4.29)	0.00115*** (3.14)	0.00000237 (0.04)
Manufacturing: Machinery & Equipment; D: 29-35	0.00139*** (2.66)	-0.00336*** (-7.88)	0.000600* (1.88)	0.000608*** (4.47)	0.000898*** (2.83)	0.0000792 (1.41)
Construction; F	0.00489** (2.23)	-0.00529*** (-8.68)	0.00131 (1.50)	0.00112*** (6.08)	0.00171*** (3.13)	-0.000313*** (-3.29)
Wholesale & Retail; Hotels & Catering; G,H	0.0159** (2.09)	-0.0213*** (-5.36)	0.00588* (1.86)	0.00596*** (3.35)	0.00289 (1.52)	-0.00349*** (-5.10)
Transport & Storage; I: 60-63	0.00386** (2.45)	-0.00409*** (-5.07)	0.000864* (1.74)	0.000711*** (3.79)	0.00111*** (2.67)	0.0000995 (1.52)
Post & Telecommunications; I: 64	0.000133 (0.17)	-0.00247*** (-4.29)	0.000743** (2.56)	0.000465*** (2.64)	-0.000387 (-1.63)	0.0000677 (1.07)
Financial Intermediation; J	-0.000838*** (-4.24)	-0.000835*** (-4.54)	0.000265*** (5.24)	0.000291*** (2.98)	-0.000105 (-0.24)	-0.0000225 (-0.93)
Real Estate, Renting & Business Activities; K	0.000882** (2.04)	-0.00568*** (-3.79)	0.000370** (2.30)	0.000741 (1.58)	0.00109 (1.02)	-0.000216*** (-2.80)
Other Community, Social & Personal Services; O	0.00745*** (2.70)	-0.0200*** (-5.13)	0.00346*** (3.74)	0.00438*** (3.16)	0.00447*** (2.19)	-0.00272*** (-4.73)

Notes: percentage changes (0.02 = 2 per cent); t-statistics in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.

Absolute change in labour demand if workers paid less than 80% of the Living Wage receive 80% of the Living Wage

<i>Industry group</i>	Age: 15-29		University Degree	30+ Intermediate	None	Industry total
	Qualification: University Degree	Intermediate/None				
Other production; ABCE	28** (13)	-330*** (63)	25 (36)	101** (48)	8*** (3)	-169*** (28)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	53* (31)	-724*** (85)	80 (63)	449*** (107)	30*** (6)	-112* (63)
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	69** (32)	-660*** (82)	117* (63)	450*** (105)	27*** (9)	3 (61)
Manufacturing: Machinery & Equipment; D: 29-35	62*** (23)	-463*** (59)	107* (57)	358*** (80)	13*** (4)	76 (54)
Construction; F	228** (102)	-1583*** (182)	190 (127)	763*** (126)	29*** (9)	-373*** (113)
Wholesale & Retail; Hotels & Catering; G,H	4578** (2191)	-34624*** (6464)	1960* (1052)	12370*** (3696)	290 (191)	-15426*** (3027)
Transport & Storage; I: 60-63	138** (56)	-598*** (118)	94* (54)	442*** (117)	16*** (6)	92 (61)
Post & Telecommunications; I: 64	3 (18)	-158*** (37)	71** (28)	117*** (44)	-3 (2)	30 (28)
Financial Intermediation; J	-101*** (24)	-140*** (31)	82*** (16)	136*** (46)	-0 (1)	-24 (26)
Real Estate, Renting & Business Activities; K	287** (141)	-2165*** (572)	318** (138)	906 (572)	43 (42)	-611*** (218)
Other Community, Social & Personal Services; O	753*** (279)	-7076*** (1379)	808*** (216)	2178*** (688)	69** (31)	-3268*** (691)

Notes: absolute changes; standard errors in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.

**MODELLING DEMAND FOR LOW SKILLED/LOW PAID LABOUR:
EXPLORING THE EMPLOYMENT TRADE-OFFS OF A LIVING WAGE**

Relative change in labour demand if workers age 30+ paid less than the Living Wage receive a Living Wage

Industry group	Age: 15-29		Age: 30+			Industry total
	Qualification: University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE	-0.00210 (-0.16)	0.0272*** (4.00)	-0.0146*** (-2.83)	-0.00851*** (-3.62)	-0.0222*** (-3.71)	-0.00283** (-2.48)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	0.0171** (2.13)	0.0274*** (7.26)	-0.0162*** (-2.68)	-0.0113*** (-5.97)	-0.0223*** (-9.52)	-0.00316*** (-4.96)
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	0.00310 (0.81)	0.0113*** (5.49)	-0.00217 (-1.09)	-0.00268** (-2.50)	-0.0176*** (-4.76)	-0.000213 (-0.46)
Manufacturing: Machinery & Equipment; D: 29-35	0.00200 (0.49)	0.0107*** (5.09)	-0.00127 (-0.63)	-0.00119 (-1.19)	-0.0173*** (-4.80)	0.000405 (0.86)
Construction; F	0.00232 (0.77)	0.00476*** (7.94)	-0.00200* (-1.95)	-0.000885*** (-4.27)	-0.00500*** (-5.45)	0.000463*** (3.04)
Wholesale & Retail; Hotels & Catering; G,H	-0.0495* (-1.80)	0.0437*** (4.72)	0.0182** (2.00)	-0.0234*** (-4.68)	-0.0518*** (-6.45)	0.00209 (1.00)
Transport & Storage; I: 60-63	-0.0206** (-2.05)	0.0154*** (4.83)	0.00773*** (3.02)	-0.00376*** (-4.10)	-0.0158*** (-4.84)	-0.000223 (-0.52)
Post & Telecommunications; I: 64	-0.00682 (-1.35)	0.0101*** (3.66)	0.00564*** (3.27)	-0.00593*** (-5.78)	-0.00698*** (-4.54)	-0.00118*** (-3.25)
Financial Intermediation; J	-0.00826*** (-2.76)	0.00480** (2.56)	0.000925 (1.45)	-0.00237* (-1.76)	-0.0154 (-1.31)	-0.000987** (-2.00)
Real Estate, Renting & Business Activities; K	-0.0157** (-2.46)	0.0291*** (2.63)	0.00352** (2.19)	-0.0139*** (-3.12)	-0.0408* (-1.88)	-0.00393*** (-3.07)
Other Community, Social & Personal Services; O	-0.0180* (-1.77)	0.0307*** (4.14)	0.0127*** (5.21)	-0.00897*** (-2.65)	-0.0568*** (-5.46)	0.00554*** (3.77)

Notes: percentage changes (0.02 = 2 per cent); t-statistics in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.

Absolute change in labour demand if workers age 30+ paid less than the Living Wage receive a Living Wage

Industry group	Age: 15-29		Age: 30+			Industry total
	Qualification: University Degree	Intermediate/None	University Degree	Intermediate	None	
Other production; ABCE	-28 (180)	2437*** (609)	-1208*** (427)	-2331*** (644)	-196*** (53)	-1326** (535)
Manufacturing: Food & Beverages, Tobacco, Textiles, Recycling, NEC; D: 15-19, 36-37	391** (183)	2998*** (413)	-1017*** (379)	-3738*** (627)	-343*** (36)	-1709*** (344)
Manufacturing: Wood, Pulp&Paper; Chemicals, Minerals & Metals; D: 20-28	192 (238)	2100*** (382)	-410 (377)	-1704** (682)	-411*** (86)	-233 (509)
Manufacturing: Machinery & Equipment; D: 29-35	89 (182)	1472*** (289)	-227 (363)	-698 (586)	-244*** (51)	391 (457)
Construction; F	108 (140)	1423*** (179)	-290* (149)	-605*** (141)	-85*** (16)	552*** (181)
Wholesale & Retail; Hotels & Catering; G,H	-14209* (7892)	71045*** (15067)	6057** (3027)	-48436*** (10346)	-5209*** (808)	9248 (9271)
Transport & Storage; I: 60-63	-736** (359)	2249*** (466)	843*** (280)	-2337*** (569)	-227*** (47)	-207 (401)
Post & Telecommunications; I: 64	-157 (116)	649*** (177)	537*** (164)	-1499*** (259)	-53*** (12)	-523*** (161)
Financial Intermediation; J	-996*** (361)	807** (316)	286 (197)	-1106* (629)	-43 (33)	-1053** (527)
Real Estate, Renting & Business Activities; K	-5101** (2070)	11104*** (4226)	3026** (1385)	-16991*** (5443)	-1621* (861)	-9582*** (3118)
Other Community, Social & Personal Services; O	-1821* (1032)	10841*** (2616)	2971*** (570)	-4461*** (1686)	-878*** (161)	6652*** (1764)

Notes: absolute changes; standard errors in parentheses; statistical significance *10% level **5% level and ***1% level; long-run change in conditional labour demand; workers paid less than the NMW receive no wage change in the calculation of the change in average wages.