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RENEWAL SERIES
PAPER 9

April 2012

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The ESRI acknowledges the financial support of the FBD Trust for the *Renewal Series.* FBD Trust is a philanthropic trust established by FBD Holdings plc.

The Authors

Adele Bergin is a Research Officer, Elish Kelly is a Research Analyst and Seamus McGuinness is an Associate Research Professor at the Economic and Social Research Institute (ESRI).

Acknowledgements

We would like to thank the editors, the anonymous reviewers and the participants in an internal ESRI seminar for their comments on an earlier draft of this paper. We would also like to thank Regina Moore, Deirdre Whitaker and Elaine Byrne for their work in preparing the manuscript for publication.

Explaining Changes in Earnings and Labour Costs During the Recession

Abstract

This paper utilises data from the National Employment Surveys to analyse movements in both earnings and labour costs during the period 2006 through to 2009. It finds that, despite an unprecedented fall in output and rise in unemployment, both average earnings and average labour costs increased marginally over the period. Although some factors, such as a rise in the incidence of part-time working and falls in construction employment, served to depress wages, these influences were more than outweighed by increases in both the share of and returns to graduate employment and a rising return to large firm employment. This analysis suggests that a good deal of the downward wage rigidity observed within Irish private sector employment since the onset of the recession has largely been driven by factors consistent with continued productivity growth. Nevertheless, particularly within the male labour market, a substantial proportion of the movements in wages cannot be explained by changes in either labour market composition or the returns to individual/job characteristics. The large unexplained component in the data is attributed to a general reluctance of firms to cut wages in order to avoid productivity losses associated with worker dissatisfaction or higher rates of labour turnover. In support of this view, the study demonstrates that firms will adopt strategies such as reducing staff numbers, hours worked and bonus payments, in preference to reducing wages.

1. BACKGROUND

Quite a good deal of research has been undertaken regarding the nature of wage adjustments across economies, firms and individuals over time (Babecky *et al*., 2009, 2010; 2012; Bertola *et al*., 2010; Christopoulou *et al*., 2010; Autor and Katz, 1999; Fuss, 2008). The majority of the research has found that wage levels generally exhibit downward rigidity, with the probability of a wage cut being lower the more skilled the worker. In terms of theoretical frameworks, the finding of downward wage rigidity is consistent with a number of theoretical labour market models. For example, the efficiency wage theory (Shapiro and Stiglitz, 1984) argues that lowering wages encourages shirking, lower levels of morale and increased monitoring costs, all of which lower productivity levels. According to adverse selection theory, wage reductions may also lead to higher levels of labour turnover, which are predicted to be more concentrated among higher productivity workers (Weiss, 1980). Furthermore, the insider-outsider theory predicts that incumbent workers will fight to maintain wage levels because they have no interest in generating new jobs. (Lindbeck and Snower, 1988).

A number of additional factors have also been found to play a role in explaining changes in the wage structure. Consistent with the predictions of efficiency wage theory, wage cuts were found to be less likely in more capital intensive firms (Layard *et al.*, 2005) and larger firms (Oi, 1983). Institutional factors have also been found to be important, with wage rigidity associated with collective bargaining within firms and employment protection legislation (European Central Bank, 2009; Messina *et al*., 2010; Autor and Katz, 1999).

The evidence from the most recent empirical European studies is consistent with the predictions of theory. Babecky *et al*. (2009) examined data from a survey of over 15,300 firms employing 14.5 million people across 15 European countries conducted during 2007 and 2008. They found that less than 1 per cent of workers experienced a pay cut in the previous five years. It is important to note that this study covers normal economic conditions. The apparent reluctance of firms to cut wages suggests that they may favour other methods of labour cost adjustment. A number of studies have found evidence in support of this. For instance Babecky *et al*., again using the 2007/2008 European survey, found that when given the choice of six non-wage cost reduction strategies, 58 per cent of managers had implemented at least one in the previous five years.[1] Babecky *et al*., also found that there was substantial heterogeneity with respect to the adoption of strategies, with the chosen policy

[1] The six strategies are: 1) reduced bonus payments, 2) reduced non-pay benefits, 3) changed shift assignments and shift premia, 4) slow or freeze promotions, 5) recruit new employees at lower wages to replace voluntary quits and 6) encourage early retirement to replace high cost workers with cheaper new recruits.

varying with the characteristics of the firm. Bertola *et al*. (2010) used a survey of 14 EU countries to examine the adjustment strategies of firms in response to shocks. They found the main channel used to cut labour costs when faced with a cost shock was employment numbers, followed by hours and flexible wage components; less than 2 per cent of firms reduced base wages.

A number of studies have focused on the adjustment strategies of firms specifically in the wake of an economic shock. Kwapil (2010) found that the main strategies employed by Austrian firms during the downturn were to reduce working hours and staff numbers, with the former being the most dominant response. Fuss (2008) explored the factors that explain wage bill adjustment under changing economic conditions in Belgium. She found that during unfavourable economic conditions employment contractions are the main source of wage bill reductions (see also Dhyne and Druant, 2010). Rõõm and Messina (2009) used a follow-up to the 2007/2008 European survey that took place in the summer of 2009 to examine changes in base wages during the crisis. They found that only 1.8 per cent of employees had experienced wage cuts since the start of the crisis, as compared to 1 per cent of employees in the earlier survey; however, there was a significant increase in the incidence of firms freezing wages rising from 5 per cent to 32 per cent.

The evidence is somewhat limited for Ireland and tends to pre-date the current crisis. Keeney and Lawless (2010), using data from a firm-level survey of wage setting carried out in 2007/2008, found that less than 2 per cent of firms had cut wages over the previous five years.[2] More recently, Walsh (2012), using firm-level data on average earnings, reported little change in hourly earnings between 2008 and 2011, with the majority of changes in the wage bill coming from a reduction in the number of hours worked. Walsh (2012) also exploited the longitudinal aspect to the data to demonstrate that compositional effects had little impact on earnings over the course of the downturn.

Given the findings of previous research and the theoretical frameworks that underpin it, we would generally still expect to observe wage rigidity under normal circumstances in Ireland and this seems to have been borne out by the existing research (Keeney and Lawless (2010) and Walsh (2012)). However, the developments of recent years have been particularly severe, leaving open the possibility that more radical responses may have been implemented by firms. The rapid fall in economic activity and rise in unemployment (see below for more detail), coupled with a lack of

[2] The sectors covered include manufacturing, construction, distribution and other services.

monetary autonomy and fiscal constraints, led many to argue[3] that an internal devaluation was required through price and wage reductions. Furthermore, the social partnership model, which had been the dominant wage setting mechanism since 1987, effectively came to a halt, thus potentially creating an environment more conducive to downward wage adjustments at firm level.

Given these developments, the objective of the research is to assess the extent to which private sector wage rates have adjusted and the degree to which any observed price movements were driven by compositional changes in the labour market as opposed to variations in the returns to observable characteristics. Christopoulou et al. (2010) found that over the period 1995 to 2002 changes in wages in the Irish labour market were generally driven by returns to employment and job characteristics, with compositional effects having relatively little influence. However, compositional effects are likely to be more apparent in a large scale recession, particularly if employment loss is concentrated among low skilled and low paid workers and in specific sectors.

We extend the analysis of individual wage rates to the level of the firm and examine how average labour costs changed following the onset of the recession. Labour costs are considered to be a key measure of competitiveness and take account of the distribution of employment across firms, which an individual-level analysis of wages cannot. We also examine the extent to which firms have implemented strategies aimed at reducing labour costs and the relative impact of such policies. There is evidence to suggest that Ireland's competitive position, as measured by its unit labour costs, had begun to fall rapidly after 2002 following many years of gains (Figure 1)[4] and, as such, it is viewed as vital that the country regains some of its lost ground if it is to recover from its current position.

The broad approach we take in the paper is to compare outcomes from before and after the crisis, where we use 2006 as an example of a pre-crisis year and 2009 to be a crisis year. It is important to note that the study is not seeking to explain individual year-on-year changes between 2006 and 2009, as the economy continued to grow in 2007.

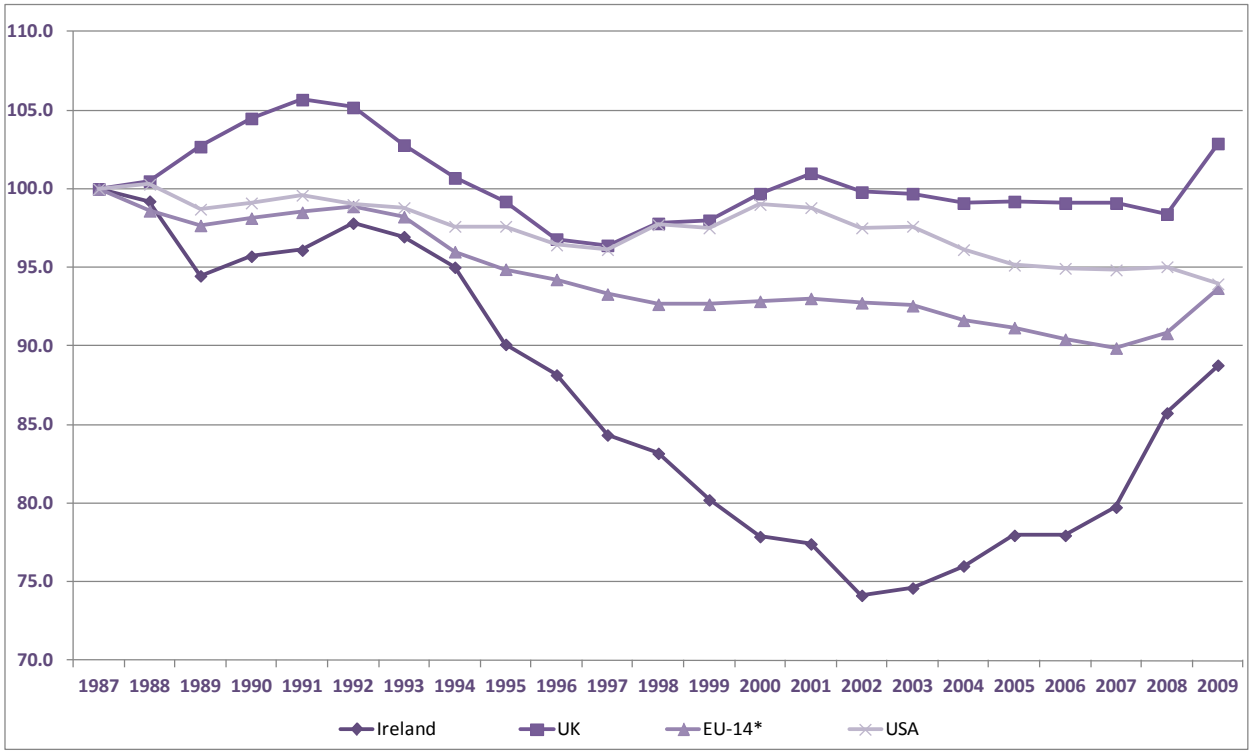
This paper is structured as follows: Section 2 describes the macroeconomic background and deterioration in the labour market over the crisis; Section 3 outlines the dataset used in the study and the methodology employed; Section 4 presents the results of wage models and decompositions for private sector employees; Section 5

[3] See for example: http://www.irisheconomy.ie/index.php/2009/10/09/stiglitz-on-internal-devaluation/

[4] See also McGuinness, Kelly and O'Connell (2010).

outlines the results for the labour cost analysis and Section 6 summarises the results and discusses policy implications.

Figure 1: Index of Real Unit Labour Costs (Total Economy) 1987-2009 (Base Year = 1987)

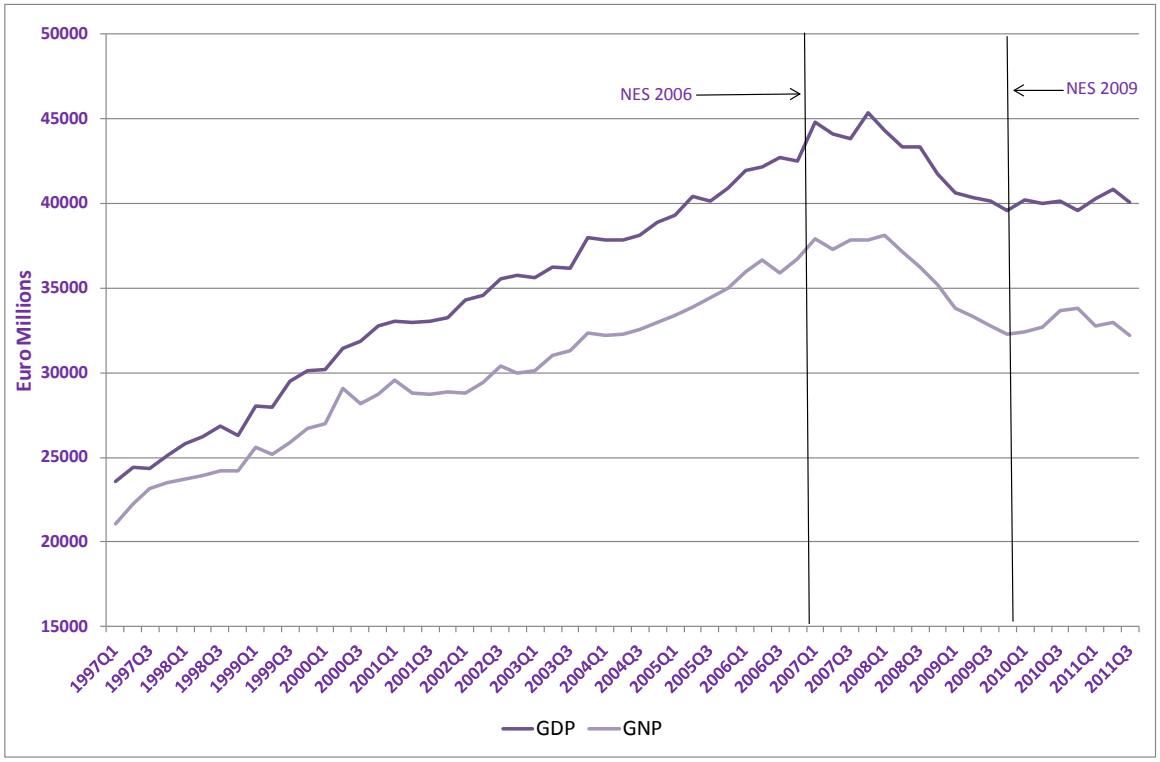


Note: * EU-15 with Luxembourg excluded
Source: Constructed with data from the *Statistical Annex of the European Economy Spring 2011*, European Commission (2011).

2. The Magnitude of the Crisis

The rate of contraction experienced within the Irish economy since 2007 has been truly remarkable from an international context. The bursting of a property market bubble and the overexposure of the banking system to the property sector resulted in the Irish economy losing some of what had been gained during more than a decade of strong growth. Figure 2 shows the quarterly profile for output and demonstrates clearly that economic activity collapsed over the period 2008 to 2010. By 2010 Q4 real GDP (GNP) was 13 (11) per cent below its 2007 Q4 level. Owing to this contraction in output and the associated increase in unemployment, output per head had fallen back to its 2000 level by the end of 2010 (Bergin et al., 2010). Note, the two vertical lines in Figure 2 highlight the period covered by the micro data used in this study which, we argue, encapsulates the bulk of the downturn in macroeconomic activity and, therefore, should capture most of the adjustment that took place with respect to earnings and labour costs.

Figure 2: Quarterly GDP and GNP



Note: Both series are seasonally adjusted and expressed at constant market prices.
Source: *Quarterly National Accounts, CSO.*

From a macroeconomic perspective, one way of gauging the impact of the crisis on the labour market is to examine movements in the wage bill of the economy. Figure 3 shows the percentage change in the non-agricultural wage bill[5] together with the percentage change in nominal GDP and GNP. Overall, the figure shows that the decline in the wage bill started after the fall in output – the wage bill fell in 2009 whereas the contraction in output began in 2008.6 In addition, the graph shows that in 2010 the wage bill fell by more than GDP and GNP, so although the adjustment in the wage bill started later it may have persisted beyond any stabilisation in output. Therefore, the wage bill evidence does provide some limited support for labour market flexibility in the form of downward wage adjustment. However, as the wage bill is a function of employment, hourly wage rates and average hours worked this is far from conclusive.

5 We focus on the non-agricultural wage bill because of difficulties in measuring income from farming.

6 In the remainder of the paper, the focus is on comparing pre-crisis and crisis outcomes. To do this, we compare outcomes for 2006 (pre-crisis) and 2009 (during the crisis). The non-agricultural wage bill reported in the National Accounts for 2009 is €68,330 million which is above the 2006 figure of €67,078 million.

Figure 3: Output and the Wage Bill

Source: National Income and Expenditure Accounts for 2010, Central Statistics Office.

Figure 4 shows the change in the non-agricultural wage bill and two of its components, average earnings and employment. The graph shows that the fall in employment began earlier and has been more severe than the fall in average earnings, indicating that the burden of adjustment**,** to date**,** has primarily been on employment rather than earnings.

With specific regard to the labour market, Table 1 provides some summary labour market statistics that approximate peak to trough activity from Quarter 4 2006 through to Quarter 4 2009 and Quarter 3 2011. There were 1.9 million people employed in 2009, which represents a 9 per cent fall on the total employed in 2006. This decline in employment was almost entirely concentrated in male employment – a 15 per cent drop compared to 1 per cent for females. Between 2009 and 2011, employment fell by another 5 per cent. This time, however, the reduction was more evenly distributed between males and females. There was a marginal decline in the labour force between 2006 and 2009, which was driven by a fall in the male labour force, while the female labour force increased. There was a more marked reduction in the labour force between 2009 and 2011, which has been predominately driven by a decline in the number of active males. Following on from the shrinking labour force, participation rates have also fallen over the crisis, particularly among younger

people[7] and males. The unemployment rate more than trebled over the period, from just 4.3 per cent in 2006 to 14.4 per cent in 2011. Breaking the unemployment data down further shows large increases in education-specific unemployment rates, particularly for those without third-level education.[8]

Figure 4: Adjustment in Average Earnings and Employment

Source: Authors' calculations based on *National Income and Expenditure Accounts for 2010 and Quarterly National Household Survey*, Central Statistics Office.

7 Data available from the authors on request.

8 Data available from the authors on request.

Table 1: Summary of Labour Market Indicators

	Total 2006 Q4	Total 2009 Q4	Total 2011 Q3	Difference Between 2009 Q4 and 2006 Q4	Difference Between 2011 Q3 and 2009 Q4
				%	%
Employment, thousands	2,079	1,891	1,794	-9.1	-5.1
Labour Force, thousands	2,172	2,162	2,104	-0.5	-2.7
				percentage point change:	
Participation Rate	63.5	61.5	60	-2.0	-1.5
Unemployment Rate	4.3	13.1	14.4	8.8	1.3
	Males 2006 Q4	Males 2009 Q4	Males 2011 Q4	Difference Between 2009 Q4 and 2006 Q4	Difference Between 2011 Q3 and 2009 Q4
Employment, thousands	1,197	1,016	960	-15.1	-5.5
Labour Force, thousands	1,253	1,209	1,164	-3.6	-3.7
				percentage point change:	
Participation Rate	73.7	69.7	67.7	-4.0	-2.0
Unemployment Rate	4.6	16.2	17.6	11.6	1.4
	Females 2006 Q4	Females 2009 Q4	Females 2011 Q4	Difference Between 2009 Q4 and 2006 Q4	Difference Between 2011 Q3 and 2009 Q4
Employment, thousands	882.7	872.1	835.4	-1.2	-4.2
Labour Force, thousands	919.8	953.2	939.2	3.6	-1.5
				percentage point change:	
Participation Rate	53.5	53.4	52.6	-0.1	-0.8
Unemployment Rate	4.0	8.7	11.0	4.7	2.3

Source: *Quarterly National Household Survey*, Central Statistics Office.

It is not clear to what extent the rapid rise in unemployment is due to business closures as opposed to downsizing. To get some sense of this, Table 2 presents the number of active and birthed enterprises across the various business sectors[9] in the economy between 2006 and 2009, along with the number of employees in each. This gives us a broad indication of the degree of firm-level structural change that took place within the labour market over the period. Overall, the total number of active firms fell by just 1.1 per cent (2,220). This decline was driven by a fall in the number of Construction and Transport & Storage sector enterprises, with the biggest reduction taking place in the Construction sector (23.1 per cent). All other sectors recorded an increase in the number of active enterprises, ranging from 2 per cent in the Industry sector to 28 per cent in the Financial & Insurance sector. Unsurprisingly, the overall number of employees in active enterprises fell between 2006 and 2009 (8.7 per cent); however, there was an increase in the number of employees in some

[9] The statistics cover NACE Rev 2 sectors B-N but excludes NACE code 64.20 activities of holding companies.

individual sectors; specifically, Wholesale & Retail (1.3 per cent), Information & Communication (3.5 per cent) and Finance & Insurance (10.3 per cent). Therefore, the data suggest that rising unemployment has been primarily driven by firm closures within the construction sector and downsizing within other areas of the economy. In relation to enterprise births, the numbers of new firms fell each year between 2006 and 2008, but some recovery took place between 2008 and 2009 with the number of new enterprises increasing by 15.5 per cent. As might be expected, on average, less people are being employed in newly-created firms, and this applies across all sectors.

Table 2: Number of Active Enterprises, Enterprise Births and Employees within both Enterprises: 2006-2009

	2006	2007	2008	2009	% Δ 2006-2009
All Sectors					
Active Enterprises	201,461	207,736	203,083	199,241	-1.1
Employees in Active Enterprises	1,30,1887	1,387,489	1,362,212	1,189,163	-8.7
Enterprise Births	16,696	13,461	11,954	13,810	-17.3
Employees in Birthed Enterprises	6,661	6,287	6,556	3,883	-41.7
Industry					
Active Enterprises	13,974	14,354	14,265	14,273	2.1
Employees in Active Enterprises	241,848	248,029	241,006	211,243	-12.7
Enterprise Births	861	672	648	815	-5.3
Employees in Birthed Enterprises	265	270	346	190	-28.3
Construction					
Active Enterprises	58,454	59,124	53,893	44,970	-23.1
Employees in Active Enterprises	178,307	184,917	150,439	96,350	-46.0
Enterprise Births	5,717	3,824	2,489	2,278	-60.2
Employees in Birthed Enterprises	1,383	1,167	974	384	-72.2
Wholesale and Retail					
Active Enterprises	42,280	43,205	4,3205	44,143	4.4
Employees in Active Enterprises	313,550	344,364	348,878	317,601	1.3
Enterprise Births	2,553	2,202	2,298	3,012	18.0
Employees in Birthed Enterprises	1,338	1,089	1,443	777	-41.9
Transportation and Storage					
Active Enterprises	11,095	11,384	11,069	11,003	-0.8
Employees in Active Enterprises	74,794	75,404	81,177	74,663	-0.2
Enterprise Births	822	658	583	762	-7.3
Employees in Birthed Enterprises	862	781	771	779	-9.6
Accommodation and Food Services					
Active Enterprises	15,724	15,794	15,987	16,460	4.7
Employees in Active Enterprises	143,282	151,818	152,005	137,612	-4.0

Table 2: Continued

	2006	2007	2008	2009	% Δ 2006-2009
Enterprise Births	1,060	913	1,115	1,363	28.6
Employees in Birthed Enterprises	1,327	1,475	1,337	932	-29.8
Information and Communication					
Active Enterprises	8,958	9,488	9,682	9,833	9.8
Employees in Active Enterprises	62,454	66,343	68,183	64,640	3.5
Enterprise Births	930	879	864	936	0.6
Employees in Birthed Enterprises	563	452	501	374	-33.6
Financial and Insurance Activities					
Active Enterprises	3,956	4,554	4,591	5,056	27.8
Employees in Active Enterprises	83,947	93,704	97,604	92,632	10.3
Enterprise Births	390	487	325	449	15.1
Employees in Birthed Enterprises	243	168	191	154	-36.6
Real Estate Activities					
Active Enterprises	9,030	9,617	9,274	10,929	21.0
Employees in Active Enterprises	14,361	15,498	14,935	12,271	-14.6
Enterprise Births	1,209	958	700	862	-28.7
Employees in Birthed Enterprises	185	171	130	141	-23.8
Professional, Scientific and Technical Activities					
Active Enterprises	27,127	28,505	29,283	30,667	13.0
Employees in Active Enterprises	90,681	99,158	101,743	88,433	-2.5
Enterprise Births	2,293	1,930	2,133	2,568	12.0
Employees in Birthed Enterprises	611	722	780	435	-28.8
Administrative and Support Services					
Active Enterprises	10,863	11,711	11,834	11,907	9.6
Employees in Active Enterprises	98,663	108,254	106,242	93,718	-5.0
Enterprise Births	860	937	799	765	-11.0
Employees in Birthed Enterprises	541	524	504	290	-46.4

Source: Business Demography NACE Rev 2, 2006-2009, Central Statistics Office.

3. Data and Methodology

The data for the study are taken from the 2006 and 2009 waves of the *National Earnings Survey* (NES). The NES is a matched employer-employee workplace survey, covering both the public and private sectors, which was carried out by the Central Statistics Office (CSO).[10] The employer sample was drawn from the CSO's Central

[10] While the NES was of enterprises with 3 plus employees, the results were calibrated to the *Quarterly National Household Survey (QNHS)* employment data for employees (excluding agriculture, forestry and fishing), which covers all employees.

Business Register. Selected firms were then asked to extract a systematic sample of employees from their payrolls. Approximately 6,500 private sector employers and 300 public sector bodies were surveyed across the economy.[11] While the NES collects information from both the private and public sectors, our analysis here focuses exclusively on private sector activity. Our sample sizes increase from just under 38,000 private sector employees in 2006 (located in over 4000 firms) to just under 52,000 in 2009 (located in over 4,500 firms). Within the survey framework, information was collected at both the level of the employee and employer. While some questions remain constant across waves, individual waves contain specific one-off modules collecting individual and firm-level data on issues such as wage bargaining, training, skill accumulation, etc. Our study of changes in private sector wage rates is conducted at the employee level and then the dataset is reduced to the firm level for the labour costs analysis and the examination of the strategies implemented by firms to reduce labour costs.

A central objective to the paper is to explore the drivers of wage determination over time and specifically to analyse the relative strength of factors related to compositional change, productivity growth and labour market institutions. To do this, we decomposes changes in wages over time into the components that are due to (a) changes in the returns to personal and job characteristics (b) changes in the composition of personal and job characteristics and (c) unknown factors. Such a framework enables us to draw conclusions on the nature of wage determination , which subsequently allows us to tease out implications for policy. The specific methodological approach adopted is referred to in the literature as an Oaxaca decomposition and details are available in Appendix 2. Thus, using this framework we will decompose changes in both individual earnings and average labour costs which will allow us to assess the importance of changes in both the composition and returns to specific attributes, such as the proportion of graduates in the labour market or the fall in construction employment, in explaining movements over time.

4. EMPLOYEE LEVEL RESULTS

Table 3 shows average gross hourly and weekly earnings and hours worked for private sector workers between 2006 and 2011, along with the annual percentage change in earnings. Given that the NES data are only available for 2006 to 2009, we also present wage data from the CSO's Earnings, Hours and Employment Costs Survey (EHECS), which is at firm-level. These data show what has happened to earnings over the entire recessionary period, specifically 2008 to 2011.[12] What is

[11] Only employers with more than three employees were surveyed and the data were collected at the enterprise level.

[12] The EHECS data is a quarterly series, so the annual hourly and weekly measures presented in Table 3 have been derived by averaging over the four quarters of data.

striking from the table is the fact that hourly earnings increased annually between 2006 and 2009, while there was no change in hourly wages between 2009 and 2011 (see Walsh, 2012).[13] Both data series overlap in 2009 and present a consistent picture. As stated, the NES data for our study cover the major period of the macroeconomic downturn; however, a worry relates to the possibility that wage adjustment substantially lags output and, as such, the period of observation may be insufficient to capture the majority of price movements in the labour market. The EHECS firm level wage data suggest that this is not the case, thereby making it unlikely that our data provide only a partial picture of labour market change. During the period covered by this study, real gross hourly earnings increased by 5.5 per cent, with a slightly smaller increase in male hourly earnings (5.1 per cent) and a larger increase for females (7.6 per cent).[14] Average weekly wages increased up to 2008 but have been falling since; however, given the pattern in hourly earnings this has clearly been driven by a decline in average hours worked.

Table 3: Average Hourly and Weekly Earnings and Hours Worked for Private Sector Workers: 2006 and 2011

	National Employment Survey					Earnings, Hours and Employment Costs Survey				
	Hourly	% Δ	Weekly	% Δ	Hours Worked	Hourly	% Δ	Weekly	% Δ	Hours Worked
2006	17.1	-	610.9	-	35.4	-	-	-	-	-
2007	18.1	5.7	639.1	4.6	35.0	-	-	-	-	-
2008	19.2	6.1	658.5	3.0	34.0	19.3	-	636.9	-	33.0
2009	19.5	1.9	645.6	-2.0	32.7	19.5	1.0	622.7	-2.2	32.0
2010	-	-	-	-	-	19.5	0.0	616.6	-1.0	31.7
2011	-	-	-	-	-	19.4	-0.5	611.5	-0.8	31.6

Source: Constructed from *National Employment Surveys* (*NES*), 2006-2009, and *Earnings, Hours and Employment Costs Surveys (EHECS)*, 2008-2011, Central Statistics Office.

4.1 Differences in Characteristics

Table A1 in the Appendix describes the variables used in the analysis and Tables B1-B3 provide some basic descriptive statistics for all private sector employees and also separately for male and female private sector employees. There has been an increase in human capital over the period; with a ten percentage point increase in the share of workers with degrees, while the proportion of workers with non-degree third-level qualifications and lower secondary qualifications has fallen. This would tend to support the notion that lower paid workers have fallen out of the labour

[13] This is consistent with the increase in average earnings derived from the *National Income and Expenditure Accounts* data, described in Section 2.

[14] Based on the NES data, real average hourly earnings increased from €18.80 to €19.90 between 2006 and 2009, with male real hourly wages increasing from €21.20 to €22.30 and female hourly wages increasing from €16.0 to €17.30 over the period.

market and that the observed rise in earnings is mainly due to compositional effects. However, the rise in the share of graduates appears to have been offset somewhat by a fall in average age and tenure. Similar patterns are found for males and females. In addition, there was a fall of around 4 percentage points in the proportion of male employees between 2006 and 2009, while the share of non-national workers increased by around three percentage points.

In terms of job characteristics, compared to the situation in 2006, there were much larger numbers engaged in part-time work with whose share in total private sector employment rose from 15 to 23 per cent. The period also saw an increase in the proportion of workers employed in large firms, a fall in union membership, a decline in the proportion of workers who were members of a professional body and a decrease in the share of workers who work fixed hours. There were only minor changes in hours worked, contract type and the proportion of employees engaged in shift work over the time period. Again, changes in characteristics by gender were broadly comparable over the time period.

In terms of changes in sectoral employment between 2006 and 2009, as expected, there was a fall in the share of workers in construction and this effect is concentrated in male employment. There was also an increase in the share of workers in health and social work in the private sector, especially in female employment. Finally, the proportion of workers in industry and business services fell, while the proportion in transport, storage and communications increased somewhat.

4.2 Differences in Returns to Characteristics

In addition to compositional impacts, average earnings will also be expected to change in response to variations in the returns to observable characteristics. To do this, we estimate OLS log wage models which measure the percentage impact that a unit change in each given characteristic has on earnings (see Appendix 2 for more details). Tables 4 to 6 present the results from the models for both 2006 and 2009 for all employees and also separately for male and females. . The models include interaction terms to test for significant differences in the coefficients over time and the results of this procedure are also shown.

Table 4: OLS Wage Models

	Total, 2006		Total, 2009		Difference	
Education (Primary or less):						
Lower Secondary	0.044***	(0.008)	0.064***	(0.008)	0.020*	(0.012)
Upper Secondary	0.143***	(0.008)	0.140***	(0.007)	-0.003	(0.010)
Post Secondary	0.184***	(0.009)	0.169***	(0.008)	-0.015	(0.012)
Cert/Diploma	0.236***	(0.009)	0.252***	(0.008)	0.016	(0.012)
Degree	0.386***	(0.009)	0.418***	(0.008)	0.032***	(0.012)
Male	0.156***	(0.005)	0.143***	(0.004)	-0.013**	(0.006)
Migrant	-0.144***	(0.006)	-0.127***	(0.005)	0.017**	(0.008)
Tenure	0.011***	(0.000)	0.012***	(0.000)	0.000	(0.000)
Age (Aged 40-49):						
Age 15 to 24	-0.306***	(0.007)	-0.279***	(0.007)	0.027***	(0.010)
Age 25 to 29	-0.142***	(0.007)	-0.191***	(0.006)	-0.048***	(0.009)
Age 30 to 39	-0.010	(0.007)	-0.043***	(0.005)	-0.033***	(0.008)
Age 50 to 59	-0.046***	(0.008)	-0.053***	(0.006)	-0.006	(0.010)
Age 60 plus	-0.136***	(0.012)	-0.081***	(0.010)	0.055***	(0.015)
Employment Contract (Indefinite Duration):						
Fixed term Contract	-0.003	(0.007)	-0.026***	(0.006)	-0.023**	(0.010)
Apprentice/trainee	-0.319***	(0.014)	-0.250***	(0.018)	0.069***	(0.024)
Other Contract	0.008	(0.011)	-0.039***	(0.009)	-0.047***	(0.014)
Fixed Hours	-0.040***	(0.005)	-0.033***	(0.004)	0.007	(0.006)
Shift Work	-0.054***	(0.005)	-0.059***	(0.004)	-0.005	(0.007)
Firm Size	0.030***	(0.001)	0.039***	(0.001)	0.010***	(0.002)
Part Time	-0.144***	(0.006)	-0.139***	(0.005)	0.005	(0.008)
Professional Body	0.126***	(0.007)	0.200***	(0.006)	0.073***	(0.009)
Union Membership	0.008	(0.005)	0.004	(0.005)	-0.004	(0.007)
Sector (Hotels & Restaurants):						
Industry	0.094***	(0.009)	0.112***	(0.007)	0.018	(0.012)
Construction	0.263***	(0.010)	0.215***	(0.009)	-0.048***	(0.013)
Wholesale & Retail	0.054***	(0.009)	0.068***	(0.007)	0.014	(0.011)
Transport, Storage & Communications	0.140***	(0.013)	0.117***	(0.008)	-0.023	(0.015)
Finance	0.249***	(0.012)	0.250***	(0.009)	0.001	(0.015)
Business Services	0.106***	(0.010)	0.104***	(0.008)	-0.003	(0.013)
Education	0.143***	(0.018)	0.240***	(0.015)	0.097***	(0.023)
Health & Social Work	0.142***	(0.013)	0.178***	(0.009)	0.036**	(0.015)
Other Services	0.089***	(0.011)	0.122***	(0.009)	0.032**	(0.014)
Constant	2.322***	(0.013)	2.352***	(0.011)	0.013*	(0.007)
Observations	37,624		51,345			
R^2	0.354		0.372			

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.
Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: OLS Wage Models

	Males, 2006		Males, 2009		Difference	
Education (Primary or less):						
Lower Secondary	0.060***	(0.011)	0.082***	(0.011)	0.022	(0.016)
Upper Secondary	0.151***	(0.011)	0.146***	(0.010)	-0.006	(0.015)
Post Secondary	0.219***	(0.012)	0.204***	(0.011)	-0.015	(0.016)
Cert/Diploma	0.237***	(0.014)	0.277***	(0.011)	0.040**	(0.017)
Degree	0.399***	(0.013)	0.455***	(0.011)	0.056***	(0.016)
Migrant	-0.158***	(0.008)	-0.136***	(0.007)	0.022**	(0.011)
Tenure	0.010***	(0.000)	0.011***	(0.000)	0.000	(0.001)
Age (Aged 40-49):						
Age 15 to 24	-0.394***	(0.011)	-0.345***	(0.010)	0.050***	(0.015)
Age 25 to 29	-0.198***	(0.010)	-0.247***	(0.009)	-0.049***	(0.013)
Age 30 to 39	-0.047***	(0.009)	-0.068***	(0.007)	-0.021*	(0.011)
Age 50 to 59	-0.023**	(0.011)	-0.040***	(0.009)	-0.017	(0.014)
Age 60 plus	-0.150***	(0.016)	-0.080***	(0.014)	0.070***	(0.021)
Employment Contract (Indefinite Duration):						
Fixed term Contract	-0.002	(0.011)	-0.026***	(0.009)	-0.024*	(0.014)
Apprentice/trainee	-0.310***	(0.017)	-0.241***	(0.024)	0.069**	(0.031)
Other Contract	-0.027*	(0.015)	-0.071***	(0.014)	-0.044**	(0.021)
Fixed Hours	-0.047***	(0.007)	-0.025***	(0.006)	0.022**	(0.009)
Shift Work	-0.069***	(0.007)	-0.062***	(0.006)	0.007	(0.010)
Firm Size	0.039***	(0.002)	0.038***	(0.002)	-0.001	(0.003)
Part Time	-0.189***	(0.013)	-0.168***	(0.008)	0.021	(0.015)
Professional Body	0.114***	(0.009)	0.191***	(0.009)	0.077***	(0.013)
Union Membership	0.021***	(0.007)	0.011	(0.007)	-0.009	(0.010)
Sector (Hotels & Restaurants):						
Industry	0.100***	(0.014)	0.128***	(0.011)	0.028	(0.018)
Construction	0.285***	(0.014)	0.231***	(0.012)	-0.053***	(0.019)
Wholesale & Retail	0.080***	(0.014)	0.086***	(0.011)	0.006	(0.018)
Transport, Storage & Communications	0.129***	(0.018)	0.118***	(0.012)	-0.011	(0.021)
Finance	0.283***	(0.020)	0.290***	(0.015)	0.008	(0.024)
Business Services	0.130***	(0.016)	0.123***	(0.013)	-0.007	(0.020)
Education	0.088**	(0.043)	0.325***	(0.030)	0.238***	(0.051)
Health & Social Work	0.121***	(0.034)	0.131***	(0.019)	0.009	(0.036)
Other Services	0.068***	(0.018)	0.125***	(0.016)	0.057**	(0.024)
Constant	2.484***	(0.018)	2.499***	(0.015)	0.006	(0.010)
Observations	20,463		26,710			
R^2	0.348		0.364			

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.
Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: OLS Wage Models

	Females, 2006		Females, 2009		Difference	
Education (Primary or less):						
Lower Secondary	0.028**	(0.013)	0.041***	(0.012)	0.013	(0.017)
Upper Secondary	0.137***	(0.011)	0.131***	(0.010)	-0.006	(0.015)
Post Secondary	0.110***	(0.014)	0.114***	(0.011)	0.004	(0.018)
Cert/Diploma	0.222***	(0.013)	0.220***	(0.010)	-0.002	(0.016)
Degree	0.355***	(0.013)	0.371***	(0.011)	0.016	(0.017)
Migrant	-0.121***	(0.009)	-0.114***	(0.007)	0.008	(0.011)
Tenure	0.012***	(0.001)	0.012***	(0.000)	-0.000	(0.001)
Age (Aged 40-49):						
Age 15 to 24	-0.197***	(0.010)	-0.215***	(0.009)	-0.018	(0.013)
Age 25 to 29	-0.061***	(0.011)	-0.128***	(0.008)	-0.067***	(0.013)
Age 30 to 39	0.052***	(0.010)	-0.013*	(0.007)	-0.065***	(0.012)
Age 50 to 59	-0.070***	(0.011)	-0.064***	(0.009)	0.005	(0.014)
Age 60 plus	-0.097***	(0.018)	-0.079***	(0.013)	0.018	(0.022)
Employment Contract (Indefinite Duration):						
Fixed term Contract	-0.003	(0.010)	-0.023***	(0.008)	-0.020	(0.013)
Apprentice/trainee	-0.254***	(0.026)	-0.237***	(0.029)	0.017	(0.039)
Other Contract	0.065***	(0.015)	-0.010	(0.012)	-0.074***	(0.019)
Fixed Hours	-0.034***	(0.007)	-0.042***	(0.005)	-0.008	(0.008)
Shift Work	-0.041***	(0.007)	-0.055***	(0.006)	-0.014	(0.009)
Firm Size	0.021***	(0.002)	0.041***	(0.002)	0.020***	(0.002)
Part Time	-0.109***	(0.007)	-0.116***	(0.005)	-0.007	(0.008)
Professional Body	0.149***	(0.010)	0.204***	(0.009)	0.055***	(0.013)
Union Membership	-0.019**	(0.008)	-0.006	(0.007)	0.013	(0.011)
Sector (Hotels & Restaurants):						
Industry	0.096***	(0.012)	0.091***	(0.010)	-0.005	(0.016)
Construction	0.179***	(0.022)	0.180***	(0.020)	0.001	(0.030)
Wholesale & Retail	0.034***	(0.011)	0.053***	(0.009)	0.019	(0.014)
Transport, Storage & Communications	0.161***	(0.018)	0.130***	(0.013)	-0.031	(0.021)
Finance	0.245***	(0.014)	0.221***	(0.012)	-0.025	(0.018)
Business Services	0.087***	(0.012)	0.085***	(0.010)	-0.002	(0.016)
Education	0.145***	(0.019)	0.215***	(0.016)	0.070***	(0.025)
Health & Social Work	0.149***	(0.014)	0.187***	(0.010)	0.038**	(0.016)
Other Services	0.087***	(0.014)	0.115***	(0.011)	0.028	(0.018)
Constant	2.293***	(0.017)	2.346***	(0.014)	0.022**	(0.009)
Observations	17,161		24,635			
R^2	0.303		0.340			

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.
Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Beginning with the results for various human capital related attributes, there was an increase in the returns to a degree particularly for males. There was also a rise in the returns to sub-degree third-level qualifications for men. The results also show there was no significant change in the return to tenure for either males or females in the

private sector between the two years. In terms of age groups, the estimates indicate that generally most age groups earn less than those aged 40 to 49 (the reference group). However, younger workers, particularly those aged between 25 and 39, earned significantly less in 2009 than 2006 and this effect was stronger for female employees. The model for all employees indicates that the gender pay gap closed somewhat over the time period. In addition, although migrants earned lower wages than natives, the estimates imply that migrants fared relatively less badly in 2009. The fall in the migrant pay penalty could be evidence of an integration effect or alternatively it could also be due to higher levels of job loss amongst low paid migrants.

Turning to job characteristics, for males there was an increase in the loss associated with working fixed-term contracts relative to males on permanent contracts, while the penalty associated with apprentice contracts was somewhat lower in 2009. Male employees working fixed hours also experienced some reduction in the loss associated with this type of work in 2009 suggesting a rising return to regularised employment. There was an increase in the firm-size premium for females, while males and females saw an increase in the premium associated with being a member of a professional body.

4.3 Oaxaca-Blinder Decompositions

To ascertain the relative importance of these observed changes in both the distribution of endowments and the return to them in explaining the change in wages of private sector employees between 2006 and 2009, we estimate the Oaxaca-Blinder decompositions described in Equation 2 in the Appendix.[15] The decomposition results are presented in Tables 7 to 9.

Turning first to the decomposition for all employees (Table 7), the raw wage gap[16] over the two years is calculated at 7.4 per cent. The adjusted differential, which is the amount of the raw wage gap that remains unexplained by differences in endowments over time, is 7.1 per cent. This demonstrates that only a very small amount, around 3 per cent, of the rise in wages between 2006 and 2009 was attributable to differences in observable characteristics, i.e., compositional effects.

[15] The decomposition proposed by Juhn, Murphy and Pierce (1993) may be more appropriate for analysing changes over time. We performed the Juhn-Murphy-Pierce decomposition and the results are broadly comparable to those of the Oaxaca-Blinder decomposition. The results from the Oaxaca-Blinder decomposition are preferred as we can examine the contribution made by individual variables to explaining the change in wages. The Juhn-Murphy-Pierce decomposition results are available from the authors on request.

[16] The raw or unadjusted wage gap is the difference in wages that exists before personal or job characteristics are taken into account.

The results indicate that a further 30 per cent of the gap can be explained by changes in the returns to different endowments (coefficient effects). This indicates that around two-thirds of the wage difference between 2006 and 2009 is due to influences not captured by our models.

Table 7: Decomposition of the Change in Wages Between 2006 and 2009 for All Employees

	Change
Amount attributable:	2.4
- Due to endowments (E):	0.2
- Due to coefficients (C):	2.2
Shift coefficient (U):	5.0
Raw differential (R) {E+C+U}:	7.4
Adjusted differential (D) {C+U}:	7.1
Endowments as % total (E/R):	3.2
Discrimination as % total (D/R):	96.8

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics office.

The separate decompositions for males and females reveal that we can explain substantially more of the female raw wage differential. Table 8 shows that the male raw differential was estimated at 6.6 per cent; less than 6 per cent of the gap was due to endowment differences with only a further 3 per cent explained by changes in the returns to endowments over the two time periods. In contrast, Table 9 reveals that around 12 per cent of the female gap, which was estimated at 9.6 per cent, was explained by differences in the distribution of characteristics, with a further 60 per cent explained by changes in returns.

Table 8: Decomposition of the Change in Wages Between 2006 and 2009 for Male Employees

	Change
Amount attributable:	0.2
- Due to endowments (E):	0.4
- Due to coefficients (C):	-0.2
Shift coefficient (U):	6.4
Raw differential (R) {E+C+U}:	6.6
Adjusted differential (D) {C+U}:	6.2
Endowments as % total (E/R):	5.8
Discrimination as % total (D/R):	94.2

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.

Table 9: Decomposition of the Change in Wages Between 2006 and 2009 for Female Employees

	Change
Amount attributable:	7.0
- Due to endowments (E):	1.1
- Due to coefficients (C):	5.9
Shift coefficient (U):	2.6
Raw differential (R) {E+C+U}:	9.6
Adjusted differential (D) {C+U}:	8.5
Endowments as % total (E/R):	11.5
Discrimination as % total (D/R):	88.5

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.

Nevertheless, such aggregate results often conceal a good deal of movement at the individual variable level. Tables 10 to 12 describe the contribution of the individual variables to the wage gap for all workers and for males and females separately. While only a small portion of the male raw wage differential can be explained by variations in observable characteristics, Table 11 reveals that some variables have strong impacts but in different directions so that, when taken together, the effects roughly cancel out. Specifically, within the male labour market, the rising shares of graduates and an increased dominance of large firm employment has tended to push wage levels upwards. Conversely, the increase in part-time work, the fall in the share of professional occupations and the decrease in tenure served to reduce male wages between 2006 and 2009. The results also show that there has been an increase in the returns to education for males with third level qualifications, in the returns to tenure, to more standard employment (suggested by the positive coefficient on fixed hours) and to being a member of a professional body. With regard to the construction sector, the decline in employment in this industry, which was on the whole well paid in the pre-crisis period, resulted in a marginal decline in pay rates over time with the fall in the return to construction-related employment proving much more important.

Table 12 shows that many of the endowment effects present in the male labour market were also important in explaining the movement in female wages. Nevertheless, some effects, such as the increase in the proportion of females working in larger firms are stronger than for males. In terms of coefficient effects for females, there was a big increase in the return to working in larger firms. This result suggests that larger firms have gained in productivity, perhaps due to economy of scale effects or the adoption of new technologies. The large firm impacts may have been substantially more concentrated in foreign multinational enterprises. However, as we do not have information on firm ownership, we cannot confirm this

hypothesis. The results for females also show a rise in the return to having a permanent contract, to being a member of a professional body and in the union premium. Finally, there was a fall in the return to working fixed hours, and younger workers did less well in 2009 relative to 2006.

Table 10: Breakdown of Decomposition Results by Variable for All Employees

Variable	Attribute	Endowment	Coefficient
Primary	-0.1	0.0	-0.1
Lower Secondary	0.6	0.4	0.2
Upper Secondary	-0.4	-0.1	-0.3
Post Secondary	-0.3	0.0	-0.3
Cert/Diploma	-0.5	-0.6	0.1
Degree	3.1	2.5	0.6
Male	-1.0	-0.3	-0.7
Migrant	-0.1	-0.4	0.2
Tenure	-0.4	-0.5	0.1
Age 15-24	0.3	-0.1	0.4
Age 25-29	-0.8	0.0	-0.8
Age 30-39	-0.9	0.1	-1.0
Age 40-49	0.0	0.0	0.0
Age 50-59	-0.1	0.0	-0.1
Age 60 plus	0.2	0.0	0.2
Permanent Contract	0.1	0.1	0.0
Fixed term Contract	-0.2	0.0	-0.2
Apprentice/trainee	0.2	0.1	0.1
Other Contract	-0.2	0.0	-0.2
Fixed Hours	0.6	0.1	0.5
Shift Work	-0.1	0.0	-0.1
Firm Size	3.5	0.7	2.8
Part Time	-1.1	-1.2	0.1
Professional Body	0.6	-0.5	1.2
Union Membership	-0.1	0.0	-0.1
Industry	0.2	0.1	0.1
Construction	-0.7	-0.2	-0.5
Wholesale & Retail	0.0	-0.1	0.0
Hotels & Restaurants	-0.1	0.0	-0.1
Transport, Storage & Communications	-0.2	-0.1	-0.1
Finance	0.0	0.1	-0.1
Business Services	-0.1	0.2	-0.3
Education	0.1	0.0	0.1
Health & Social Work	0.3	0.1	0.1
Other Services	0.1	0.0	0.1
Subtotal	**2.4**	**0.2**	**2.2**

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.

In general it seems fair to say that the increases in both the share and the returns to graduate labour in addition to a rising return to large-firm employment are the most substantial factors driving the rise in real average earnings. Rising returns to both graduate and large-firm employment are consistent with a scenario of rising demand for labour through skill biased technological change. The pattern of results suggests that increasing rewards to productivity growth represents the most likely explanation for the continued rise in hourly pay since the downturn.

Table 11: Breakdown of Decomposition Results by Variable for Male Employees

Variable	Attribute	Endowment	Coefficient
Primary	0.0	0.1	-0.1
Lower Secondary	0.5	0.5	0.1
Upper Secondary	-0.6	-0.1	-0.5
Post Secondary	-0.5	0.0	-0.5
Cert/Diploma	-0.2	-0.5	0.3
Degree	3.5	2.6	0.9
Migrant	0.0	-0.3	0.3
Tenure	-0.2	-0.5	0.4
Age 15-24	0.4	-0.1	0.5
Age 25-29	-0.9	0.0	-0.8
Age 30-39	-0.7	0.1	-0.8
Age 40-49	-0.2	0.0	-0.1
Age 50-59	-0.5	-0.1	-0.3
Age 60 plus	0.3	-0.1	0.3
Permanent Contract	0.1	0.1	0.0
Fixed term Contract	-0.2	0.0	-0.2
Apprentice/trainee	0.2	0.1	0.1
Other Contract	-0.1	0.0	-0.1
Fixed Hours	1.6	0.0	1.6
Shift Work	0.3	0.1	0.2
Firm Size	0.3	0.5	-0.1
Part Time	-1.1	-1.2	0.1
Professional Body	0.8	-0.5	1.3
Union Membership	-0.3	-0.1	-0.3
Industry	0.1	0.1	0.0
Construction	-1.4	-0.3	-1.1
Wholesale & Retail	-0.5	-0.1	-0.4
Hotels & Restaurants	-0.1	0.0	-0.1
Transport, Storage & Communications	-0.4	-0.2	-0.2
Finance	0.1	0.2	-0.1
Business Services	-0.4	0.1	-0.5
Education	0.1	0.0	0.1
Health & Social Work	-0.1	0.0	0.0
Other Services	0.1	0.0	0.1
Subtotal	**0.2**	**0.4**	**-0.2**

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.

Table 12: Breakdown of Decomposition Results by Variable for Female Employees

Variable	Attribute	Endowment	Coefficient
Primary	-0.1	-0.1	0.0
Lower Secondary	0.5	0.4	0.1
Upper Secondary	-0.3	0.0	-0.3
Post Secondary	0.0	0.0	0.0
Cert/Diploma	-0.9	-0.7	-0.1
Degree	2.7	2.5	0.3
Migrant	-0.3	-0.4	0.1
Tenure	-0.5	-0.3	-0.2
Age 15-24	0.0	-0.1	0.0
Age 25-29	-0.8	0.0	-0.8
Age 30-39	-1.3	0.0	-1.3
Age 40-49	0.4	0.0	0.4
Age 50-59	0.4	0.0	0.4
Age 60 plus	0.1	0.0	0.1
Permanent Contract	1.7	0.0	1.7
Fixed term Contract	0.0	0.0	0.0
Apprentice/trainee	0.1	0.1	0.0
Other Contract	-0.2	0.0	-0.2
Fixed Hours	-0.4	0.1	-0.6
Shift Work	-0.3	0.0	-0.3
Firm Size	6.7	0.9	5.8
Part Time	-1.2	-1.0	-0.2
Professional Body	0.3	-0.5	0.8
Union Membership	0.3	0.0	0.3
Industry	-0.1	0.1	-0.2
Construction	0.0	0.0	0.0
Wholesale & Retail	0.2	-0.1	0.2
Hotels & Restaurants	-0.1	-0.1	-0.1
Transport, Storage & Communications	-0.1	0.0	-0.1
Finance	-0.4	-0.1	-0.4
Business Services	0.0	0.2	-0.2
Education	0.1	0.0	0.1
Health & Social Work	0.6	0.3	0.3
Other Services	0.1	0.0	0.1
Subtotal	**7.0**	**1.1**	**5.9**

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.

5. Firm Level Labour Cost Analysis

Moving on to assess the impact that the recession has had on firms' average labour costs and by extension their competitiveness, it is estimated that real labour costs increased by 4.3 per cent between 2006 and 2009. While the rise in labour costs is likely to reflect the rise in average earnings, this does not necessarily imply an erosion of Ireland's competitiveness during this time period, as this depends on the rate of growth relative to other countries.

In this section of the paper, we examine this finding in further detail. First, we analyse the impact that various firm-level characteristics had on average labour costs in 2006 and 2009. We then undertake a decomposition analysis to establish if the increase in average labour costs over the period was being driven by compositional factors (i.e., changes in firm characteristics) or changes in the costs associated with firm characteristics. In addition, using data for 2009, we examine the incidence and characteristics of firms implementing various strategic changes in their employment conditions (e.g., cut staff numbers, pay, hours worked, etc.) to deal with the impact of the economic downturn on their business, along with the impact that these strategies had on average labour costs in 2009.

5.1 Average Labour Costs in 2006 and 2009

Table 13 presents the results from the 2006 and 2009 OLS average labour cost models. Overall, we found that in both years average labour costs were positively correlated with the share of male workers, the share of educated workers, the share of professional body employees and firm size. On the other hand, the proportion of part-time workers, the share engaged in shift work and the percentage of migrant workers tended to reduce average labour costs. A non-linear relationship was found to exist between average labour costs and the age of the workforce: specifically, labour costs were lower in firms' with high shares of both younger (aged 15-29) and older (aged 60 and above) workers relative to firms with a large proportion of employees aged between 40 and 49.[17]

In terms of the characteristics that saw significant changes in their coefficients between 2006 and 2009, most adjustments were in a positive direction, as one would expect given that average labour costs increased between the two time points. Specifically, there were significant increases in costs for all levels of education, the proportion of professional body workers, trade union density, the share of employees who work fixed hours and the fraction on an indefinite duration employment contract. The only significant fall related to the cost of tenured employees which suggests that there has been some reduction in the pay levels of more experienced workers. Although the proportion of migrant workers continued to reduce average labour costs in 2009, as did the shares of younger (aged 15-24) and older (aged 50 and above) employees, the magnitude of the coefficients declined between 2006 and 2009. The analysis confirms the view that migrant workers have been a consistent factor in keeping labour costs low in Irish firms during the boom era; however, compared to nationals, migrants were being paid relatively more in 2009 compared to 2006. In relation to sectoral effects, relative to

[17] Age can be viewed as being a proxy for experience; thus, the relationship identified between age and labour costs is similar to the standard non-linear relationship that exists between experience and individual earnings.

firms operating in the industrial sector average labour costs were found to be higher in Construction enterprises in both 2006 and 2009; however, the scale of the difference in average labour costs between the two sectors halved during the time period. Labour costs were also higher in Transport & Communications; Financial Intermediation and Business Services firms in 2006, but by 2009 average labour costs were significantly lower in Transport & Communication firms.

Table 13: Impact of Firm Characteristics on Average Labour Costs: 2006 and 2009

	2006		2009	
Share of Male Workers	0.141***	(0.022)	0.165***	(0.017)
Age (Aged 40-49):				
Share of Workers aged 15-24	-0.387***	(0.035)	-0.332***	(0.028)
Share of Workers aged 25-29	-0.217***	(0.036)	-0.268***	(0.028)
Share of Workers aged 30-39	-0.075**	(0.031)	-0.038*	(0.023)
Share of Workers aged 50-59	-0.079**	(0.036)	0.012	(0.029)
Share of Workers aged 60 and above	-0.204***	(0.051)	-0.121***	(0.045)
Education (Primary or less):				
Share of Junior Cert	0.034	(0.045)	0.191***	(0.037)
Share of Leaving Cert	0.159***	(0.041)	0.221***	(0.032)
Share of Post-Leaving Cert	0.127***	(0.044)	0.268***	(0.036)
Share of Third-level No Degree	0.220***	(0.046)	0.328***	(0.041)
Share of Third-level Degree	0.417***	(0.045)	0.562***	(0.033)
Average Tenure	0.006***	(0.001)	0.001	(0.001)
Share of Part-time Workers	-0.186***	(0.029)	-0.181***	(0.018)
Average Shift-work	-0.090***	(0.027)	-0.101***	(0.022)
Share of Fixed Hour Workers	-0.053***	(0.021)	0.032**	(0.016)
TU Density	0.000	(0.000)	0.001***	(0.000)
Share of Professional Body Workers	0.133***	(0.033)	0.285***	(0.029)
Share of Migrant Workers	-0.219***	(0.027)	-0.123***	(0.021)
Firm Size	0.039***	(0.007)	0.060***	(0.006)
Employment Contract (Indefinite Duration):				
Share of Fixed Term Workers	-0.025	(0.021)	-0.045***	(0.016)
Share of Apprentices/Trainees	-0.271***	(0.060)	-0.328***	(0.062)
Share of Other Employment Contract Type Workers	-0.057**	(0.029)	-0.092***	(0.021)
Sector (Industry):				
Construction	0.160***	(0.027)	0.078***	(0.021)
Wholesale & Retail	0.040	(0.026)	0.000	(0.020)
Hotels & Restaurants	-0.039	(0.031)	-0.099***	(0.024)
Transport & Communication	0.075*	(0.039)	-0.049**	(0.025)
Financial Intermediation	0.217***	(0.051)	0.041	(0.028)
Business Services	0.151***	(0.028)	0.007	(0.023)
Education	0.057	(0.059)	0.034	(0.039)
Health	0.072	(0.044)	0.008	(0.029)
Other Services	0.045	(0.034)	0.006	(0.027)
Constant	2.504***	(0.057)	2.389***	(0.045)
Observations	4,035		4,543	
R^2	0.249		0.384	

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.
Note: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2 Oaxaca-Blinder Decompositions

In order to enhance our understanding of what happened to firms' average labour costs between 2006 and 2009, specifically in terms of establishing if the increase was driven by structural factors or changes in the costs to specific firm characteristics, we again estimated Oaxaca-Blinder decompositions, the results for which are presented in Tables 14 and 15.

TABLE 14: Decomposition of the 2006-2009 Average Labour Cost Gap

	Change
Amount attributable	16.4
- Due to endowments (E):	-0.8
- Due to coefficients (C):	17.3
Shift coefficient (U):	-12.1
Raw differential (R) {E+C+U}:	4.3
Adjusted differential (D) {C+U}:	5.1
Endowments as % total (E/R):	-19.2
Discrimination as % total (D/R):	119.2

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.

The raw differential (Table 14) tells us that average labour costs increased by 4.3 per cent between 2006 and 2009; however, changes in the composition of firms accounted for very little of this, with the growth in costs primarily due to firm level attributes. Thus, structural factors were largely unimportant in explaining rising average labour costs between 2006 and 2009, a result that is consistent with the analysis undertaken at the level of the employee.

Turning to the impact of individual firm-level variables, we can see from Table 15 that there were some compositional adjustments between the two time points – increases in the share of graduates and part-time workers, and a reduction in the proportion of workers from professional bodies. However, these changes effectively cancelled each other out and most of the increase in average labour costs over the time period was driven by coefficient effects. In particular, there were increasing costs to firms for a given share of standardised employees, professionally qualified workers, employees with contracts of indefinite duration and migrant workers. Costs also rose within larger firms over the period. The costs associated with a unionised workforce increased over the time period as well, even though there was a fall in trade union density. The only two attributes that firms rewarded less, and therefore reduced their labour costs, were the share of tenured workers and those with Leaving Certificate qualifications.

Table 15: Detailed 2006 and 2009 Average Labour Cost Gap Decomposition Results

Variable	Attributable	Endowment	Coefficient
Share of Male Workers	1	-0.3	1.3
Share of Workers aged 15-24	0.4	0.1	0.3
Share of Workers aged 25-29	-1.5	-0.1	-1.3
Share of Workers aged 30-39	0.1	0.1	0
Share of Workers aged 40-49	-0.7	0.1	-0.8
Share of Workers aged 50-59	0.6	-0.2	0.8
Share of Workers aged 60 and above	0.2	0	0.2
Share of No Qualification Workers	-0.7	0.1	-0.8
Share of Junior Cert Workers	1.1	0.3	0.8
Share of Leaving Cert Workers	-1.2	-0.1	-1.1
Share of Post Leaving Cert Workers	0.5	0	0.5
Share of Third-level No Degree Workers	-0.4	-0.5	0.1
Share of Third-level Degree Workers	3.6	2.7	0.9
Average Tenure	-3.8	-0.1	-3.8
Share of Part-time Workers	-1.6	-1.7	0.1
Average Shift-work	0	0.2	-0.2
Share of Fixed Hour Workers	6	-0.1	6
TU Density	0.6	-0.6	1.2
Share of Professional Body Workers	1.2	-1.1	2.3
Share of Migrant Workers	1.1	-0.3	1.4
Firm Size	6.9	0.7	6.2
Share of Indefinite Duration Workers	2.4	0.2	2.3
Share of Fixed Term Workers	0	0	0.1
Share of Apprentices/Trainees	0.1	0.2	-0.1
Share of Other Employment Contract Type Workers	0	0	0
Industry	1.2	0	1.2
Construction	-0.3	-0.2	-0.1
Wholesale & Retail	0.9	0	0.9
Hotels & Restaurants	0.1	-0.1	0.1
Transport & Communication	-0.4	-0.2	-0.2
Financial Intermediation	-0.3	0	-0.3
Business Services	-1.2	0	-1.2
Education	0.1	0	0.1
Health	0.1	0	0.1
Other Services	0.2	0	0.2
Subtotal	**16.4**	**-0.8**	**17.3**

Source: Results based on data from the *2006* and *2009 National Employment Surveys* (NES), Central Statistics Office.

5.3 Changes in Employment Conditions in 2009

In the 2009 NES questionnaire, firms were asked to indicate if they had implemented changes to a number of employment conditions in that year.[18] In particular, they were asked if they had implemented cuts in i) staff numbers, ii) rates of pay/salary, iii) hours worked, iv) paid leave, v) bonuses, vi) allowances/premiums or vii) overtime. Table 16 illustrates the responses to these questions. Overall, almost 62 per cent of firms indicated that they had introduced some type of cut in employment conditions in 2009.[19] However, when we examine the individual strategies we can see that the incidence of cuts for each is quite low, especially given that the economy was in the depth of the recession at that time. Reducing staff numbers was the main tool that was used by firms to lower labour costs in 2009, with 34 per cent of firms indicating that they had cut employee numbers. This adjustment policy was followed by cuts in hours worked (29 per cent) and bonuses (26 per cent). Anecdotal evidence at that time suggested that there were widespread cuts in private sector pay; however, the evidence in Table 16 indicates that pay was left unchanged in three-quarters of firms. This raises the question of the differences in the characteristics of the firms that did and did not reduce pay as a method of adjusting to the crisis. This is examined later in the paper. Thus, it would seem that in the face of falling demand, both domestically and internationally, firms primarily reacted by reducing the amount of labour utilised as opposed to targeting the price of labour per se.

Table 16: Changes in Employment Conditions in 2009: Implementation of Cuts

	Per Cent
Overall	61.8
Type of Cut:	
Staff Numbers	34.0
Hours Worked	29.0
Bonuses	26.1
Pay	23.2
Overtime	21.6
Allowances/Premiums	15.7
Paid Leave	2.3

Source: Constructed from *2009 National Employment Survey*, Central Statistics Office.

In analysing the impact that these adjustment strategies had on firms' labour costs, we were conscious of the fact that there might be non-randomness in our sample of firms. Specifically, it could be higher/lower labour cost firms that are more likely to have adjusted their employment conditions. If this is the case, then our adjustment

[18] Specifically between October 2008 and October 2009.

[19] *Note*: as discussed in Section 2, there has been a much higher incidence of firms downsizing rather than closing over the crisis.

strategy estimates would be biased if the strategies introduced by firms were correlated with firm-level characteristics that were in turn associated with higher/lower labour costs. We deal with this source of potential bias by estimating a Heckman based selection model, as described in Equation 3 in the Appendix. The first stage of the modelling approach requires us to estimate the firm-level characteristics associated with the adoption of each particular strategy and, as such, the models can be quite informative in their own right. Table 17 presents the characteristics of firms that implemented the different adjustment strategies taken from the stage 1 Heckman probit models.[20] No consistent pattern exists across the various strategies, apart from larger enterprises having a somewhat higher likelihood to target employment conditions in 2009 which is, perhaps, unsurprising given that such firms will also have experienced the largest absolute falls in demand. It also appears that firms at the lower end of the productivity spectrum – as measured by the proportion of part-time workers in the firm, the share of shift-work employees and the proportion of the workforce with lower levels of education – were more likely to implement cuts in hours worked, bonuses and paid leave. The corollary of this is that workforce restructuring did not appear to be a major priority for firms at the higher end of the productivity distribution, despite the fact that such organisations employed higher proportions of more highly educated and costly labour.

Table 17: Characteristics of Firms that Implemented Cuts in Employment Conditions in 2009

	Staff	Pay	Hours Worked	Paid Leave	Bonuses	Premium/ Allowance	Overtime
Share of Male Workers	-	-	-0.202**	-	-	-	-
Share of Workers aged 25-29	-	-0.373**	0.585***	0.759**	-	-	0.325**
Share of Workers aged 30-39	-	-	0.236*	-	-	-	-
Share of Workers aged 50-59	-	-0.316**	-	-	-0.320**	-	-
Share of Workers aged 60 plus	-0.798***	-	-	-	-	-0.472*	-0.430*
Share of Junior Cert Workers	-	-	-	0.842*	-	-	-
Share of Leaving Cert Workers	-	-	0.323*	0.864*	0.334*	-	-
Share of Post-Leaving Cert Workers				0.962**	-	-	-
Average Tenure	0.019***	-	0.027***	-	0.011*	-	0.025***
Share of Professional Body Workers	0.587***	0.775***	-	0.588**	0.474***	-	-
Firm Size	0.167***	0.057***	0.054***	0.140***	0.121***	0.046**	0.110***
Share of Fixed Term Workers	-	-	-0.231***	-	-0.162**	-	-
Share of Apprentices/Trainees	-	-	-	1.367***	-	-	-
Average Shift Work	-0.200**	-	0.221**	-	-	-	-
Trade Union Density	-	-0.004***	-0.002*	0.009***	-	-	-
Share of Part-time Workers	-	-	0.849***	-	-	-0.177*	-

Source: Results based on data from the *2009 National Employment Survey* (NES), Central Statistics Office.
Note: *** p<0.01, ** p<0.05, * p<0.1

[20] Only significant coefficients included in this table.

Table 18 presents the results from our analysis of the impact of the adjustment strategies on firm's average labour costs. Our models are estimated both including and excluding controls for selection.[21] Before controlling for selection (Column 1), it appears that reductions in hours worked lowered firms average labour costs, while bonus cuts increased costs. This latter result seems counterintuitive; however, these results were no longer significant when selection was accounted for. In the selection consistent equation (Column 2), the negative and significant hours worked term suggests that firms with lower *ex ante* labour costs were more likely to have implemented this strategy, and the positive and highly significant coefficient for the reduction in hours worked variable indicates that this strategy (i.e. reducing hours worked) increased average labour costs within such firms. While this result might appear counterintuitive in the first instance, the stage 1 probit models (Table 17) shows that firms most likely to curtail the number of hours worked tended to employ a higher share of part-time workers. Thus, if firms implemented cuts in hours through part-time redundancies, this would tend to raise average labour costs as the gross weekly pay of part-time workers would be much lower than those of their full-time equivalents. Nevertheless, the overriding conclusion to be drawn from our firm level analyses is that average labour costs continued to rise over the period 2006 to 2009, largely as a consequence of price factors with compositional issues explaining only a very small proportion of the change. The vast majority of firms did not target wage rates during the period, with the evidence suggesting that the policy, when implemented, tended to be concentrated at the lower end of the productivity spectrum. Given the limited adoption of policies designed to reduce the cost of labour to firms, it is perhaps not surprising that such strategic changes were found to have little or no impact in reducing average labour costs within our sample.

[21] The selection terms control for the extent to which the characteristics of firms implementing adjustment strategies may themselves be correlated with labour costs and a failure to adjust for such effects can result in a biased estimate. The lamda terms can most easily be thought of as the extent to which firms' labour costs would be expected to diverge from the average *ex ante* given their characteristics. Thus a negative (positive) lamda would be indicative of the policy being implemented more by low cost/value added (high cost) firms. The inclusion of these lamdas terms results in more reliable estimates of the policy impacts themselves.

Table 18: Impact of Individual Employment Condition Cuts on Firms' Average Labour Costs

	Individual Strategies	Lamda Adjusted
Staff Numbers	0.004	0.112
	(0.011)	(0.117)
Pay	0.000	-0.096
	(0.012)	(0.136)
Hours Worked	-0.034***	0.277***
	(0.011)	(0.091)
Paid Leave	0.024	-0.064
	(0.032)	(0.183)
Bonuses	0.055***	0.110
	(0.014)	(0.177)
Allowance/Premiums	-0.024	0.138
	(0.018)	(0.191)
Overtime	-0.012	0.027
	(0.015)	(0.174)
Staff Numbers Lamda		-0.066
		(0.071)
Pay Lamda		0.055
		(0.080)
Hours Worked Lamda		-0.189***
		(0.054)
Paid Leave Lamda		0.042
		(0.083)
Bonuses Lamda		-0.034
		(0.106)
Allowances/Premiums Lamda		-0.091
		(0.106)
Overtime Lamda		-0.023
		(0.102)
Observations	4,543	4,543
R^2	0.442	0.445

Source: Results based on data from *the 2009 National Employment Survey* (NES), Central Statistics Office.
Note: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6. SUMMARY AND POLICY

It is important to note that while high wage levels in Ireland have become a primary issue in the current environment, they were not a principal factor in leading to the current downturn. The Irish recession was caused by a combination of factors, including the collapse of the housing bubble, the overexposure of the banking system to the property market and the global downturn. As a consequence, the fiscal deficit deteriorated and policies to reduce it have negatively impacted on domestic demand. Nevertheless, it has been widely argued that recovery should entail an adjustment in the price of labour, given our high relative costs, which deteriorated from 2002 onwards (see Figure 1) and our lack of monetary autonomy. Yet the existing international research firmly demonstrates that it is extremely unusual for

firms to engage in wage cutting even in the aftermath of a shock. Historically, firms tend to use other levers, such as cutting employment, hours and non-wage remuneration to achieve reductions in labour costs. Generally, the theoretical frameworks explain such behaviour as firms seeking to avoid productivity losses, either through worker disincentive effects or higher levels of labour turnover (Shapiro and Stiglitz, 1984; Weiss, 1980; Lindbeck and Snower, 1988). The corollary of this is that wage cutting is likely to be inversely related to the average productivity levels of the workforce.

The paper finds that private sector wage rates have altered little since the onset of the recession (see also Walsh, 2012). Nevertheless, the aggregate data hide a very complex picture. Within the male labour market, wages were driven down by an increase in the share of part-time workers. However, this was more than off-set by a rising share in the proportion of graduates. There were also increased returns to membership of professional bodies, third-level qualifications and regularised employment. With respect to females, again we see compositional change with the rise of part-time employment depressing wages, but this was more than offset by an increase in the share of graduates and a substantial jump in the return to females employed in larger firms.

In relation to firm-level strategies, once more the results are consistent with international research in that wage cutting was a less favoured method of adjustment, with firms preferring to cut labour costs through reducing staff numbers, hours worked and bonuses. Consistent with the individual-level analysis, labour costs were held down by a rise in the share of part-time workers and a fall in the costs associated with higher tenure, but these effects were more than offset by the influences of a rising share of graduates and a rise in the average cost of labour within larger firms. The tenure result suggests that, with the onset of the recession, firms ceased to reward long service in its own right, which suggests that the pay gap between older and younger workers may have reduced during the downturn. However, overall the firm level analysis would suggest that labour costs were maintained through the rising share of graduates and rising wages within foreign multinational enterprises and/or large firms.

To the extent that private sector wages reflect both worker productivity and firm-level profit maximisation, the research suggests that while some downsizing has been necessary within most sectors in response to market conditions, those firms that have survived have done so by retaining their most productive workers. While some small compositional effects have been evident, downward wage rigidity in Ireland has been a consequence of a rise in the relative share and returns to graduate employment and a rising payoff to working in a large firm, particularly for

females. Given this framework, our analysis is consistent with the possibility that firms have behaved in a profit maximising way and rewarded productivity among their workforce. The demise of social partnership over the period suggests that employers were not heavily constrained by bargaining arrangements[22] and that labour market conditions were generally more flexible than they had been for quite some time. In addition, we did not find any evidence that firms faced institutional barriers to downward wage adjustment, given that there was no substantial impact on the trade union variable included in our specifications. Furthermore, given that wage costs were predominately driven by returns to rising graduate employment, our analysis also shows that wage rigidity was not a consequence of a high wage floor among low-skilled workers. In this context, the analysis suggests that there may be little to be gained from pursuing policies aimed at labour market deregulation such as, reducing the minimum wage and/or restricting bargaining arrangements within firms/industries, as such policies are unlikely to influence the wage setting behaviour of firms.

Despite the rich nature of our data, the fact remains that substantial proportions of the movements in wages cannot be attributed to either coefficient or composition effects, particularly in the case of males. The international evidence and the predictions of theory suggest that the unexplained component within the data will be related to firms reluctance to cut wages due to feared productivity losses arising from lower morale, increased monitoring costs and/or higher rates of turnover. It could be argued that there is a potential role for policy in counteracting such barriers to wage adjustment; however, the situation is far from straightforward. Arguably, disincentive effects may follow a wage cut as a result of employee resentment relating to a change in relative pay with respect to comparable employees in other firms. If wage rates were cut in a universal fashion across all firms with, for instance a promise of future increases in take home pay through income tax relief following productivity gains then relativities would be unaffected and disincentive effects minimised. Indeed, this would be in line with the original Irish social partnership model that was based on a system of wage restraint, with productivity growth rewarded through lower rates of income tax.

Furthermore, in 2010, the Irish government implemented blanket pay cuts across the public sector, albeit without the consent of the social partners, and a pay freeze has been agreed for public sector employees up to 2013. However, even were the social partners to agree to private sector pay cuts or a freeze in nominal pay, the policy could not be implemented in a universal fashion as less than 40 per cent of private

[22] In fact, Keeney and Lawless (2010) found that Irish firms did not feel constrained by institutional factors from cutting wages even when social partnership was in operation.

sector employees are covered by the national wage agreement (McGuinness, Kelly and O'Connell, 2010).[23] Consequently, disincentive effects are likely to persist following any intervention making such a policy unenforceable.

Given the productivity related risks arising from any attempt to reduce wage rates, as discussed above, it is clear that firms will generally tend to use other methods of achieving a reduction in labour costs. This is borne out by the results from this study, which demonstrate that strategies such as reducing staff numbers, hours worked and bonus payments are all preferred over reductions in wages.

[23] This is an approximation based on firm-level employees.

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Table A1: Variable Labels and Definitions

Label	Definition
Human Capital	
Age	Age (years)
Proportion Age 15-24	Workers aged between 15 and 24 (1,0 dummy variable)
Proportion Age 25-29	Workers aged between 25 and 29 (1,0 dummy variable)
Proportion Age 30-39	Workers aged between 30 and 39 (1,0 dummy variable)
Proportion Age 40-49	Workers aged between 40 and 49 (1,0 dummy variable)
Proportion Age 50-59	Workers aged between 50 and 59 (1,0 dummy variable)
Proportion Age 60 plus	Workers over the age of 60 (1,0 dummy variable)
Primary	Primary (1,0 dummy variable)
Lower Secondary	Lower secondary (1,0 dummy variable)
Upper Secondary	Upper Secondary (1,0 dummy variable)
Post Secondary	Post Secondary (1,0 dummy variable)
Cert/Diploma	Certificate or Diploma (1,0 dummy variable)
Degree	Degree (1,0 dummy variable)
Experience (in years)	Experience (years)
Tenure (in years)	Length of time with current employer (years)
Professional Body	Member of a professional body (1,0 dummy variable)
Male	Male (1,0 dummy variable)
Migrant	Non Irish Nationals (1,0 dummy variable)
Job and Firm Characteristics	
Permanent Contract	Permanent employment contract (1,0 dummy variable)
Fixed term Contract	Fixed term contract (1,0 dummy variable)
Apprentice/trainee	Apprentice/trainee contract (1,0 dummy variable)
Other Contract	Other type of contract (1,0 dummy variable)
Fixed Hours	Fixed working hours (1,0 dummy variable)
Shift Work	Shift Work (1,0 dummy variable)
Hours	Hours worker per month (hours)
Union Membership	Member of a union (1,0 dummy variable)
Firm Size	Number of employees in a firm (continuous, where 1= 1-9 employees, 2= 10 to 49 employees, 3=50 to 249 employees, 4= 250 to 499 employees, 5=500 to 999 employees and 6= 1000+ employees)
Full Time	Full-time employment (1,0 dummy variable)
Part Time	Part-time employment (1,0 dummy variable)
Sector	
Industry	Manufacturing, mining and quarrying, electricity, gas and water supply (1,0 dummy variable)
Construction	Construction (1,0 dummy variable)
Wholesale & Retail	Wholesale and retail (1,0 dummy variable)
Hotels & Restaurants	Hotels and Restaurants (1,0 dummy variable)
Transport, Storage & Communications	Transport, storage and communications (1,0 dummy variable)
Finance	Financial intermediation (1,0 dummy variable)
Business Services	Business services (1,0 dummy variable)
Education	Education (1,0 dummy variable)
Health & Social Work	Health and social work (1,0 dummy variable)
Other Services	Other services (1,0 dummy variable)

Table B1: Summary Statistics for All Private Sector Workers

	2006		2009	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Age	37.64	11.80	37.17	11.76
Proportion Age 15-24	0.13	0.34	0.13	0.34
Proportion Age 25-29	0.16	0.37	0.17	0.37
Proportion Age 30-39	0.30	0.46	0.31	0.46
Proportion Age 40-49	0.22	0.41	0.22	0.41
Proportion Age 50-59	0.14	0.35	0.13	0.34
Proportion Age 60 plus	0.04	0.20	0.04	0.19
Primary	0.07	0.26	0.07	0.26
Lower Secondary	0.14	0.34	0.10	0.30
Upper Secondary	0.26	0.44	0.28	0.45
Post Secondary	0.13	0.34	0.13	0.33
Cert/Diploma	0.16	0.37	0.09	0.28
Degree	0.24	0.43	0.34	0.47
Male	0.54	0.50	0.52	0.50
Migrant	0.14	0.35	0.17	0.38
Experience (in years)	16.72	11.33	15.70	11.02
Tenure (in years)	8.21	8.18	7.78	7.51
Permanent Contract	0.86	0.35	0.87	0.34
Fixed term Contract	0.09	0.29	0.09	0.28
Apprentice/trainee	0.02	0.13	0.01	0.10
Other Contract	0.03	0.18	0.04	0.19
Fixed Hours	0.73	0.44	0.71	0.45
Shift Work	0.23	0.42	0.23	0.42
Hours	144.12	42.13	144.92	47.38
Union Membership	0.24	0.43	0.20	0.40
Firm Size	2.88	1.51	3.05	1.52
Full Time	0.85	0.35	0.77	0.42
Part Time	0.15	0.35	0.23	0.42
Professional Body	0.16	0.37	0.13	0.34
Industry	0.22	0.41	0.19	0.40
Construction	0.09	0.28	0.07	0.25
Wholesale & Retail	0.22	0.41	0.22	0.42
Hotels & Restaurants	0.06	0.24	0.07	0.25
Transport, Storage & Communications	0.04	0.20	0.08	0.27
Finance	0.08	0.27	0.09	0.29
Business Services	0.17	0.37	0.12	0.33
Education	0.01	0.11	0.01	0.11
Health & Social Work	0.06	0.23	0.09	0.29
Other Services	0.06	0.23	0.06	0.23
Real Wage	18.8	16.02	19.9	14.72

Source: Constructed from *2006* and *2009 National Employment Surveys*, Central Statistics Office.

Table B2: Summary Statistics for Male Private Sector Workers

	2006		2009	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Age	38.46	11.79	37.75	11.54
Proportion Age 15-24	0.11	0.31	0.11	0.32
Proportion Age 25-29	0.15	0.36	0.15	0.36
Proportion Age 30-39	0.31	0.46	0.33	0.47
Proportion Age 40-49	0.23	0.42	0.22	0.42
Proportion Age 50-59	0.15	0.36	0.13	0.34
Proportion Age 60 plus	0.05	0.22	0.04	0.20
Primary	0.08	0.28	0.08	0.27
Lower Secondary	0.15	0.36	0.11	0.31
Upper Secondary	0.25	0.43	0.26	0.44
Post Secondary	0.15	0.35	0.14	0.35
Cert/Diploma	0.14	0.34	0.08	0.26
Degree	0.24	0.43	0.34	0.47
Migrant	0.15	0.36	0.18	0.38
Experience (in years)	18.54	12.17	17.38	11.69
Tenure (in years)	9.07	8.96	8.56	8.20
Permanent Contract	0.86	0.34	0.87	0.33
Fixed term Contract	0.09	0.28	0.08	0.27
Apprentice/trainee	0.02	0.13	0.01	0.10
Other Contract	0.03	0.18	0.04	0.18
Fixed Hours	0.73	0.45	0.71	0.45
Shift Work	0.25	0.43	0.24	0.42
Hours	156.07	35.94	156.90	41.36
Union Membership	0.27	0.45	0.21	0.41
Firm Size	2.87	1.46	3.00	1.45
Full Time	0.95	0.21	0.88	0.32
Part Time	0.05	0.21	0.12	0.32
Professional Body	0.17	0.37	0.14	0.35
Industry	0.28	0.45	0.26	0.44
Construction	0.14	0.35	0.10	0.31
Wholesale & Retail	0.20	0.40	0.21	0.41
Hotels & Restaurants	0.05	0.22	0.05	0.22
Transport, Storage & Communications	0.05	0.21	0.10	0.29
Finance	0.06	0.23	0.07	0.26
Business Services	0.16	0.36	0.12	0.32
Education	0.01	0.07	0.01	0.08
Health & Social Work	0.01	0.11	0.03	0.18
Other Services	0.05	0.21	0.04	0.20
Real Wage	21.2	18.19	22.3	17.09

Source: Constructed from *2006* and *2009 National Employment Surveys*, Central Statistics Office.

Table B3: Summary Statistics for Female Private Sector Workers

	2006		2009	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Age	36.69	11.73	36.55	11.97
Proportion Age 15-24	0.15	0.36	0.16	0.36
Proportion Age 25-29	0.18	0.38	0.18	0.39
Proportion Age 30-39	0.29	0.46	0.29	0.45
Proportion Age 40-49	0.21	0.40	0.21	0.40
Proportion Age 50-59	0.13	0.34	0.13	0.34
Proportion Age 60 plus	0.04	0.19	0.03	0.18
Primary	0.06	0.23	0.06	0.24
Lower Secondary	0.12	0.33	0.09	0.29
Upper Secondary	0.27	0.45	0.29	0.46
Post Secondary	0.11	0.31	0.11	0.31
Cert/Diploma	0.20	0.40	0.10	0.29
Degree	0.24	0.43	0.35	0.48
Migrant	0.13	0.34	0.16	0.37
Experience (in years)	14.59	9.83	13.90	9.93
Tenure (in years)	7.18	7.03	6.93	6.59
Permanent Contract	0.85	0.35	0.86	0.35
Fixed term Contract	0.10	0.29	0.09	0.29
Apprentice/trainee	0.01	0.11	0.01	0.09
Other Contract	0.04	0.19	0.04	0.19
Fixed Hours	0.74	0.44	0.71	0.45
Shift Work	0.21	0.40	0.21	0.41
Hours	130.08	44.48	132.02	49.99
Union Membership	0.21	0.41	0.18	0.39
Firm Size	2.88	1.57	3.11	1.59
Full Time	0.73	0.44	0.64	0.48
Part Time	0.27	0.44	0.36	0.48
Professional Body	0.16	0.36	0.13	0.33
Industry	0.14	0.35	0.12	0.33
Construction	0.03	0.16	0.03	0.16
Wholesale & Retail	0.24	0.43	0.24	0.43
Hotels & Restaurants	0.08	0.26	0.08	0.27
Transport, Storage & Communications	0.03	0.18	0.06	0.23
Finance	0.11	0.31	0.11	0.31
Business Services	0.18	0.38	0.13	0.34
Education	0.02	0.15	0.02	0.14
Health & Social Work	0.10	0.31	0.15	0.36
Other Services	0.07	0.26	0.07	0.26
Real Wage	16.0	12.46	17.3	11.05

Source: Constructed from *2006* and *2009 National Employment Surveys*, Central Statistics Office.

Appendix 2: Methodological Approach

At the level of the employee we begin deconstructing wage changes using an Oaxaca decomposition (Oaxaca, 1973). Specifically, wage effects are estimated by Equation 1:

$$Y_{it} = \alpha + \beta 1 \quad X_{it} + \beta_2 J_{it} + \varepsilon_{it} \tag{1}$$

where Y is log gross hourly earnings in period t; X denotes human capital characteristics such as age, education, migrants' status, gender and job tenure, etc.; J denotes a series of job and industry characteristics such as hours worked, firm size and sector; while ε denotes the error term. The decompositions are estimated in line with Equation 2:

$$\overline{Y_{09}} - \overline{Y_{06}} = (\overline{X_{09}} - \overline{X_{06}})\widehat{\beta_{1_{09}}} + (\widehat{\beta_{1_{09}}} - \widehat{\beta_{1_{06}}})\overline{X_{06}} + (\overline{J_{09}} - \overline{J_{06}})\widehat{\beta_{2_{09}}} + (\widehat{\beta_{2_{09}}} - \widehat{\beta_{2_{06}}})\overline{J_{06}} + (\widehat{\propto_{09}} - \widehat{\propto_{06}}) \tag{2}$$

The terms multiplied by the Betas represent endowment effects i.e., the extent to which any observed change in average earnings over time is driven by changes in the distribution of human capital and job characteristics (i.e., compositional changes), while the terms multiplied by the X and J terms represent coefficient influences, which measure the degree to which the change in average earnings has been driven by variations in the return to various human capital and job characteristics.

The Oaxaca decomposition allows us to separate out the impact of individual characteristics on the change in wages over the period. However, there is an identification problem associated with using dummy and categorical variables in the decomposition (Oaxaca and Ransom, 1999); essentially the change in wages attributable to differences in these types of variables may not be invariant to the choice of reference group. To overcome this problem, we follow Gardeazabal and Ugidos (2004) and estimate the decompositions imposing a normalising restriction on each set of dummy and categorical variables.[24]

With respect to the firm level analysis, our key dependant variable is average labour costs within the firm. Average labour costs represents a key productivity corollary that firms are most likely to target during the course of the recession in order to maintain and improve competitiveness. In terms of the econometrics, our

[24] All categories of the dummy and categorical variables are included in the decomposition. The restriction is that the sum of the estimated coefficients of each categorical variable must be zero. The implementation of the restriction leaves the other coefficients unaffected.

specifications are based around the assumption that, just as individual level wages are primarily determined by the amount of human capital accumulated, average labour costs within the firm will be driven by the education profile of the workforce. Given this, we estimate the following equation for both 2006 and 2009:

$$\overline{LC_{it}} = \alpha + \beta_1 \overline{X_{it}} + \beta_2 F_{it} + \lambda_{it} + \varepsilon_{it} \quad (3)$$

where LC denotes labour costs; X the share of a particular human capital attribute within the firm; and F firm level characteristics such as firm size and sector, and also a series of variables indicating organisational strategies undertaken during the recession such as cutting wages, bonuses, staff numbers, etc. As strategies aimed at reducing labour costs are unlikely to be random with respect to wage costs, the models are augmented by a series of selection terms λ estimated using the standard Heckman approach.

The Economic & Social Research Institute
Whitaker Square
Sir John Rogerson's Quay
Dublin 2, Ireland
+ 353 1 863 2000 www.esri.ie

The ESRI acknowledges the financial support of FBD Trust for the *Renewal Series*