

IZA DP No. 9580

The Changing Nature of Irish Wage Inequality from Boom to Bust

Niamh Holton
Donal O'Neill

December 2015

The Changing Nature of Irish Wage Inequality from Boom to Bust

Niamh Holton

Nevin Economic Research Institute

Donal O'Neill

*Maynooth University
and IZA*

Discussion Paper No. 9580
December 2015

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

Any opinions expressed here are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The Institute for the Study of Labor (IZA) in Bonn is a local and virtual international research center and a place of communication between science, politics and business. IZA is an independent nonprofit organization supported by Deutsche Post Foundation. The center is associated with the University of Bonn and offers a stimulating research environment through its international network, workshops and conferences, data service, project support, research visits and doctoral program. IZA engages in (i) original and internationally competitive research in all fields of labor economics, (ii) development of policy concepts, and (iii) dissemination of research results and concepts to the interested public.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ABSTRACT

The Changing Nature of Irish Wage Inequality from Boom to Bust¹

The dramatic change in economic conditions in Ireland over the last 10 years provides an opportunity to examine the impact of large macroeconomic shocks on inequality. We analyse wage inequality in Ireland from the height of an economic boom, through a very deep recession, to the start of a recovery. In keeping with previous work we find that dispersion in wages increased towards the height of the boom, driven largely by rising returns to skills. However, the economic crisis of 2008-2013 was accompanied by a significant reduction in earnings dispersion. Although the improving characteristics of the work force increased wages for everyone over this period, these increases were offset by falling returns to skills. Only workers in the lowest decile were unaffected by the declining returns, resulting in wage growth at the bottom of the distribution and a decline in inequality during the recession.

JEL Classification: J31

Keywords: inequality, composition bias, returns to skill

Corresponding author:

Donal O'Neill
Economics Department
NUI Maynooth
Maynooth, Co. Kildare
Ireland
E-mail: donal.oneill@nuim.ie

¹ We are grateful to Olive Sweetman for helpful comments on an earlier draft of this paper.

1. Introduction

A number of studies have examined the impact of the macroeconomic environment of a country on its level of inequality, looking in particular at whether inequality increases or declines during recessions (Heathcaote et al. 2010, Bonhomme and Haspido, 2012, Jenkins et al. 2013). The recent experience of the Irish economy provides a very useful setting for further examination of this issue. After a period of exceptional growth from 1994-2007, the Irish economy collapsed, with negative output growth between 2008-2010 and only very modest growth during the weak recovery of 2011-2013. The contrasting experience of the Irish economy over this period provides researchers with an ideal opportunity to track and examine the evolution of inequality as an economy moves from a boom to a severe recession through to a subsequent recovery.

Given the dramatic changes that occurred in the Irish economy during this period any attempt to understand the changing nature of inequality must account for the potentially large changes in the composition of the workforce that might have arisen as the unemployment rate increased from under 5% to almost 15%. To do this we use a decomposition technique developed by Machado and Mata (2005) to identify the separate contributions of changes in the composition of the workforce and changes in the returns to these characteristics to changes in inequality over the period 2004-2013. Our work builds on earlier work by Voitchohsky et al. (2012) who adopted a similar approach when examining wage inequality in Ireland from 1994-2007. Extending the period of analysis to cover the time period from 2007-2013 allows us to assess the impact of the Great Recession on inequality in Ireland. Consistent with Voitchohsky et al. (2012) we show that inequality increased substantially during the height of the boom, driven almost entirely by rising returns to skills. However, the pattern changed dramatically with the onset of the recession. Between 2007 and 2012

inequality fell significantly, so that by 2013 wage inequality had returned to its 2004 level. This fall in inequality reflects stagnant or declining wages at all points in the distribution above the 10th percentile. That failure of wages to grow for these workers, despite substantial improvements in the skills of the workforce, reflects a significant decline in returns to these skills during the recession. This resulted in relative wage gains at the bottom of the distribution and falling inequality. The contrasting roles of returns and characteristics in explaining the evolution of wages in Ireland during the recession highlights the importance of controlling for compositional changes when examining wage trends (Solon et al. 1994, Doris et al. 2015).

Section 2 outlines the key features of the Irish macroeconomic environment over the period examined in our study and briefly reviews earlier work on wage inequality. Section 3 discusses the data used in our analysis and establishes the overall evolution of wage dispersion throughout the period of analysis. Section 4 briefly describes the decomposition adopted in our analysis before moving onto present the main findings of the analysis. Section 5 concludes the paper.

2. The Great Recession

In the past decade the major world economies experienced a great recession and a worldwide financial crisis. Ireland was one of the countries most affected by the economic downturn. Table 1 shows that prior to 2008 Ireland was a thriving economy experiencing growth rates of close to 6% and unemployment rates of only 4% (see also Whelan, 2013)

The Irish economy underwent a dramatic reversal with the onset of the Great Recession in 2008, with GDP contracting by 14% and unemployment levels rising to 14% by 2011. The effects of the global recession felt elsewhere were compounded in Ireland due to the collapse of the construction following the bursting of a property bubble and a subsequent financial

crisis in the banking sector. Few sectors of the economy were spared, though the construction sector experienced the largest declines, with employment in this sector falling by 60% between 2007 and 2011. By 2013 the Irish economy had bottomed out and the country had returned to positive but negligible growth but unemployment remaining very high at 13.1%.

The Irish government responded to the crisis with a series of income tax changes. These included the introduction of a new income levy, increases in the health levy and a substantial increase in the ceiling below which pay related social insurance contributions were payable. In addition there was a substantial cut in pay for public sector workers. Initially these cuts took the form of a new Pension Levy introduced in 2009 but were followed by direct pay cuts of 5 to 10% in 2010. An additional round of public sector pay cuts was implemented in 2013, affecting higher paid public sector workers; those earning more than €65,000 had their pay cut by between 5.5 and 10%, with bigger cuts applying to those on higher pay. Callan et al. (2011) and Keane et al. (2012) document the progressivity of the combined tax changes and public sector pay cuts introduced at this time, with lowest income groups losing by 4-5% and the highest income group losing by close to 13%.

A number of recent international studies have examined the impact of the macroeconomic environment on inequality. Jenkins et al. (2013) examine the impact on household incomes of the major economic downturn that began at the end of 2007. They provide a general overview for 21 countries with detailed analysis for a subset of 6 of these countries. They find that between 2007 and 2009 the changes in the distribution of household income in Germany, Sweden, and the UK were generally modest, whether measured in terms of real income levels, income inequality, or relative poverty rates. Italy and the USA were the two case study countries where increases in inequality were most apparent. Meyer and Sullivan (2013) found that while income inequality increased in US during the Great

Recession, consumption inequality fell. Looking over a longer period Heathcoate et al. (2010) found that those in the bottom of the earnings distribution suffer the biggest losses during declines.

Wage inequality increased in Germany following the economic downturn due to the reunification of Germany in 1992/93 (Fuchs-Schundeln, 2010). However, wage inequality decreased in Germany during the Great Recession driven predominantly by a decline in the exporter wage premium (Dauth et al. 2015). Bonhomme and Hospido (2012) find a strong countercyclical pattern to male earnings inequality in Spain, with inequality increasing around the 1993 recession, decreasing substantially during the 1997-2007 expansion, and then increasing during the recent recession. Likewise Newel and Socha (2007) report that wage inequality increased in Poland following the economic downturn in the late 1990's.

Turning to Ireland, Callan et al (2014) examine income inequality from 2008-2013 and find the largest falls in income occurred at the bottom of the income distribution. There have been fewer papers examining wage inequality in Ireland. Voitchohsky et al. (2012) examined inequality from 1994-2007. They found that dispersion in hourly wages fell sharply to 2000 before increasing somewhat to 2007. However, their analysis did not extend to the Great Recession.

The Central Statistics Office (2010) studied the change in the wage bill paid by employers in Ireland for the period after the onset of the recession using the Earnings Hours and Employment Costs Survey. Between the third quarter of 2008 and the third quarter of 2009 the total wage bill of all employers fell by 7%. The majority of this reduction resulted from a decrease in employment levels in firms with a smaller proportion due to a reduction hours worked by employees. Walsh (2012) extended the study of the wage bill to cover the years 2009-2011. He reports a 6% reduction in the wage bill of employers between 2009 and 2010 and a further reduction of 1% between 2010 and 2011. The majority of the reduction in

the wage bill between 2009 and 2010 was again due to decrease in the number of employees firms employed.

Walsh (2012) was based on the aggregate wage bill of employers and thus suffers from potential composition bias. Doris et al. (2015) use administrative longitudinal data to follow individual earnings for the entire employee population in Ireland between the years of 2005 and 2013. They find a significant degree of downward wage flexibility in the pre-crisis period, supporting the view that the Irish labour market is a flexible one. They also observe a significant response in wage change behaviour with the onset of the crisis; the proportion of workers receiving earnings cuts more than trebled during the crisis. In addition the wage cuts were progressive, particularly in the public sector, where highest wage earners recorded earnings cuts of 12%.

In this paper we extend earlier analysis of inequality in Ireland by examining hourly wage dispersion from 2004-2013, a period covering the peak of the boom, the worst of the recession and the subsequent seeds of a recovery. We decompose changes in wage inequality into a component due changes in the price of skills and component due to changing characteristics of the workforce. In this way we assess the impact of the Great Recession on inequality in Ireland, taking into account the any compositional changes that may have occurred following the dramatic increase in unemployment during this period.

3. Data and Descriptive Statistics

To carry out our analysis we use data from the Irish component of the EU Statistics on Income and Living Conditions (EU-SILC). The EU-SILC is an annual, EU wide household survey, which is conducted in Ireland by the Central Statistics Office. The EU-SILC is a cross sectional dataset that provides information on the income and living conditions for a

sample of households in Ireland. The survey is conducted annually and has a sample size ranging from 5,000 – 6,000 households and 11,000 – 14,000 individuals each year. The sampling frame and weighting procedures are designed to ensure the EU-SILC sample is representative of the population using external controls.

We follow Voitchovsky et al. (2012) and restrict our sample to all employees aged between 16 and 65 years of age, who work more than one hour and less than 100 hours a week, and who report a gross wage above €1 an hour and below €100 an hour (in 2010 prices). The analysis excludes those in full-time education at the time of the survey. To study the evolution of earnings inequality we focus on the distribution of gross hourly earnings. Data on hourly earnings are provided directly by the CSO in the RMF version of the data used in our analysis and are based on earnings received in the last pay cheque combined with hours worked. These data are subject to careful cleaning by the CSO, using administrative and other sources, prior to release of the RMF data by the CSO.

The evolution of inequality from 2004-2013 is presented in Figure 1 and in more detail in Table 2. Two clear patterns emerge from the data. From 2004-2007, inequality increased, with the ratio of the top earnings decile to the bottom decile rising from 3.62 to 4.04. Although earnings at the bottom of the distribution increased over this period by 5.56%, the change was much smaller than that 12.4% increase experienced at the top of the distribution. However, the trend in inequality changed dramatically with the onset of the crisis in 2008. Between 2008 and 2012 earnings at the bottom of the distribution continued to rise, albeit at a very modest 1% over the entire period. In contrast earnings at the top of the distribution fell by 4% over the same period. As a result by 2012 inequality had almost returned to its 2004 level. There is suggestive evidence that inequality is beginning to increase again as the economy begins its recovery. Wages at the bottom of the distribution

fell from 2012 to 2013 while wages at the top rose for the first time since 2009. However, it is too early to say from these data whether or not this is the start of a persistent trend.

As noted earlier unemployment in Ireland increased from under 5% in 2007 to almost 15% in 2012. However, the increase in unemployment was not uniform across education levels. Data from the Central Statistics Office show that between the first quarter of 2007 and the second quarter of 2012 the unemployment rate for those with a lower secondary education increased from 7.3% to 25.8%. The unemployment rate for those with a third level degree or higher also increased but at a much slower rate, increasing from 2.4% to 5.8%. It is well known that the compositional changes arising from these changes can have a significant impact on the wage structure (Solon et al. 1994). Since low paid workers lost their jobs in relatively large numbers, the ensuing truncation of the wage distribution is likely to boost reported average wages of remaining workers, mitigating any potential pro-cyclical pattern. The loss of these low paid workers is not only going to affect average wages but is also likely to affect dispersion of wages among remaining workers.

To examine the impact of the recession on the composition of workforce in Ireland in more detail Table 3 shows the educational distribution of the workforce in our sample from 2004-2013. What is particularly striking is the significant improvement in the education levels of the workforce during the recession. The proportion of workers with 3rd level education increased from 37% in 2007 to over 50% in 2013, a dramatic increase in such a short period. This was accompanied by a decline in those with a primary education or lower from 11% in 2007, to less than 5% in 2013. In the remainder of this paper we wish to examine the impact of these and other changes on earnings inequality in Ireland.²

² Summary statistics of all the variables used in our analysis by position in the earnings distribution are given in Table 4.

4. Decomposition and Results

To identify the contributions of changes in returns to skill and changes in the distribution of skills on inequality we use the decomposition developed Machado and Mata (2005). Machado and Mata's (2005) technique decomposes changes in the wage distribution into the changes caused by the covariates and the changes caused by the returns to covariates. In this way the Machado and Mata's (2005) decomposition extends the Oaxaca (1973) for mean decomposition to the entire wage distribution.

The approach is based on quantile earnings regressions, specified as

$$Q_{\theta}(w|z) = z'\beta(\theta) \quad (1)$$

where $\beta(\theta)$ is a vector of regression coefficients at the θ^{th} quantile.

To perform the required distributional counterfactual analysis Machado and Mata exploit the probability integral transformation to derive the marginal distribution of wages consistent with the conditional distribution (1). The probability integral transformation theorem implies that if $\theta_1, \theta_2, \dots, \theta_m$, are drawn from a uniform (0,1) distribution then the corresponding m estimates of the conditional quantiles of wages at z for time t , $\{w_t^*(t) = zt * t' \beta_t(\theta_i)_{i=1}^m$, represent a random sample from the estimated conditional distribution of wages given z . In order to estimate the marginal distribution consistent with these conditional distributions one only needs to average over the z values at time t . This can be done by analytically or via simulation.

Given this approach appropriate counterfactuals can be obtained by simply adjusting the distribution from which the characteristics are drawn from before combining the covariates and the returns. For instance it is straightforward to estimate what the distribution of wages in year 1 would have been if all characteristics had remained at the levels observed in year 0. To do this we begin drawing a random vector θ , of size m , from a uniform distribution. Using the covariates for year 1 we estimate m conditional quantile regressions,

with the quantiles corresponding to θ . This provides m sets of year 1 returns for each quantile; $\{\beta^1(\theta_i)\}_{i=1}^m$. Finally we combine these point estimates with a random sample of size m from the rows of the covariate matrix in year 0. The corresponding estimates $\{w_i^*(t) \equiv z_i^*(0)' \beta^1(\theta_i)\}_{i=1}^m$ provide m random draws from the counterfactual distribution of wages in year 1 with characteristics fixed at year 0 levels. Alternative counterfactuals can be simulated using the same procedure.

Before looking at the decomposition results in detail, Table 5 reports the returns to characteristics by decile of the earnings distribution for 2004, 2007, 2008 and 2013. These are a key input into the wage decomposition procedure described above. The results are as expected with a male premium of 10-15%, a premium of being Irish of the order of 20% and an urban premium of the order of 10%. Of particular interest is the returns to education over this period. Our estimates show that the returns rise steadily with education. The OLS regressions in the last 4 columns of Table 5 show a mean return of tertiary education of the order of 50-70%. Looking at the results at the individual quantiles we see that in each year the return to tertiary education is substantially bigger at the higher quantile. For example in 2004, the return to tertiary education at the 10th decile was 50%, while the corresponding return at the 90th percentile was 87%. This pattern is consistent with international work in this area. Martins and Pereira (2004) examined data for 16 countries from the mid 1990's and found that the returns to schooling were higher for the more skilled individuals, conditional on their observable characteristics. They suggest a number of possible explanations such as over-education, ability – schooling interactions and school quality or different fields of study.

Given our interest in changing inequality it is also of interest to examine the change in returns to education over this period. The results in Table 5 show a fall in returns between 2004 and 2007 at the lowest decile but increasing returns at the higher decile. However, the period from 2008-2013 saw a substantial fall in returns to skill at both deciles. At the top

decile only tertiary education records a statistically significant return over primary education by 2013, and even here the return is 63% compared to 82% in 2008. These results are consistent with the progressive nature of the fiscal response to the crisis and would be expected to reduce inequality.

To examine the role of changing returns and workforce composition on inequality over this period we implement the Machado and Mata decomposition outlined above.³ The results are presented in Figure 2 and 3. Figure 2 examines the period from 2004-2007 corresponding to the peak of the boom, while Figure 3 looks at 2007-2013, the period of the Great Recession. Looking at the boom period our results are in keeping with those of Voitchohsky et al. (2012). The solid line shows a general pattern of increasing wage growth throughout most of the distribution, resulting in a substantial increase in inequality during the height of the boom. The decomposition shows that this increase was driven almost entirely by rising returns to skills. Although changing composition contributed to wage growth throughout the distribution, the magnitudes of these changes were small compared to the impact of rising returns. Throughout the wage distribution changes in returns are estimated to account for approximately 80% of the observed wage changes. At the top of the distribution returns were estimated to have increased wages by almost 20%, compared to a 5% increase due to characteristics.

Figure 3, shows that this pattern changed dramatically with the onset of the recession. The pattern of wage changes between 2007 and 2012 resulted in a significant fall in equality. This is driven by wage gains at the bottom of the distribution and stagnant or declining wages throughout the rest of the distribution. The stagnant/declining wages across most of the distribution may be surprising given the substantial improvements in the skills of the workforce noted earlier. However, our analysis reveals that the improvements in

³ The procedure is implemented using the Stata code provided by Melley (2006). This procedure uses the same framework as Macahdo and Mata but evaluates necessary integrals using summations rather than simulation. The two approaches are numerically identical as the number of random draws in Machado and Mata goes to infinity.

characteristics, by themselves, would have lead to substantial wage gains, of the order of 8% throughout much of the distribution. This is a stark illustration of the potential role of composition bias when evaluating the cyclical of wages. The failure of the improved characteristics to translate into wage gains over this period reflects the significant decline in returns to these skills that occurred during the recession. Falling returns to skill caused the wages of most workers to decline over this period. The exception was workers in the lowest percentiles of the wage distribution. This is consistent with the fact that these workers were least affected by the decline in returns to skills. By 2013, only 35% of workers in the bottom decile of the unconditional wage distribution had tertiary education compared to over 90% of those in the top decile. The combination of changing returns and workforce composition resulted in relative wage gains for the lowest paid workers and lower inequality. Had the returns to skill not declined during the recession, we estimate that wages at the 10th percentile of the wage distribution would have increased by 1.5% during the recession rather than the observed increase of 0.4%, while wages at the 90th percentile would have increased by 5.5% as opposed to the observed decline of 1.3%. Under the counterfactual of fixed returns to skill inequality would have continued to rise during the economic crisis due to the changing composition of the workforce.

5. Conclusions

Although the economic downturn beginning in 2007 reflected a global recession that affected many countries, the combination of falling global output, a housing bubble and a financial crisis meant that Ireland was one of the countries most affected by the Great Recession. The collapse in output and spiraling unemployment rates during the Great Recession in Ireland provides a rare opportunity to study the response of wage inequality to

dramatic changes in the economic conditions. To do this we examine how wage inequality in Ireland changed as we moved from the height of the boom to the Great Recession.

We find a strong cyclical pattern to inequality in Ireland, with inequality rising during the boom and falling during the Great Recession. Like previous work we find that the rise in inequality during the boom was largely driven by a rise in the returns to skills, reflective of the tightness of the labour market at that time. Any consideration of the subsequent change in wage structure during the Great Recession must account for the large changes in the composition of the labour force that occurred during this period. We find that the education levels of the workforce improved significantly during the crisis, with the proportion of the workforce with tertiary education increasing from approximately 35% to over 50%. This reflects the greater impact of rising unemployment during the recession on the lowest skilled. Despite the improvement in education of the remaining workforce over this time, wages were stagnant or declined slightly throughout most of the wage distribution. This reflects declining returns to skills. At most parts of the distribution the net effect of improved covariates and reduction in returns was close to zero. Only in the lowest part of the wage distribution, consisting of low skilled workers least affected by the decline in returns to skills, do we observed wages rise during the recession.

The contrasting roles of returns and characteristics in explaining the evolution of wages in Ireland during the recession highlights the importance of distinguishing between these competing and potentially offsetting factors when understanding the changing Irish wage structure in response to the Great recession.

References

- BONHOMME, S AND L. HOSPIDO, 2012 “The Cycle of Earnings Inequality: Evidence from Spanish Social Security Data,” IZA Discussion Paper No. 6669
- CALLAN, T, B. NOLAN AND J. WALSH, 2011. “The Economic Crisis, Public Sector Pay, and the Income Distribution” *Research in Labor Economics*, 32, 207-225
- CALLAN, T, B. NOLAN, C. KEANE, M. SAVAGE AND J. WALSH, 2014. "Crisis, response and distributional impact: the case of Ireland," *IZA Journal of European Labor Studies*, Springer, vol. 3(1), pages 1-17, December.
- CENTENO, M. and A. A. NOVO, 2014. "When Supply Meets Demand: Wage Inequality in Portugal," *IZA Journal of European Labour Studies*, Vol. 3, No. 23, pp. 1-20.
- CENTRAL STATISTICS OFFICE, 2010. "Analysis of Wage Bill Change in Enterprises and Components of Change, Quarter 3 2008 until Quarter 3 2009," Dublin: Central Statistics Office.
- DAUTH, W., H. SCHMERER and E. WINKLER, 2015. “Exporters and Wage Inequality during the Great Recession: Evidence from Germany”, *Economic Letters*, 136, 137-140.
- DORIS, A., D. O’Neill and O. Sweetman, 2015. “Wage Flexibility and the Great Recession: the Response of the Irish Labour Market”, *IZA Journal of European Labor Studies*, pp. 1-25.
- FUCHS-SCHÜNDELN, N., D. KRUEGER, AND M. SOMMER, 2010 “Inequality trends for Germany in the last two decades: A tale of two countries,” *Review of Economic Dynamics*, vol. 13(1), pages 103-132, January.
- HEATHCOTE J., F. PERRI AND G. VIOLANTE, 2010, “Unequal We Stand: An Empirical Analysis of Economic Inequality in the US, 1967-2006”, *Review of Economic Dynamics*, forthcoming.
- JENKINS, S., A. BRANDOLINI, J. MICKLEWRIGHT, and B. NOLAN 2013, The Great Recession and the distribution of household income Oxford University Press, Oxford, UK.
- KEANE, C, T. CALLAN , M. SAVAGE , J. WALSH, B. COLGAN 2012 “Distributional impact of tax, welfare and public service pay policies: 2009-2012,” *Quarterly Economic Commentary*, Winter.
- LINDLEY, J. and S, MACHIN, 2013. “Wage Inequality in the Labour years”, *Oxford Review of Economic Policy*, Vol.29, No.1, pp. 165-177.
- MARTINS, P. AND P. PEREIRAB, 2004 “Does education reduce wage inequality? Quantile regression evidence from 16 countries,” *Labour*, 11, 355-371.

- MACHADO, J. and J. MATA, 2005. "Counterfactual Decomposition of Changes in Wage Distributions Using Quantile Regressions," *Journal of Applied Econometrics*, Vol. 20, pp. 445-465.
- MELLY, B. 2006. "Estimation of Counterfactual Distributions using Quantile Regressions," University of St. Gallen. http://www.sgvs.ire.eco.unisi.ch/papers/Melly_SGVS06.pdf
- MEYER, B., and J. SULLIVAN. 2013. "Consumption and Income Inequality and the Great Recession." *American Economic Review*, 103(3): 178-83.
- NEWELL, A. and M. W. SOCHA, 2007. "The Polish Wage Inequality Explosion," *Economics of Transition*, Vol. 15, pp. 733-58.
- SOLON, G., R. BARSKY, and J. A. PARKER (1994): "Measuring the Cyclicalities of Real Wages: How Important Is Composition Bias?," *The Quarterly Journal of Economics*, 109, 1-25.
- VOITCHOVSKY, S., B. MAITRE, B. and B. NOLAN, 2012. "Wage Inequality in Ireland's "Celtic Tiger" Boom," *The Economic and Social Review*, Vol. 43, No. 1, pp. 99-133.
- WALSH, K. 2012. "Wage Bill Change in Ireland During Recession-How Have Employers Reacted to the Downturn," *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. XLI, pp. 39-70.
- WHELAN, K. 2013. "Ireland's Economic Crisis The Good, the Bad and the Ugly", UCD Centre of Research, Working Paper No. WP13/06, Dublin.

Figure 1: Distribution of Hourly Earnings, 2004-2013

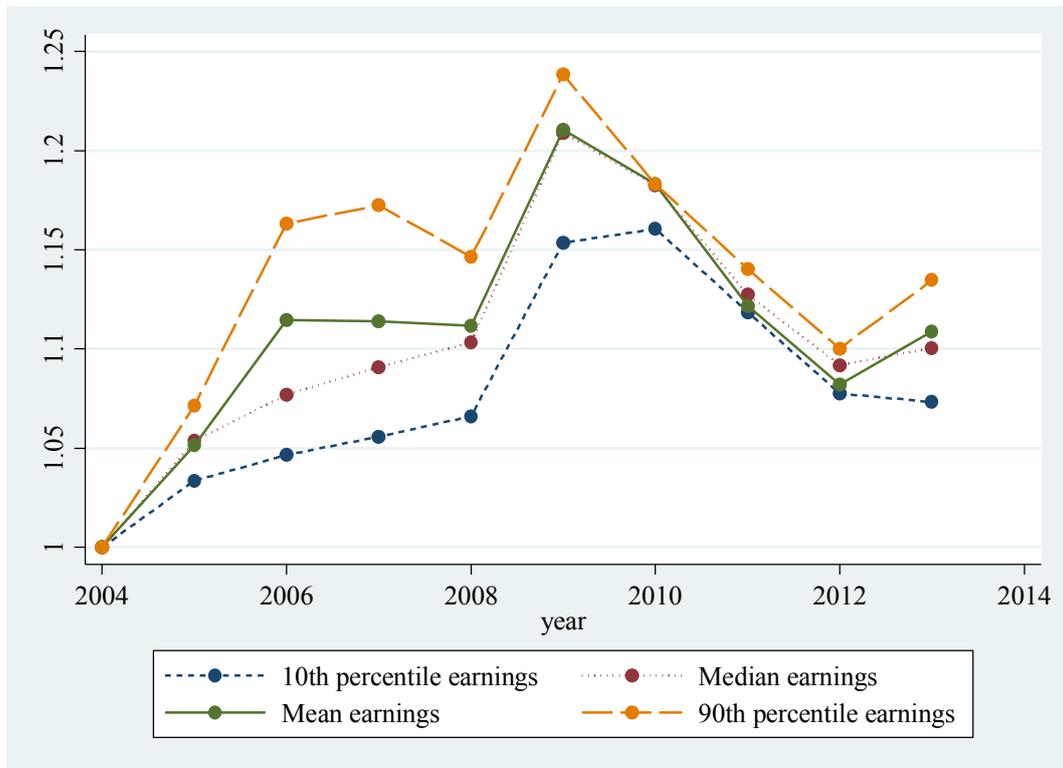


Figure 2: Decomposition of Earnings Change, 2004-2007

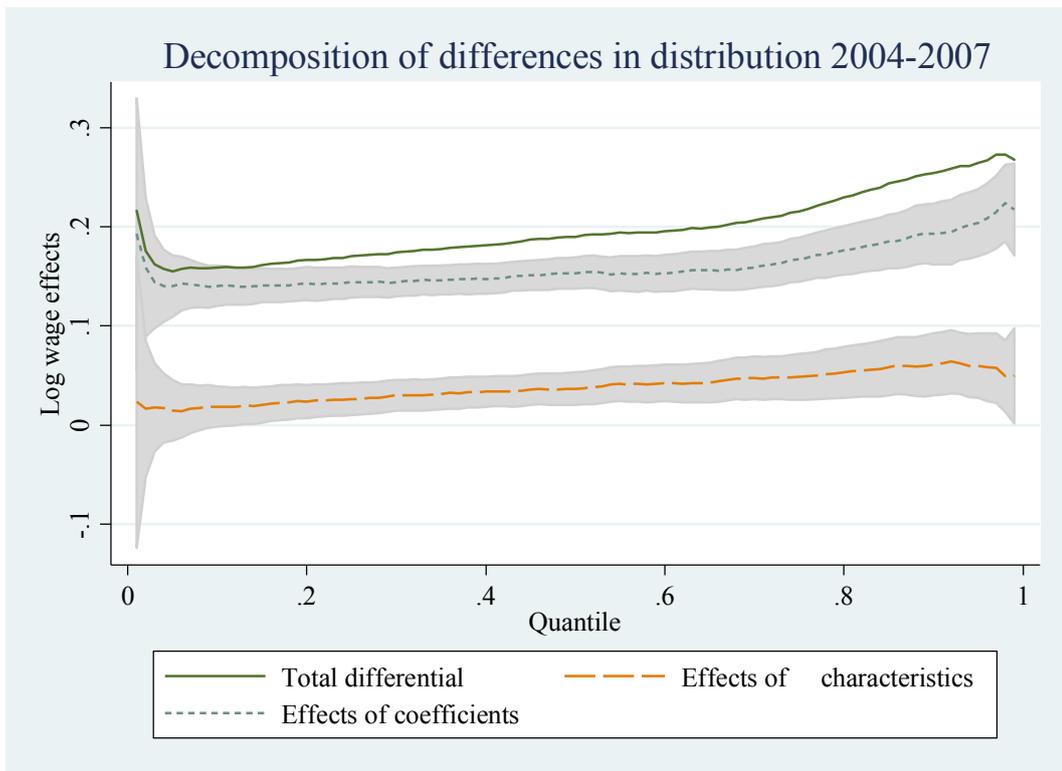


Figure 3: Decomposition of Earnings Change, 2008-2013

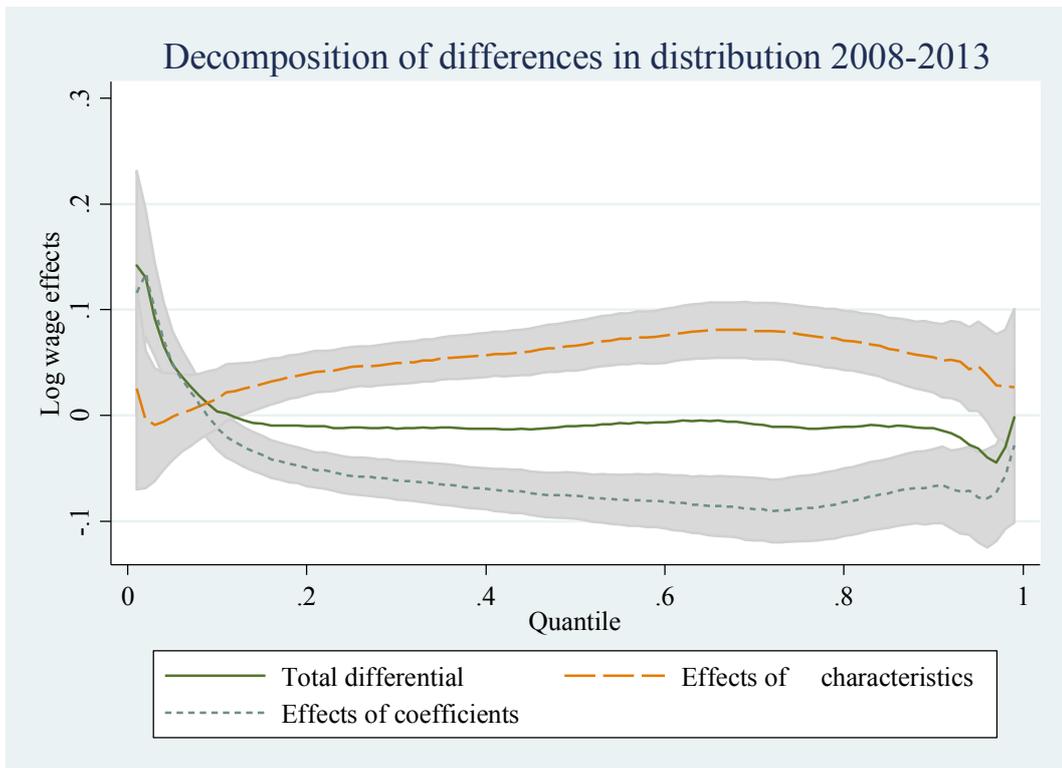


Table 1: Trends in Growth, Employment and Unemployment Rates, Ireland
2004-2013

	GDP Growth (annual %)	Unemployment Rate, (% of total labour force)
2004	4.6	4.5
2005	5.7	4.4
2006	5.5	4.5
2007	4.9	4.7
2008	-2.6	6.4
2009	-6.4	12.0
2010	-0.3	13.8
2011	2.8	14.6
2012	-0.3	14.7
2013	0.2	13.1

Table 2: Hourly Earnings, 2004-2013 (2010 Prices)

Year	Bottom Decile	Bottom Quartile	Median	Top Quartile	Top Decile	Mean	Top Decile/ Bottom Decile
2004	8.259912	10.63532	14.47916	21.04023	30.07834	17.37411	3.641484
2005	8.537887	10.99593	15.25681	22.35601	32.23341	18.26746	3.775338
2006	8.644979	11.24125	15.5953	23.55158	34.98976	19.36635	4.047409
2007	8.72093	11.15578	15.79467	23.64899	35.26572	19.35321	4.043803
2008	8.805509	11.14211	15.97646	23.79444	34.48368	19.31628	3.916149
2009	9.528585	12.18324	17.50592	26.17764	37.25129	21.03208	3.909425
2010	9.586276	12.11913	17.12094	25.37788	35.58842	20.5561	3.712434
2011	9.239918	11.29529	16.3252	24.11422	34.30154	19.48756	3.712321
2012	8.900903	10.75446	15.81015	23.17511	33.09432	18.79892	3.718086
2013	8.865866	11.03071	15.93371	23.50732	34.13185	19.26495	3.849805

Table 3: Distribution of Education in the working population, 2004-2013 (%)

	Primary	Lower Secondary	Upper Secondary	Post Leaving Cert	Third Level	N
2004	.1176316	.1917736	.2727273	.0956248	.3219806	3817
2005	.1259551	.1843727	.2615233	.0971161	.3310328	4057
2006	.1155872	.1769352	.2469721	.102159	.3583465	3798
2007	.1126721	.1761731	.2466985	.0921607	.3722956	3559
2008	.1122289	.1703867	.2420622	.0965105	.3788117	3181
2009	.0837406	.1407625	.2411209	.0922124	.4320626	3069
2010	.0831409	.1285604	.2317167	.0769823	.4568899	2598
2011	.0664308	.1175314	.2118711	.0699686	.5141509	2544
2012	.0616147	.1147309	.2248584	.0669263	.5102691	2824
2013	.0496689	.1069536	.2211921	.0738411	.5304636	3020

Table 4: Characteristics of the Workforce

	2004 P10	2008 P10	2013 P10	2004 P90	2008 P90	2013 P90	Mean 2004	Mean 2008	Mean 2013
Male	.375	.376	.371	.570	.547	.543	.510	.488	.473
Experience	19.25	20.57	19.44	25.28	26.74	24.34	21.66	24.03	21.82
Primary	.203	.172	.086	.011	.028	.003	.118	.112	.050
Lower Secondary	.302	.245	.133	.039	.022	.010	.192	.170	.107
Upper Secondary	.305	.320	.265	.110	.085	.066	.273	.242	.221
PLC	.073	.088	.123	.042	.035	.003	.096	.097	.073
Third Level	.117	.176	.368	.798	.830	.914	.322	.379	.531
Irish	.919	.843	.699	.963	.978	.950	.950	.922	.852
Urban	.630	.655	.619	.782	.758	.715	.706	.686	.644
BMW Region	.326	.276	.275	.131	.123	.166	.205	.198	.244

Table 5: Regression Results 2004, 2007, 2008 & 2013

	2004 P10	2007 P10	2008 P10	2013 P10	2004 P90	2007 P90	2008 P90	2013 P90	OLS 2004	OLS 2007	OLS 2008	OLS 2013
Male	.132 .022	.120 .031	.161 .027	.093 .023	.148 .022	.149 .028	.151 .018	.098 .041	.172 .014	.153 .015	.157 .016	.081 .017
Exp	.028 .003	.026 .004	.032 .005	.021 .003	.042 .004	.040 .004	.049 .005	.040 .004	.037 .002	.038 .002	.042 .002	.034 .003
Exp²	-.001 .0001	-.0004 .0001	-.001 .0001	-.0004 .0001	-.0006 .0001	-.0006 .0001	-.0007 .0001	-.0006 .0001	-.001 .0001	-.0006 .0001	.007 .0001	-.005 .0001
Lower Sec.	.067 .039	.054 .039	.034 .040	-.011 .030	.156 .036	.182 .068	.057 .059	-.138 .104	.132 .027	.087 .030	.058 .031	-.022 .041
Upper Sec.	.201 .036	.172 .048	.108 .048	.077 .026	.316 .038	.338 .082	.248 .074	.046 .102	.329 .027	.258 .029	.210 .031	.110 .038
PLC	.238 .039	.211 .053	.226 .056	.070 .031	.404 .032	.399 .080	.298 .089	-.052 .106	.368 .032	.329 .035	.265 .037	.078 .045
Third Level	.501 .033	.450 .053	.471 .052	.266 .037	.874 .036	.918 .065	.824 .065	.632 .098	.750 .026	.724 .029	.676 .030	.525 .036
Irish	.260 .054	.251 .058	.350 .079	.221 .031	.108 .055	.244 .039	.265 .057	.259 .031	.161 .032	.294 .029	.340 .030	.280 .024
Urban	.097 .038	.082 .030	.040 .024	.029 .021	.047 .034	.078 .035	-.018 .026	.048 .029	.089 .016	.069 .017	.047 .018	.068 .018
BMW Region	-.115 .036	-.060 .033	-.037 .030	-.047 .023	-.079 .027	-.073 .027	-.113 .036	-.078 .031	-.089 .018	-.089 .019	-.075 .020	-.075 .020
Constant	1.21 .077	1.39 .112	1.33 .124	1.68 .070	1.96 .061	1.98 .105	2.06 .072	2.29 .121	1.50 .045	1.59 .045	1.60 .047	1.83 .048