Employment Earnings Inequality in Ireland 2006 to 2010

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Contents

List of Tables

List of Figures

Executive Summary

This report analyses changes in the earnings distribution of employment income in Ireland over the period 2006-2010. Over this period, the country has experienced a significant rise in unemployment and a decline in Gross Domestic Product (GDP). This report aims to establish the impact of this period of economic turmoil on the distribution of individuals' employment earnings. Using a new administrative data source from the Central Statistics Office (CSO), based on information collected by the Revenue Commissioners, we analyse the changes in employment earnings of approximately 1.4 million people and the impact on earnings inequality as a result. The report analyses inequality from several perspectives including age, gender and the sector an individual is employed in. This allows for new insights to be gained as to how different groups in employment in Ireland have been affected over this period.

The report's key findings show that median pay for all individuals in the sample is higher in 2010 than it was in 2006 but is lower than that of the 2008 and 2009 figures. This means much of the significant gains made by lower paid workers in the years immediately before the economic crisis were eroded. Women have seen a larger increase in median pay over the period. Earnings inequality, as measured by the Gini coefficient, has decreased over the 5 years. The Gini coefficient declined consistently between 2006 and 2008 but it subsequently increased between 2008 and 2010. However, the level of inequality in 2010 (0.381) is still below its 2006 level (0.397). Thus it appears that the increase in median pay has not adversely affected earnings inequality.

Earnings inequality varies according to age. Individuals in younger age categories have experienced falling inequality in their employment earnings, individuals classed as 'middle aged' have seen no real change and those in the older age categories have seen increasing income inequality. Earnings inequality is particularly high for those in the sixty five and over category. However, this may be because social welfare pensions are not accounted for[1] and thus leads to higher earnings inequality in this group.

In terms of earnings mobility, 53% of individuals moved between earnings quintile over the period with 47% remaining in the same quintile. 48% of those who were in the bottom quintile in 2006 were in a higher quintile in 2010. Low paid workers (those who earn less than sixty percent of median earnings) account for almost a quarter of our sample, on average, each year. Females account for significantly more low paid individuals though the median pay for low paid female workers is higher than male workers.

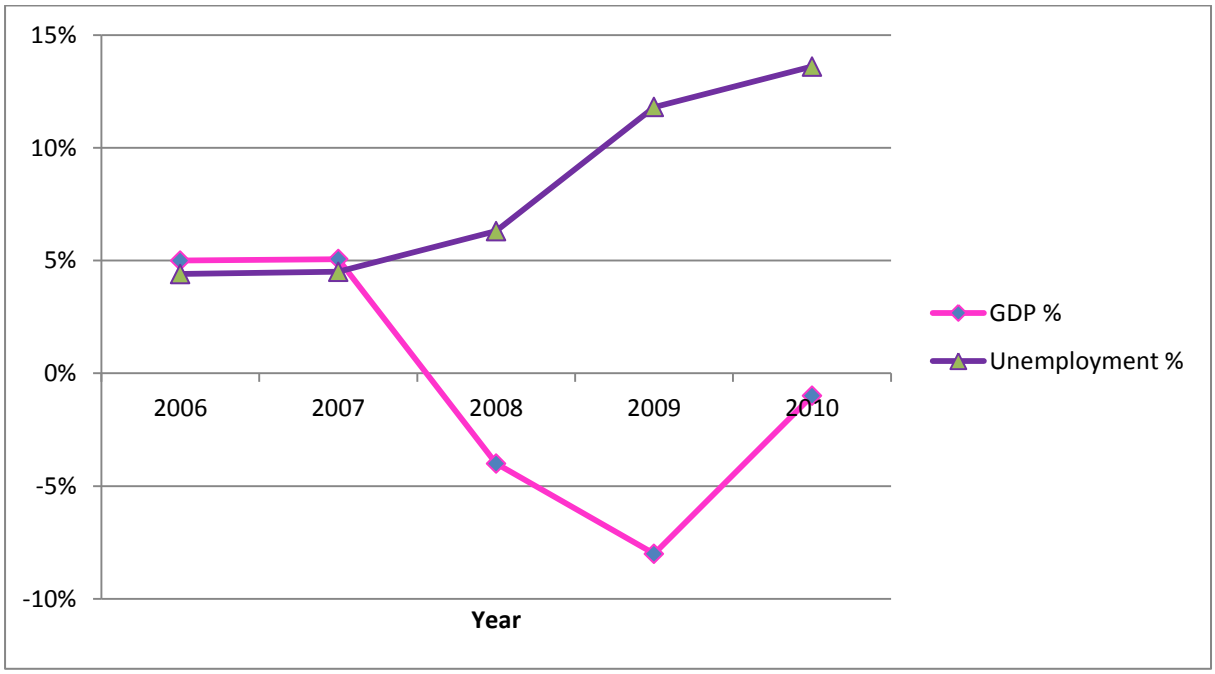
There is remarkable variation in median pay across NACE sectors. Those sectors which have more formal employment and pay terms or which are more unionised have higher levels of median pay. The sectors with higher earnings equality and lower median pay are those which are less responsive to domestic market business conditions because they are either publicly-owned and/or face little domestic competition or they are foreign-owned and do not sell into the domestic market.

[1] The P35L file does not contain data on social welfare pensions or other transfer payments.

1. Introduction

Ireland's economy is currently in a period of economic turmoil following the 'Celtic Tiger' years. The years of high economic growth have been followed by a significant decrease in Gross Domestic Product (GDP). GDP growth was 5% in 2006 but contracted by 1% in 2010. In 2009 GDP fell year on year by 8%. Unemployment also increased substantially from 4.4% in 2006 to 13.6% in 2010. Figure 1 below shows the percentage change in both GDP and the rate of unemployment in Ireland from 2006 to 2010.

Figure 1: GDP Growth and Unemployment Rate in Ireland 2006-2010



In 2008, in a very dramatic turning point, the Irish economy entered a deep recession (ESRI, 2012). During a recession, one might expect incomes to decrease as unemployment increases and companies implement cost cutting measures including wage cuts and reduced working hours. The CSO's Earnings Hours and Employment Costs Survey shows that both hours worked per week and earnings per week have decreased from quarter 1 (Q1) 2008 to quarter 4 (Q4) 2010. Hours worked fell from 32.7 hours worked in Q1 2008 to 31.8 hours worked in Q4 2010. At the same time, earnings per week fell from €704.28 in Q1 2008 to €701.93 in 2010 (CSO, 2012b). What then is the effect of this on income inequality? Income inequality measures the income distribution in an economy to see if income is generally equally distributed among all individuals or whether a small percentage of the population hold a large percentage of the income of a country. Income inequality is typically measured by the Gini coefficient[2] and this has been used previously to estimate income inequality in Ireland using data from the Survey on Income and Living Conditions (SILC) 2010, complied by the Central Statistics Office (CSO, 2012a).

[2] The Gini coefficient ranges from 0 which indicates perfect equality (i.e. everyone has equal income) to 1 which indicates perfect inequality (i.e. where one individual holds all income). More detail is provided in the Appendix.

The SILC report shows that income inequality has increased between 2009 and 2010 with an increase in the Gini coefficient from 29.3% in 2009 to 33.9% in 2010. The findings from the CSO also suggest that there has been an uneven distribution in the change that has occurred in equivalised disposable income[3] across each of the income deciles. For example in 2010, those in the lowest income decile experienced a fall in equivalised disposable income of over 26% while those in the highest income decile experienced an increase in income of more than 8%. The uneven nature of this shift is important from a policy perspective as those in the lowest income decile appear to be significantly adversely affected. Household composition also appears to have an important effect. There was a decrease in equivalised disposable income of those between the ages of 18-64 living alone and also for people who live in households with children.

The OECD (2011) have highlighted that income inequality has been increasing across most countries. This has become more apparent during the economic crisis and can have a significant social impact. Rising income inequality may mean some perceive that they are bearing a greater share of the crisis, even though they were not responsible, while perceiving those on higher incomes have not been similarly affected. This may result in social tension. Further, Wilkinson and Pickett (2010) contend that countries with higher levels of income inequality are more likely to also suffer from a wide range of social problems, including poorer educational achievement, lower life expectancy and other inferior health outcomes, higher levels of violence and crime, lower social mobility and lower levels of social trust and cohesion.

In its report, *Divided we stand: why inequality keeps rising*, the OECD (2011) highlights that the single most important factor behind the growing gap between rich and poor is greater inequality in wages and salaries. Wages and salaries account for about 75% of household income among working age adults. With the exception of 3 countries – France, Spain and Japan – the wages of the top paid 10% of workers have risen relative to the wages of the lowest paid 10% of workers from the mid-1980s to the late 2000s. The OECD (2011) reports that income inequality as measured by the Gini coefficient has increased in 17 of the 22 OECD countries between the mid-1980s and the late 2000s. Income inequality also appears to be rising in countries such as Germany, Denmark and Sweden which could have been classed as low income inequality countries.

This report is concerned with inequality in earnings and so has implications for government attempts to reduce Irish income inequality. Wilkinson and Pickett (2010: 271) argue that it is impossible for governments not to influence income differences. They do this through, for example, their role as an employer, through tax and welfare policies and through education, industrial and labour market policies.

Income equality may result from a more even distribution of pre-tax gross earnings or from redistributive taxes and transfer payments and since Wilkinson and Pickett (2010: 246) note

[3] Equivalised disposable income is household income adjusted for household composition (CSO, 2012).

"the need for redistribution depends on how unequal incomes are before taxes and benefits", this report sheds light on the extent to which redistributive policies are warranted or required.

This research measures inequality in employment income (or earnings) for individuals over the last 5 years using a unique dataset based on Revenue data available through the CSO. Income inequality is estimated across a number of categories including gender, age, and sector of employment. It is important to note from the outset that this report focuses solely on employment income; the dataset does not capture non-employment income such as the income of self-employed individuals or transfer payments. The terms 'income' and 'earnings' are used interchangeably throughout. The report begins by discussing some of the conceptual literature and previous empirical research concerning income inequality and its relationship with economic growth and income mobility. It also examines the relationship between individual characteristics, such as age and gender, and income inequality. The data and methodology used are discussed in section three while the findings are presented in section four and five. The report concludes in section six.

2. Literature Review

This section provides a brief overview of conceptual and empirical literature on income inequality. It begins with a discussion of income inequality focusing on economic growth, age and gender. Previous research on income mobility is also highlighted.

2.1 Income Inequality

Economic recessions, in general, lead to a reduction in real incomes and greater dispersion of household incomes (Jenkins et al., 2011). Earnings inequality at the bottom of the income distribution increases sharply during bad economic times (Krueger et al., 2009). This is attributable to the rise in unemployment which pushes a larger number of individuals into the bottom of the earnings distribution.

A recession leads to an increase in poverty rates. Blank and Card (1993) argue that economic growth has long been viewed as one of the most effective ways to reduce poverty. They state that the increasing labour market opportunities that are part of an economic expansion help the poor more than the rich leading to a reduction in poverty and a subsequent narrowing of the income distribution. However, Blank and Blinder (1985) note that the poor are not a homogenous population. Poverty rates, and thus income inequality, differ significantly by sex and age of head of household. They point to studies showing that households headed by females and elderly people are largely unaffected by fluctuations in the business cycle.

Work arrangements may also be a contributory factor leading to increased income inequality (OECD, 2011). This typically includes the number of hours worked. A recession may lead to a reduction in hours worked and thus a reduction in income. The OECD (2011) finds that more working hours were lost among low-wage earners than their higher paid counterparts leading to increasing earnings inequality. Changes in macroeconomic conditions may also be examined using the unemployment rate. The unemployment rate is frequently used as an

indicator of the economic cycle (Blank and Card, 1993). Unemployment is more likely to hit those at the bottom of the income distribution harder than those at the top with several empirical studies showing that unemployment has the effect of inequality increasing (Gustafsson and Johansson, 1999). The unemployment rate only summarises one aspect of the economic cycle, however. A better measure is median income (Blank and Card, 1993). The authors argue that changes in median income reflect changes in labour force participation, changes in unemployment and changes in real income, all of which vary over the business cycle.

Auten and Gee (2009) look at both income levels and changes by the age of individuals over two time periods, 1987-1996 and 1996-2005. The study includes tax payers who appeared in both time periods and were aged 25 or over in the initial year. In both periods, it is found that the median income of the 25-34 age category is far less than that of other age categories but the median income of this age category grew considerably faster than the other age categories. Hirsch, Seaks and Formby (1980) point out that some of the income inequality as measured by the Gini coefficient is related to age as there is an expectation that, in general, income will increase as age increases. Therefore it is necessary to consider that differences in income inequality may be driven by differences in the age structure of the population.

Levy and Murnane (1992) find that male workers in the United States in the early 1990s earned less in real terms than their counterparts in the mid-1960s (particularly younger men). Inequality in male earnings distribution displays polarisation: the number of men with earnings below $20,000 and men earning over $40,000 have both increased. Women experienced similar wage inequality but the proportion of women earning over $20,000 per annum increased significantly. This is supported by Gottschalk (1997) in his study of earnings inequality in the U.S. where he compares earnings inequality in the 1970s and the 1990s. He finds that while there was inequality in women's earnings it coincided with a large shift in the whole distribution from the 1970s to the 1990s; small absolute increases in earnings from women at the lowest level of earnings and much larger increases for those at the top. The author argued these changes were due to cyclical changes between the two decades; the unemployment rate was higher in the 1990s than the 1970s. Both studies find that the earnings gap between men and women declined. A potential reason for the wage gap between men and women is work arrangements i.e. the number of hours worked. While female participation in the labour market has increased, women often only work part-time and therefore earn less than their male counterparts (OECD, 2011).

2.2 Income mobility

Fields and Ok (1999) note that while there is a large body of literature on income mobility, the concept of income mobility is not very well defined. Studies have focused on different aspects of income mobility. Acs and Zimmerman (2008: 2) point out that "in no small part, economic mobility, the rate at which individuals change positions in the income distribution over time, mitigates inequality." They suggest that consideration should be given to trends in economic mobility. Overall they report that mobility rates in the US over the periods 1984-1994 and 1994-2004 did not change considerably.

Auten and Gee (2009) use income tax data to investigate income mobility in the United States. It is noted that while income inequality has been the focus of some studies, there has been less analysis of income mobility. Data from individual tax returns over the periods 1987-1996 and 1996-2005 is used. It is reported that there was significant income mobility during these time periods in the US. During the period 1996-2005, over half of the tax payers moved to a different quintile. This finding, they suggest, is consistent with previous research. Those at the very top of the income distribution were very likely to experience a change with the authors reporting that less than half of those individuals who were in the top 1% in 1996 were still there in 2005. Also in the US, Sawhill and Condon (1992) report that for the period 1967-1976, 44% of individuals in the lowest quintile moved to a higher quintile while approximately 50% of individuals in the top quintile moved to a lower quintile during the same period. This is similar to Acs and Zimmerman (2008) who report that approximately half of those in the lowest income quintile moved to a higher quintile over the periods 1984-1994 and 1994-2004.

3. Data and Methodology

An administrative data source compiled by the CSO offers the opportunity to investigate and track changes in employee earnings in Ireland from 2006 to 2010. While the Survey on Income and Living Conditions (SILC) data focuses on a relatively small sample size (12,000 individuals on average) this dataset contains information on each registered employment record from 2006 to 2010 totalling more than 10 million individual records.

The dataset used is constructed by the CSO using three separate data sources as follows:

1. P35L data source from the Revenue Commissioners on employment records
2. Client Record System (CRS) from the Department of Social Protection
3. Central Business Register (CBR) at CSO

The P35L is the primary source of data and contains a record for each registered employment in the given year. The dataset contains an Employer Registration Number for each enterprise and this facilitates merging with the CBR to assign business based attributes such as legal form and activity breakdown of the enterprise by NACE Rev. 1 and Rev2.[4] The dataset also contains the Personal Public Service Number that facilitates merging with the CRS to assign person based attributes such as gender, date of birth and nationality. The P35L file also contains information on pay and the number of weeks worked in a particular company.

The data has some limitations. Ideally, income would be measured on a post-tax and transfer basis according to Gottschalk and Smeeding (1997). It would also include cash and non-cash components. Our data source does not enable us to measure income on a post-tax basis; it is based on weekly reckonable pay which is pre-tax income. It does not allow us to look at

[4] The regulation establishing NACE Rev. 2 was adopted in December 2006 and has been used for statistics referring to economic activities performed from 1 January 2008 onwards. The major distinction between NACE Rev. 1 and NACE Rev. 2 is the latter is a more detailed description of economic activities but the codification used under both classifications is quite similar (Eurostat, 2008).

transfer payments or non-cash components as this information is not required in the P35L return. However, given that wages and salaries account for up to 75% of household income as previously stated, this data is useful for shedding light on income inequality and its sources.

The P35L file that is available for this research does not include information on occupational pensions. Occupational pensions are organised by the employer to provide pensions to employees upon retirement. These pensions are distinct from social welfare pensions which are paid by the State and are excluded from the P35L file. Individuals who are retired but receiving occupational pensions are recorded under Pay Related Social Insurance (PSRI) class K or M.[5] The majority individuals in PRSI classes K and M have been removed from the P35L file by the CSO. However, there may be a small number of individuals in class K and/or M who have been recorded as individuals with paid jobs and are thus included in this analysis. Given that this is a very small number of individuals we do not see it as a significant limitation of this research. With these factors taken into consideration, care must be taken in comparing measures of inequality with other studies using all sources of income.

While some of the existing literature analyses income inequality on a household basis this is not possible using the available data. The dataset is compiled using individual employment records; it is not possible to identify whether individuals are part of a larger household. We do not see this as a significant limitation; income inequality can also be measured on an individual basis.

Only individuals who were employed in all years from 2006 to 2010 are included in our analysis. One observation is included for each person so if a person had more than one job in a given year, their pay and the number of weeks worked was summed. This allowed one observation per individual to be included but without losing valuable information on pay or numbers of weeks worked. This left a sample of 1,406,901 individuals.

In order to analyse the data, summary statistics are initially examined to give a profile of the individuals within the dataset. These are reported in Table 1 in the next section. Mean and median income is calculated. Both are measures of central tendency of the pay distribution. The mean is a simple average of pay but can be affected by extreme values. The median is the middle value when all pay is ordered from highest to lowest and so is unaffected by extremely high or low values of pay. The average number of weeks worked is also presented. These statistics are calculated for each of the five years analysed for the dataset overall, as well as by gender. Average age (presented as age in 2006, as all other years would be this figure plus 1 year) is also included. Summary statistics are also presented by quintile. The dataset is divided into quintiles (fifths) from poorest to richest based on median pay. The bottom quintile contains the fifth of the population with the lowest earnings while the top quintile contains the fifth of the population with the highest earnings. In order to comment on the distribution of income, we analyse the aggregate number of people in each income range.

[5] www.welfare.ie/EN/Topics/PRSI/Pages/prsiclasses.aspx

In subsequent analyses in section four, where possible the dataset was broken down by gender and by age category. Section five, using a different sample, analyses the data using the NACE Rev. 2 sector variable. Further details of this sample are provided in section five. The number of weeks worked, while presented in the analysis, does not enable us to examine income inequality resulting from the number of hours worked by each individual. For example, an individual's employment record may state that they worked 48 weeks in 2006. However, the individual may have only worked on a part-time basis (e.g. 20 hours a week) but the dataset does not contain a breakdown of the hours worked. Thus, the variable, number of weeks worked, is severely limited and is thus not relied upon as an explanatory factor in our analysis.

To assess equality of income, the Gini coefficient is used. The Gini coefficient lies between zero and one where zero indicates complete equality (i.e. everybody has the exact same income) and one represents complete inequality (i.e. one person holds all the income). The Gini coefficient is also calculated by gender to establish if there is a difference in income inequality among men and among women, by age category to assess if there is a difference across ages and by NACE Rev. 2 sector to shed light on differential impacts of the crisis on sectoral pay. For more information on the Gini coefficient see Appendix 2.

Income quintiles are used to study income mobility to measure movement within the earnings distribution over the 5 years. Initially we compare a person's 'quintile position' in 2006 to their 'quintile position' in 2010, to give an indication of whether people's income relative to the rest of the dataset has changed. This is done for the entire sample as well as by gender. We also report the number of individuals that stay in the same quintile, move to a higher quintile or move to a lower quintile. This is done for the entire sample as well as by age category. Finally we analyse individuals whom we classify as low paid workers based on median pay. We have used the measure associated with 'the working poor' (those in employment at risk of poverty) to analyse low paid individuals in Ireland. The threshold level for low-paid individuals is 60% or less of median income (Hanzl-Weiß and Vidovic, 2010). However, our analysis differs somewhat from the measurement of working poor as it is done on an individual rather than a household basis. We term individuals who earn 60% or less of median income as 'low paid workers'. We examine low paid workers in terms of mean and median income and average number of weeks worked. We also look at the breakdown of low paid workers by gender.

4. Employment Income Inequality in Ireland: 2006-2010

This section outlines the key findings from our analysis. We begin by exploring summary statistics from our dataset. Table 1 describes the median pay of workers in Ireland from 2006 to 2010. The sample consists of 706,489 males and 700,412 females. Overall median pay has increased from €30,780 in 2006 to €32,930 in 2010. Median pay increased between 2006 and 2008 but decreased in 2009 and 2010. This pattern holds overall as well as for males and females separately. This decrease in earnings from 2008 to 2010 lends support to the existing

literature which finds that income decreases during an economic recession.[6] The decline in median pay from its peak in 2008 to 2010 for all individuals in the dataset is just over €2,300. While earning more on average, males have suffered a larger decrease in median pay from the 2008 peak of more than €3,400 (9.6%) while for females the decline is less than €1,000 (3.7%). The mean number of weeks worked has changed very little. It should be noted that this measure does not take the number of hours/days worked per week so we are therefore unable to distinguish between part-time and full-time workers.

Table 1: Summary pay statistics for the period 2006-2010

Total					
	2006	**2007**	**2008**	**2009**	**2010**
Mean Pay	€30,780	€34,345	€36,240	€34,608	€32,930
Median Pay	€26,391	€29,330	€30,980	€30,000	€28,669
Mean Number of Weeks Worked	46	48	48	48	46
Mean Age (in 2006)	36				
Number of Observations	1,406,901				
Male					
	2006	**2007**	**2008**	**2009**	**2010**
Mean Pay	€36,452	€40,426	€42,344	€39,728	€37,623
Median Pay	€31,460	€34,355	€35,976	€34,201	€32,507
Mean Number of Weeks Worked	46	48	49	48	46
Mean Age (in 2006)	36				
No of Observations	706,489				
Female					
	2006	**2007**	**2008**	**2009**	**2010**
Mean Pay	€25,059	€28,212	€30,083	€29,444	€28,196
Median Pay	€21,854	€24,615	€26,296	€26,136	€25,334
Mean Number of Weeks Worked	45	47	48	47	47
Mean Age (in 2006)	35				
Number of Observations	700,412				

Turning to the median pay of males and females it can be seen that the median pay for males is higher in all years. This supports existing studies which find a gender gap in earnings. However, it is not possible to say why this gap exists from this data. It may be the case that more females work on a part-time basis and so earn less money. The gap between males and females seems to have narrowed. In 2006, males earned €9,606 more than females while in 2010 this gap has narrowed to €7,173 as seen in table 2.

[6] According to the ESRI (2012) the Irish economy entered a deep recession in 2008.

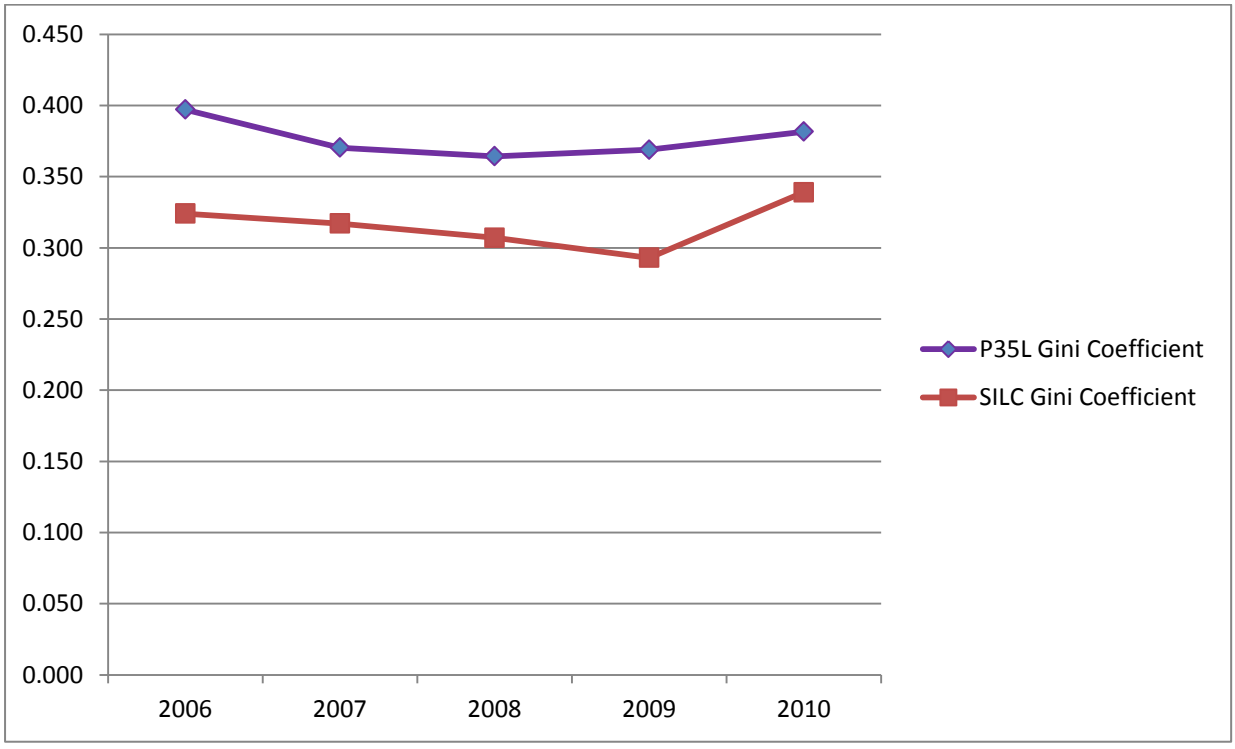
Table 2: Median Pay Difference by Gender 2006-2010

	2006	2007	2008	2009	2010
Pay Difference	€9,606	€9,740	€9,680	€8,065	€7,173
As a % of Female Median pay	44.0%	39.6%	36.8%	30.9%	28.3%

4.1 Employment Income Inequality

The Gini coefficient is the most commonly used method of measuring income inequality (World Bank, 2012). The Gini coefficient lies between zero and one where zero indicates complete equality (i.e. everybody has the same income) and one represents complete inequality (i.e. one person has all the income). More detail on how to calculate the Gini coefficient is available in the Appendix. Figure 2 below shows the Gini coefficient for all those who have a P35L file in employment in each year from 2006-2010 compared to the Gini coefficient of those in the Survey on Income and Living Conditions (SILC).

Figure 2: Gini Coefficient of Sample Population from 2006-2010



The Survey on Income and Living Conditions is a household survey on issues relating to income and living conditions in Ireland (CSO, 2010). While the SILC (2010) report includes a smaller sample population[7] and includes all forms of income (not just employment income) it is interesting to compare the Gini coefficients to shed more light on income inequality in Ireland. The Gini coefficient, using employment income, decreased from 0.397 in 2006 to 0.364 in 2008. This indicates that income inequality decreased over this period. However,

[7] The sample used in all years is typically less than 13,000 individuals and thus represents a much smaller sample than the P35L dataset. Full details of the sample size in each SILC report can be found in the reports available through the CSO website: www.cso.ie

from 2008, the Gini coefficient increased to 0.381 in 2010. This means that income inequality increased. The increasing Gini coefficient from 2008 to 2010 coincides with the economic recession in Ireland. From the literature, an economic recession is characterised by decreasing incomes, as seen in Table 1, and increasing income inequality, as seen above. The SILC report shows decreasing income inequality based on a Gini coefficient of 0.324 in 2006 to 0.293 in 2009 but a significant increase to 0.339 in 2010 from 2009. Our data shows a slightly different result with 2008 representing the turning point in income inequality. However, the biggest increase takes place from 2009 to 2010, in line with the SILC data.

Inequality can also be examined from a gender based perspective. This allows us to see if employment income inequality is greater among men or women and to what extent, if any. Table 3 below displays the Gini coefficient for males and females for each year from 2006 to 2010.

Table 3: Gini Coefficient of Men and Women from 2006-2010

	2006	2007	2008	2009	2010
Male	0.38	0.35	0.35	0.36	0.38
Female	0.39	0.36	0.36	0.36	0.37

From the table above, it can be seen that inequality among males decreased initially from 2006 to 2008 but has since returned to the level seen at the start of the study period in 2006, with the largest increase taking place from 2009 to 2010. Inequality for females, while decreasing over the five years, saw an increase in 2010 from the 2009 figure.

Employment income inequality can also be examined by age. Table 4 presents the Gini coefficient for several age group categories from 2006 to 2010.

Table 4: Gini Coefficient by Age Group Categories 2006-2010

	2006	2007	2008	2009	2010
16-20	0.43	0.38	0.36	0.38	0.38
21-25	0.34	0.29	0.28	0.30	0.31
26-30	0.30	0.28	0.28	0.30	0.32
31-35	0.32	0.31	0.32	0.33	0.35
36-40	0.36	0.35	0.35	0.36	0.37
41-45	0.37	0.36	0.36	0.36	0.37
46-50	0.37	0.36	0.36	0.36	0.37
51-55	0.38	0.37	0.37	0.38	0.39
56-60	0.40	0.40	0.40	0.40	0.43
61-65	0.45	0.45	0.45	0.46	0.52
65+	0.52	0.51	0.51	0.52	0.56

Employment income inequality is at the same level or higher for all age categories in 2010 compared to 2006, except the 16-20 and 21-25 age groups. These groups have seen a notable decline in inequality. Those aged in their 40's have seen very little change in employment income inequality and remained relatively stable over the period. This contrasts with those over 55 years of age. Table 4 shows that inequality in 2010 is 0.43 for those in the 56-60 age category while it has increased to 0.52 for the 61-65 age category. The exclusion of social welfare pensions[8] from those in the 65+ age category may explain to some extent the high levels of inequality in this group.

4.2 Employment Income Mobility: Movement between Quintiles

Exploring the movement between quintiles shows how people moved around the earnings distribution from 2006 to 2010. The population sample is divided into quintiles (fifths) from poorest to richest based on their pay. The bottom quintile contains the fifth of the population with the lowest earnings (or employment income) while the top quintile contains the fifth of the population with the highest earnings. Table 5 below illustrates the earnings distribution movement over the five years. The rows represent quintile position in 2010 and the columns represent quintile position in 2006. The numbers in each cell represent the percentage of the population in each quintile in each year. For example, 10.34% of the total sample were in the bottom quintile in 2006 and were also in the bottom quintile in 2010 and 5.03% of the total sample were in the bottom quintile in 2006 but moved to the second quintile in 2010. The cells along the diagonal represent those who remained within the same quintile. The cells to the left (below) of the diagonal represent movement to a higher quintile and the cells to the right (above) the diagonal represent movement to a lower quintile.

Table 5: Movement between quintiles from 2006-2010 (% of total)

		Quintile in 2006				
Quintile in 2010		**Bottom Quintile**	**Second Quintile**	**Third Quintile**	**Fourth Quintile**	**Top Quintile**
	Bottom Quintile	10.34	5.24	2.59	1.48	0.35
	Second Quintile	5.03	8.65	4.23	1.67	0.41
	Third Quintile	2.43	3.98	8.88	3.89	0.81
	Fourth Quintile	1.33	1.51	3.46	10.17	3.55
	Top Quintile	0.86	0.62	0.83	2.79	14.88

Approximately 10% of the sample was in the bottom quintile (i.e. lowest quintile) in 2006 and remained there is 2010. This means that of those in the bottom quintile in 2006, about 52% of individuals remained in the bottom quintile in 2010, while 48% of those individuals

[8] Social welfare pensions are not included in the P35L file as it is not paid by the employer.

moved to a higher quintile. For those remaining in the bottom quintile, this means that while their earnings could have increased over the 5 years, they are still at the bottom of the earnings distribution. Less than 1% of the sample was in the bottom quintile in 2006 and moved to the top quintile in 2010. About 57% of those in the second quintile in 2006 moved to a different quintile in 2010; 26% moved to a lower quintile, 43% remained in that quintile and 30% moved to a higher quintile. In the third quintile, about 44% of individuals in this quintile in 2006 remained in that same quintile in 2010. The other 56% moved to another quintile; 34% moved to a lower quintile while approximately 22% moved to a higher quintile. With regards to the forth quintile, 51% of individuals who were in this quintile in 2006 remained there in 2010. Of those who moved, 14% moved to a higher quintile while 35% moved to a lower quintile.

Finally in terms of the top quintile, we see that about three quarters of individuals who were in the top quintile in 2006 remained there in 2010, implying that about 25% of individuals moved to a lower quintile – mostly to the forth quintile. This implies that there is less mobility in the top quintile. These findings in relation to the lower quintiles support those of Acs and Zimmerman (2008). As mentioned earlier, they report that approximately half of those in the lowest income quintile moved to a higher quintile over the periods 1984-1994 and 1994-2004. However, Auten and Gee (2009) report significant movement in the top 1% of earners with less than half of those individuals who were in the top 1% in 1996 were still there in 2005. While this report examines quintiles, we do not find such significant movement for those in the top quintile. By summing the cells along the diagonal it can be seen that 53% of individuals remained in the same quintile between 2006 and 2010. A total of 22.8% of individuals moved to a higher quintile and 24.2% of individuals moved to a lower quintile.

The earnings distribution of the population can also be examined on the basis of gender as seen in Table 6.

Table 6: Movement between quintiles based on gender from 2006-2010 (% of total)

Males		Quintile in 2006				
Quintile in 2010		**Bottom Quintile**	**Second Quintile**	**Third Quintile**	**Fourth Quintile**	**Top Quintile**
	Bottom Quintile	6.65	3.89	2.30	1.25	0.38
	Second Quintile	4.00	6.25	3.54	1.51	0.45
	Third Quintile	2.70	3.92	8.42	3.80	0.86
	Fourth Quintile	1.84	1.81	3.94	11.26	4.12
	Top Quintile	1.24	0.88	1.06	3.43	20.50

Females		Quintile in 2006				
Quintile in 2010		**Bottom Quintile**	**Second Quintile**	**Third Quintile**	**Fourth Quintile**	**Top Quintile**
	Bottom Quintile	14.06	6.60	2.88	1.71	0.32
	Second Quintile	6.07	11.08	4.93	1.84	0.37
	Third Quintile	2.16	4.05	9.34	3.98	0.76
	Fourth Quintile	0.83	0.21	2.99	9.07	2.98
	Top Quintile	0.48	0.35	0.60	2.14	9.21

It can be seen from the diagonal in the first part of Table 6 that the majority of men remained in the same earnings quintile in 2010 relative to their position in 2006 (53.1%). Approximately 16% of men who were in the fourth quintile in 2006 moved to the highest quintile in 2010 while just over 20% fell to the fourth quintile from the top quintile in 2010 relative to 2006. The earnings distribution of females paints a similar picture; the majority of women remained in the same quintile in 2010 compared to their position in 2006 (52.8%). Almost 60% of females who were in the bottom quintile in 2006 remained there in 2010. A further 26% of women moved to the second quintile from the bottom quintile in 2010 implying a very small number of women moved from the lower quintiles to the higher quintiles over the five years. Around 9% of all women in the sample were in the top quintile in 2006 and remained there in 2010. This contrasts with the corresponding figure for males, where we see that over 20% of males in the sample were in the top quintile in 2006 and 2010. It appears that an individual's position in the earnings distribution in 2010 is very much shaped by their position in 2006. Over 50% of individuals, both male and female, are likely to remain in the same quintile when comparing the two years.

Table 7 presents the median pay per earnings quintile. Appendix 1 contains a more comprehensive breakdown of median pay, average age, number of males and females and average weeks worked by males and females for each quintile for each year.

Table 7: Median pay by quintile and percentage change 2006-2010

	Median pay 2006	Median pay 2007	Median pay 2008	Median pay 2009	Median pay 2010	% change 2006-08	% change 2008-10	% change 2006-10
Bottom Quintile	€5,909	€8,977	€10,032	€8,795	€7,227	+70%	-28%	+22%
Second Quintile	€16,986	€20,351	€21,830	€20,622	€19,125	+29%	-12%	+13%
Third Quintile	€26,391	€29,330	€30,981	€30,000	€28,669	+17%	-8%	+9%
Fourth Quintile	€37,228	€40,334	€42,369	€41,121	€39,545	+14%	-7%	+6%
Top Quintile	€58,569	€63,059	€65,946	€63,304	€60,698	+13%	-8%	+4%
Full Sample	€26,391	€29,330	€30,980	€30,000	€28,669	+17%	-8%	+9%

It can be seen that median income has increased for all quintiles across the five year study period. Median pay for the full sample increased by 9%, with the largest rises seen in the lower quintiles. The bottom and second quintile increased by 22% and 13% respectively. However, it can be seen that there are two distinct periods between 2006 and 2010. From 2006 to 2010, median pay for those in the bottom quintile increased by 70% and for those in the second quintile by 29%. This was significantly higher than the increase experienced by higher paid employees, whose median earnings rose by between 13% and 17%. While lower paid employees experienced a greater increase in the years to 2008, they also suffered a much greater decline in median earnings during the recessionary period from 2008 to 2010. While median earnings for the higher quintiles fell by less than 10%, the bottom quintile saw a reduction in median income of 28% between 2008 and 2010.

This means some of the significant gains made by lower paid workers in the years immediately before the economic crisis were eroded.

Table 8 below examines the extent to which there has been a movement, if any, between quintiles across the years 2006 and 2010. The table examines this movement for the entire sample and also by gender and age category. We can see that just over half (744,417) of the sample remained in the same quintile in 2010 as they were in in 2006. Overall, slightly more individuals moved to a higher quintile (340,900) than moved to a lower quintile (321,584). In terms of gender, females were marginally more likely to move to a higher quintile than males (26% compared to 22%). This is consistent with the finding earlier on the narrowing of median income gaps between males and females.

With regard to age, we can see a similar pattern across many age categories – a substantial number of people remained in the same quintile in 2010 as they were in in 2006. There is a clear pattern that employment income mobility declines (a higher proportion in the same quintile) as age increases, with the exception of the 61-65 age category when a sizeable number (46%) move to a lower quintile. This age category includes individuals who reached retirement age during the period of the study and, while they remained in employment, many will have reduced their work hours and subsequently their income.

One category which saw a larger number of people moving to a higher quintile was the 21-25 age category. Approximately 44% of this age group moved to a higher quintile. This may be attributable to individuals in this age category at the beginning of the study period that move from part-time employment while studying or in graduate entry positions after college. These individuals, who by their inclusion in the data are still in employment, would have progressed to more highly paid roles or full-time positions.

Table 8: Quintile changes between 2006 and 2010 by full sample, gender and age

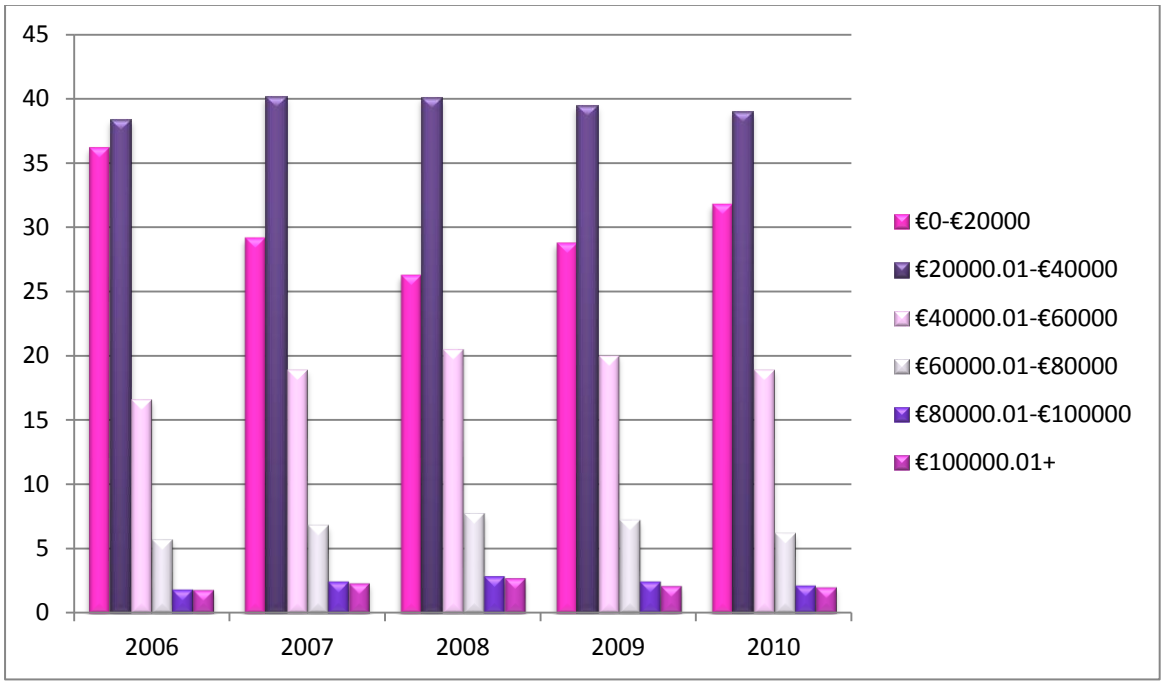
	Same Quintile		Move to lower quintile		Move to higher quintile	
Overall (number)	744,417	53%	321,584	23%	340,900	24%
Male (number)	374,887	53%	175,458	25%	156,144	22%
Female (number)	369,530	53%	146,126	21%	184,756	26%
Age Category						
16-20 years	54,568	51%	8,200	8%	43,612	41%
21-25 years	77,863	37%	40,307	19%	92,156	44%
26-30 years	107,880	46%	59,016	25%	70,093	30%
31-35 years	109,962	54%	53,333	26%	41,732	20%
36-40 years	98,694	58%	39,943	24%	30,746	18%
41-45 years	95,158	62%	33,507	22%	25,252	16%
46-50 years	84,361	64%	29,686	22%	18,394	14%
51-55 years	63,640	63%	26,040	26%	11,343	11%
56-60 years	38,160	59%	20,143	31%	5,942	9%
61-65 years	9,700	48%	9,339	46%	1,314	6%
66+ years	4,431	65%	2,070	30%	316	5%

4.3 Employment Income Earned by Range

According to the CSO (2010) average hourly earnings stood at €22.07 and the average weekly hours paid was 31.8 hours at the end of quarter four in 2010. This means that average weekly earnings was approximately €702 in 2010. If we assume that the average individual works 50 weeks per annum this means that the average annual income of individuals in 2010

was €35,100. Using the P35L file, we examine employment incomes earned by range from 2006 to 2010 to establish the distribution of employment income as shown in Figure 3.

Figure 3: Employment Incomes earned by Range 2006-2010



Most individuals in Ireland earned less than €40,000 per annum from employment over the five year period. The highest number of individuals falls into the €20-40,000 income range bracket. Within this income bracket more individuals earn between €20,000 and €30,000 than those earning between €30,000 and €40,000 (approximately 3% more per annum on average). The graph shows that incomes increased from 2006 to 2008 with the percentage in the lowest income bracket decreasing and all other income brackets displaying increasing percentages. However, since 2008 there has been a decrease in incomes earned with a larger decrease evident in 2010. A larger percentage of individuals fell into the lowest income range while the percentage of individuals in all other income brackets decreased.

4.4 Low paid workers

According to the European Council (2005) being employed significantly reduces the risk of poverty. However, some individuals are still seen at risk of poverty even when they are in employment. Existing studies focus on identifying the working poor as a measure of those in employment at risk of poverty. The European Working Conditions Observatory (2010) calculates working poor using the employment status of the individual and the income status of the household in which that individual resides. Thus, individuals in full-time employment are classified as working poor if their household earns less than 60% of the median earnings of all those in full-time employment. Our dataset does not permit us to identify the extent of working poor because it does not contain information on household income. However, given

the limitations of our data, for the purpose of this study we examine individuals who earn less than 60% of median earnings of all individuals in our sample. These individuals may be at risk of poverty. Thus, individuals who earn 60% or less of median employment income are deemed to be low paid workers in this research.

Table 9 shows the number and percentage of low paid individuals in Ireland on an annual basis from 2006 to 2010. On average over the five years approximately one quarter of those in employment are classified as low paid workers. This means that they earn 60% or less of the median employment income of all individuals in this research. However, contrary to what may be expected, the number of low paid individuals has decreased marginally over the course of the economic downturn in Ireland. This cannot be explained by a decrease in median pay as this figure is higher in 2010 than it was in 2006 (see Table 1). In 2006, over 390,000 people were low paid while in 2010 this figure had fallen to almost 370,000 people. In terms of the median pay of these individuals it is higher in 2010 than it was in 2006 though it had fallen from a high in 2008.

We may also examine low paid individuals from a gender perspective to see if it is men or women who are more likely to fall into this category. The number of men who are classified as low paid workers fell considerably between 2006 and 2008 from 141,565 to 111,691. However it has subsequently increased to 149,968 in 2010. Interestingly, the number of low paid females has fallen every year except for 2010 which saw a slight increase. However, a larger percentage of female workers are categorised as low-paid.

Table 9: Low Paid Individuals in Ireland 2006-2010

	2006	2007	2008	2009	2010
Total					
Number of low paid individuals	390,332	340,535	331,901	347,981	369,152
Percentage (of all individuals)	28%	24%	24%	25%	26%
Mean Pay	€8,093	€10,020	€10,806	€9,993	€8,999
Median Pay	€8,067	€10,410	€11,335	€10,400	€9,286
Median Pay per weeks worked	€244	€267	€291	€274	€273
Standard deviation (pay)	€4,498	€4,800	€5,062	€5,040	€4,979
Mean weeks worked	33	39	39	38	34
Mean age	31	33	35	37	39
Male					
Number of low paid males	141,565	113,735	111,691	131,126	149,968
Percentage (of all males)	20%	16%	16%	19%	21%
Mean Pay	€8,049	€9,984	€10,805	€9,750	€8,681
Median Pay	€8,005	€10,440	€11,495	€10,198	€8,882
Median Pay per weeks worked	€267	€298	€319	€309	€296
Standard deviation (pay)	€4,550	€4,916	€5,222	€5,204	€5,076
Mean weeks worked	30	35	36	33	30
Mean age	29	31	33	35	38
Female					
Number of low paid females	248,767	226,800	220,210	216,855	219,184
Percentage (of all females)	36%	32%	31%	31%	31%
Mean Pay	€8,118	€10,038	€10,806	€10,140	€9,217
Median Pay	€8,099	€10,400	€11,261	€10,517	€9,549
Median Pay per weeks worked	€225	€260	€275	€263	€258
Standard deviation (pay)	€4,468	€4,741	€4,979	€4,932	€4,900
Mean weeks worked	36	40	41	40	37
Mean age	33	35	36	38	39

5. Sectoral Analysis

The dataset allows us to analyse employment income inequality on a sectoral basis as all individuals are assigned a NACE Rev. 2 code which represents the economic activity of the sector in which they are employed. For example, NACE Rev. 2 code B refers to all mining and quarrying activities in Ireland. Within NACE Rev. 2 code B mining and quarrying activities can be further disaggregated to reflect more specific activities within the sector. NACE code B05.1, for example, is mining of hard coal. For the purposes of this report, the sectoral analysis is conducted at the more aggregated level to establish the extent of income inequality across different sectors. Appendix 3 presents the NACE Rev. 2 sectors that are used in this report.

It is important to note here that the sectoral analysis is not comparable to the previous tables as it does not use the same sample population. In the dataset individuals are assigned a NACE Rev. 2 code to reflect the sector in which they work. However, an individual may work in more than one sector in any year. To ensure that all employment records for all sectors are captured we could not sum individuals' pay and weeks worked as previously done. If that approach was adopted here, valuable sector-level information would have been lost as all individuals would have been assigned only one NACE Rev. 2 code which may not accurately reflect their employment records over the five years. Instead, median pay and income inequality are calculated on a sectoral basis where all sector level information is captured i.e. median pay per sector not per individual.

The dataset contained individuals that were not assigned a NACE Rev. 2 code. As there was no way of knowing what sector they were employed in these individuals were excluded from the analysis. The total number of observations in each year, those who did not have a NACE code assigned to them and the resulting sample size after these individuals were removed is shown in Table 10.

Table 10: Adjusted Sample for missing NACE Rev. 2 Code

	2006	2007	2008	2009	2010
Total observations	2,776,006	2,958,235	2,834,984	2,444,565	2,329,216
No. of individuals unassigned NACE Rev. 2 code	51,230	64,183	52,877	21,488	18,796
Adjusted sample for missing NACE Rev. 2 code	2,724,776	2,894,052	2,782,107	2,423,077	2,310,420

Table 11 presents median pay for various sectors from 2006 to 2010. The last category, 'other', includes all individuals who are not included in categories B to N (excluding K) and ranges from a low of 858,785 employees in 2006 to a high of 909,857 in 2008. The data shows that there are large differences in the median pay of individuals depending on the sector in which they are employed. For example, individuals in sector D (*Electricity, gas, steam and air conditioning supply)* earn substantially more than individuals in sector I (*Accommodation and food service activities*). In all sectors, median pay in 2010 is higher than in 2006. For some sectors, median pay was higher in the intervening years of 2007 to 2009 compared to 2010. This no doubt reflects the worsening economic conditions over the latter part of the period. However, some sectors, such as sector L (*Real estate activities),* display increasing median pay over the whole period, albeit relatively small increases.

Table 11: Sectoral Median Pay 2006-2010

NACE Rev. 2 Code		2006	2007	2008	2009	2010	% Change in median pay
Mining & Quarrying (B)	Median Pay	€31,304	€32,182	€33,332	€31,493	€32,870	+5%
	Weeks	40	40	41	40	42	
	Median Pay per week	€783	€805	€813	€787	€783	
Manufacturing (C)	Median Pay	€23,269	€24,364	€26,093	€26,750	€26,746	+15%
	Weeks	39	39	41	42	42	
	Median Pay per week	€597	€625	€636	€637	€637	
Electricity, gas, steam and air conditioning supply (D)	Median Pay	€56,003	€56,924	€60,240	€59,208	€58,493	+4%
	Weeks	46	47	46	46	45	
	Median Pay per week	€1,217	€1,211	€1,310	€1,287	€1,300	
Water supply (E)	Median Pay	€18,655	€20,541	€22,692	€22,819	€23,149	+24%
	Weeks	35	36	37	38	40	
	Median Pay per week	€533	€571	€613	€601	€579	
Construction (F)	Median Pay	€15,750	€17,322	€18,293	€17,225	€15,891	+0.9%
	Weeks	32	33	33	33	33	
	Median Pay per week	€492	€525	€554	€522	€482	
Wholesale and retail trade (G)	Median Pay	€10,210	€10,576	€12,778	€14,560	€14,468	+42%
	Weeks	33	33	35	38	38	
	Median Pay per week	€309	€320	€365	€383	€381	
Transportation and storage (H)	Median Pay	€20,863	€21,391	€23,123	€24,487	€24,221	+16%
	Weeks	37	37	39	40	41	
	Median Pay per week	€564	€578	€593	€612	€591	
Accommodation and food service activities (I)	Median Pay	€5,116	€5,600	€6,268	€7,220	€6,911	+35%
	Weeks	26	26	28	31	31	
	Median Pay per week	€197	€215	€224	€233	€223	
Information and communication (J)	Median Pay	€25,807	€27,481	€29,000	€30,807	€31,028	+20%
	Weeks	36	37	37	38	38	
	Median Pay per week	€717	€743	€784	€811	€817	
Real estate activities (L)	Median Pay	€13,570	€14,224	€14,464	€14,872	€15,789	+16%
	Weeks	34	34	34	36	38	
	Median Pay per week	€399	€418	€425	€413	€416	
Professional, scientific and technical activities (M)	Median Pay	€18,794	€19,613	€22,000	€22,380	€21,920	+17%
	Weeks	35	35	36	38	38	
	Median Pay per week	€537	€560	€611	€589	€577	
Administrative support and service activities (N)	Median Pay	€5,854	€5,885	€6,711	€7,305	€8,248	+41%
	Weeks	24	23	25	27	29	
	Median Pay per week	€244	€256	€268	€271	€284	
Other	Median Pay	€19,719	€21,837	€23,550	€25,300	€24,067	+22%
	Weeks	37	38	38	40	40	
	Median Pay per week	€533	€575	€620	€633	€602	

There is remarkable variation in median pay across NACE sectors. Sector D (*Electricity, gas, steam and air conditioning supply*) stands out with almost double the median pay of the next highest paid sector (B – *Mining and Quarrying*), which is a very small sector in terms of numbers employed. The sector is characterised by large, state-owned enterprises operating in the electricity and gas markets.

The next highest paid sector in 2010 is sector J (*Information and Communication*) which has a median pay level of €31,028. This sector is characterised by a sizeable level of employment in Irish branches of multinational corporations. The level of pay is likely to be responsive to international trading conditions as much as the slowdown of the domestic economy, since these businesses are unlikely to sell product into the Irish market on a significant scale. This may also explain the relatively high level of median pay in the sector C (*Manufacturing*).

It is also notable that the *Other* sector has a relatively high median pay. The analysis presented in this paper categorises employment by NACE Rev 2 sector. It is not possible to analyse the data by public and private sector employees since this has not been coded in the data. It would be possible to identify public sector workers by their PRSI class, but this has not been released with the data file.

It is possible however to infer from the NACE codes which sectors are predominately public. Appendix 4 contains an analysis of numbers employed in the population by NACE Rev 2 sector in 2008. This can help identify sectors, for example, sectors D and E - *Electricity, gas, water supply and waste management*, which are largely composed of workers in semi-state companies such as ESB and Bord Gais. According to their annual reports they had almost 9,000 workers in 2008, which corresponds to almost two thirds of the numbers employed in Sectors D and E.

The other sector that is predominately public is the Sector referred to as *Other* in Table 10. It can be seen in the table above that the other sectors not separately identified in Table 10 are Sector O - *Public administration and defence; compulsory social security*, Sector P – *Education*, Sector Q – *Human health and social work activities* and Sectors R and S – *Arts, entertainment, recreation and other service activities.* The first three of these are likely to be dominated by public sector employees. Those three sectors account for 89% of the numbers employed in the *Other* sector of Table 10.

It is possible then to infer which sectors are dominated by public sector employees and the level of earnings inequality in these sectors relative to the others can provide some evidence of the differential experiences of public and private sector workers.

These findings suggest that those sectors which have more formal employment and pay terms, with, for example, set salary scales for positions, or which are more unionised have higher levels of median pay. The sectors mentioned above are those which are less responsive to domestic market business conditions because they are either publicly-owned and/or face little domestic competition or they are foreign-owned and do not sell into the domestic market.

The construction sector (F) has generated significant discussion and interest in the media since the onset of the recession. Interestingly, our data shows that the median pay in this sector hasn't dramatically changed from 2006 to 2010. While median pay increased in 2007 and 2008 it decreased in 2009 and 2010. While this data focuses only on those individuals who remain in employment in the construction sector over the period it points to the fact that those employed in the sector haven't seen a dramatic decrease in their median pay. It should be noted that a feature of the construction sector is the use of contractors who are not directly employed by developers. Many of these contractors would be self-employed and so not included in the data for this study. The apprentices or labourers employed by developers and contractors would be registered as employees and therefore included.

It is notable that the lowest paid sectors (I - *Accommodation and food service activities*, N – *Administrative and support services activities* and G – *Wholesale and retail trade*) are characterised by part-time and minimum wage employment and have the lowest relative weeks worked in our sample. The sectoral level information can also be utilised to study employment income inequality among sectors. Employment income inequality for each sector and year, using the Gini coefficient, is displayed in Table 12.

Table 12: Sectoral level Gini coefficients 2006-2010

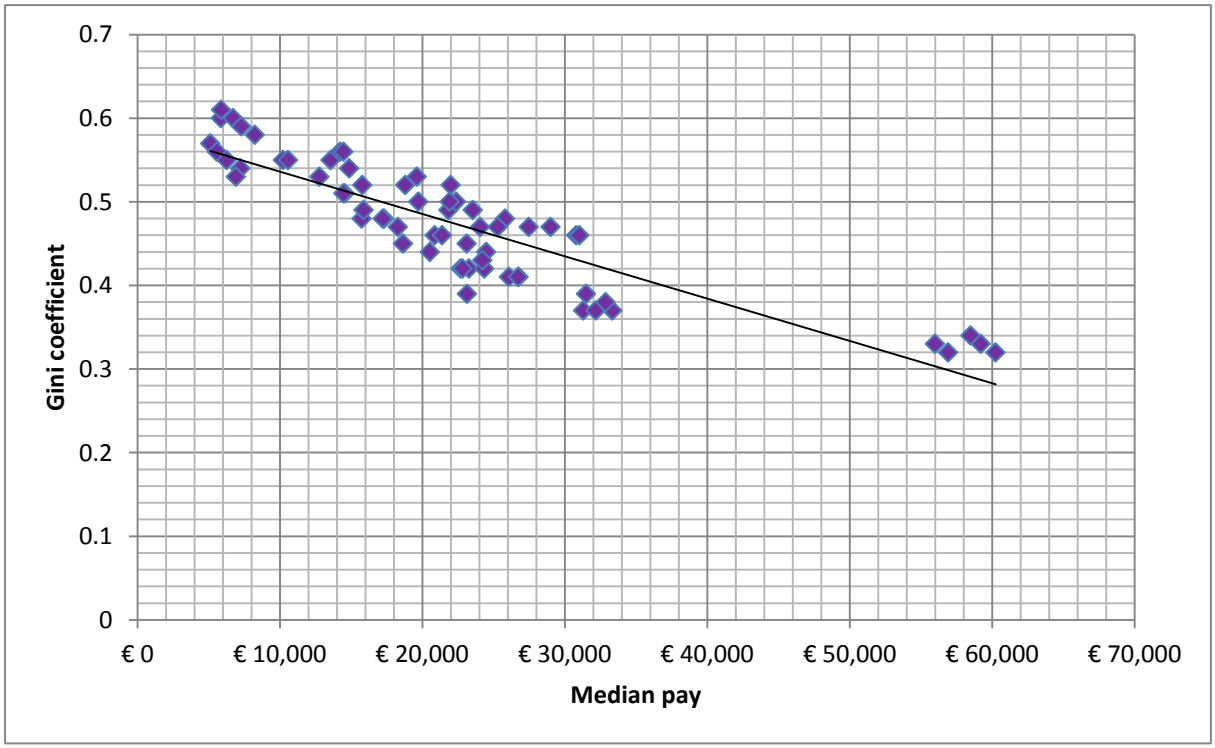
NACE Rev. 2 Code	2006	2007	2008	2009	2010
Mining & Quarrying (B)	0.37	0.37	0.37	0.39	0.38
Manufacturing (C)	0.42	0.42	0.41	0.41	0.41
Electricity, gas, steam and air conditioning supply (D)	0.33	0.32	0.32	0.33	0.34
Water supply (E)	0.45	0.44	0.42	0.42	0.39
Construction (F)	0.48	0.48	0.47	0.48	0.49
Wholesale and retail trade (G)	0.55	0.55	0.53	0.51	0.51
Transportation and storage (H)	0.46	0.46	0.45	0.44	0.43
Accommodation and food service activities (I)	0.57	0.56	0.55	0.54	0.53
Information and communication (J)	0.48	0.47	0.47	0.46	0.46
Real estate activities (L)	0.55	0.56	0.56	0.54	0.52
Professional, scientific and technical activities (M)	0.52	0.53	0.52	0.50	0.50
Administrative support and service activities (N)	0.60	0.61	0.60	0.59	0.58
Other	0.50	0.49	0.49	0.47	0.47

Most sectors show a slight decrease in inequality. However, for some sectors, employment income inequality is quite high. The highest employment income inequality is seen in sector N (*Administrative support and service activities*), followed by sector I (*Accommodation and food service activities*). These two sectors account for the lowest median pay in our sample. This might be explained in part by the average weeks worked in both sectors which is below that of other sectors. The average weeks worked in sector N (*Administrative support and service activities*) has increased from 24 weeks in 2006 to 29 weeks in 2010 while sector I (*Accommodation and food service activities*) has seen an increase from 26 weeks in 2006 to

31 weeks in 2010. This is generally less than the average weeks worked in the other sectors, as can be seen in Table 11, and may thus explain some of the difference in sectoral median pay.

There is a negative relationship between the median pay and employment income inequality across sectors. This can be seen in Figure 4. This illustrates that those sectors characterised by higher levels of median pay have lower levels of employment income inequality. This may be explained by stronger employee representation in those sectors or more formally applied employment terms and conditions, such as the payment of increments, which compress earnings at different grades in the sector. If a trade-off exists between higher levels of pay and greater employment income inequality this has important implications for policy.

Figure 4: Median Pay and Gini Coefficient of Employment Income Inequality by Sector 2006-2010



6. Conclusions

The economic recession in Ireland has led to increased employment income inequality among individuals. Median pay in 2010 is higher than that of 2006 for all individuals. A gender pay gap exists in Ireland with males earning just over €7,000 more than their female counterparts in 2010. Our finding of a gender pay gap supports existing literature in the area. There is some evidence of employment income mobility in Ireland over the five year period. Most of the movement between quintiles shows that the majority of individuals move one quintile whether it's a quintile above or below their quintile in 2006. Very few individuals see a dramatic change in their quintile position. The individual's position in 2010 appears to be most significantly conditioned by their position in 2006.

There are a greater number of females than males who are classified as low-paid workers, although the number of females in this group has decreased over the 5 year period. The sectoral analysis shows that median pay varies substantially according to the sector in which the individual is employed. The less exposed the sector is to domestic demand conditions the higher is median pay. There appears to be a negative relationship between employment income inequality and median pay.

7. Further Research

The area of employment income inequality in Ireland provides a range of further research opportunities. While this report has explored employment income inequality at a broad sectoral level this could be examined at a more disaggregated level. The P35L file does not separate individuals according to whether they work in the public or private sector but proxies for both sectors may be used to see the extent of income inequality. Employment income mobility may also be studied at a sectoral level to see if individuals move between sectors and the effect on their employment income. This may have implications for government policies on up-skilling and job training if individuals do move/do not move between sectors.

References

Acs, G. & Zimmerman, S. 2008. US intragenerational economic mobility from 1984 to 2004: Trends and implications. *The Economic mobility project*.

Auten, G. & Gee, G. 2006. Income mobility in the United States: New evidence from income tax data. National Tax Journal, LX11(2), 301-328.

Blank, R. M. & Blinder, A. S. 1985. Macroeconomics, income distribution, and poverty. National Bureau of Economic Research Working Paper No. 1567, Cambridge, Mass., USA.

Blank, R. M., Card, D., Levy, F. & Medoff, J. L. 1993. Poverty, income distribution, and growth: Are they still connected? *Brookings Papers on Economic Activity*, 1993**,** 285-339.

CSO, 2012a. Survey on Income and Living Conditions (SILC) 2010. Available online at http://www.cso.ie/en/media/csoie/releasespublications/documents/silc/2010/silc_2010.pdf [Accessed 03/09/2012].

CSO, 2012b. Employment, Hours and Earnings by Type of Employee, Statistic, Industry Sector NACE Rev 2 and Quarter. Available online at http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=EHQ11&PLanguage=0 [Accessed 21/09/2012].

CSO, 2010. Earnings and Labour Costs. Available online at http://www.cso.ie/quicktables/GetQuickTables.aspx?FileName=EHQ03.asp&TableName=Earnings+and+Labour+Costs&StatisticalProduct=DB_EH. [Accessed 21/08/2012].

ESRI, 2012. Irish Economy. Available online at http://www.esri.ie/irish_economy/ [Accessed 23/08/2012].

European Working Conditions Observatory, 2010. Working poor in Europe. Available online at http://www.eurofound.europa.eu/ewco/studies/tn0910026s/tn0910026s_1.htm. [Accessed 23/08/2012].

Eurostat, 2008. NACE Rev. 2 Statistical classification of economic activities in the European Community. Available online at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-07-015/EN/KS-RA-07-015-EN.PDF [Accessed 13/09/2012]

Fields, G. & Ok, E. 1999. The measurement of income mobility: An introduction to the literature. [Electronic version]. In J. Silber (Ed.) *Handbook on income inequality measurement* (pp. 557-596). Norwell, MA: Kluwer Academic Publishers.

Gottschalk, P. & Smeeding, T. M. 1997. Cross-National Comparisons of Earnings and Income Inequality. *Journal of Economic Literature*, 35**,** 633-687.

Gottschalk, P. 1997. Inequality, income growth, and mobility: The basic facts. *The Journal of Economic Perspectives*, 11**,** 21-40.

Gustafsson, B. & Johansson, M. 1999. In Search of Smoking Guns: What Makes Income Inequality Vary over Time in Different Countries? *American Sociological Review,* 64**,** 585-605.

Hanzl-Weiß, D., Vidovic, H. & Sanoussi, F. 2010. Working poor in Europe. *European Foundation for the Improvement of Living and Working Conditions.* Available online at http://www.eurofound.europa.eu/pubdocs/2010/25/en/2/EF1025EN.pdf [Accessed 28/08/2012]

Hirsch, B. Seaks, T. Formby, J. 1980. Inter-age and intra-age income inequality: A cross sectional analysis. *Southern Economic Journal.* 46(4), 1187-1196.

Jenkins, S., Brandolini, A., Micklewright, J. & Nolan, B. 2011. The Great Recession and the Distribution of Household Income. Available online at http://www.frdb.org/upload/file/report_1_palermo.pdf

Krueger, D., Perri, F., Pistaferri, L. & Violante, G. L. 2010. Cross-sectional facts for macroeconomists. *Review of Economic Dynamics,* 13**,** 1-14.

Levy, F. & Murnane, R. J. 1992. US earnings levels and earnings inequality: A review of recent trends and proposed explanations. *Journal of economic Literature,* 30**,** 1333-1381.

OECD. 2011. *Divided We Stand,* OECD Publishing. Available online at http://browse.oecdbookshop.org/oecd/pdfs/product/8111111e.pdf [Accessed 18/07/2012].

Perotin, P. and Robisnon A. 2002. Employee Participation in Profit and Ownership: A Review of the Issues and Evidence. *Paper prepared for the European Parliament* (Available online at http://www.efesonline.org/LIBRARY/Employee%20Participation%20in%20Profit%20and%20Ownership%20P%E9rotin%2003.pdf [Accessed 5/9/2012]

Sawhill, I. & Condon, M. 1992. Is US income inequality really growing? Sorting out the fairness question. *Policy Bites*. Washington DC: Urban Institute.

The World Bank, 2012. Measuring Inequality. Available online at http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20238991~menuPK:492138~pagePK:148956~piPK:216618~theSitePK:430367,00.html [Accessed 28/08/2012].

Trinczek, 2007. Income Poverty in the European Union. Available online at http://www.eurofound.europa.eu/ewco/surveyreports/EU0703019D/EU0703019D_4.htm [Accessed 25/08/2012].

Weeks, J. 2005. Inequality Trends in Some Developed OECD Countries. *United Nations Department of Economci and Social Affairs Working Paper Series* DESA WP No. 6 ST/ESA/2005/DWP/6 Available online at http://www.un.org/esa/desa/papers/2005/wp6_2005.pdf [Accessed 5/9/2012].

Wilkinson, R. and Pickett, K. 2010. *The Spirit Level: Why equality is better for everyone*. Penguin Books, London.

Appendix 1: Summary Statistics

	Median pay	Mean age	Number of Males	Number of Females	Male: mean weeks worked	Female: mean weeks worked
2006						
Bottom Quintile	€5,909	30	102,237	179,147	25	32
Second Quintile	€16,986	34	111,229	170,173	45	48
Third Quintile	€26,391	36	139,243	142,123	50	51
Fourth Quintile	€37,228	37	162,178	119,505	51	51
Top Quintile	€58,569	41	191,602	89,464	52	52
2007						
Bottom Quintile	€8,977	33	92,801	188,588	33	39
Second Quintile	€20,351	35	115,690	165,687	48	50
Third Quintile	€29,330	36	145,224	136,158	51	51
Fourth Quintile	€40,334	38	161,603	119,783	51	51
Top Quintile	€63,059	42	191,171	90,169	52	52
2008						
Bottom Quintile	€10,032	35	93,161	188,232	34	40
Second Quintile	€21,830	36	118,345	163,040	49	50
Third Quintile	€30,981	37	145,435	135,931	51	51
Fourth Quintile	€42,369	38	160,236	121,142	51	51
Top Quintile	€65,946	42	189,312	92,067	52	52
2009						
Bottom Quintile	€8,795	37	106,069	175,313	30	38
Second Quintile	€20,622	37	120,618	160,785	48	50
Third Quintile	€30,000	38	139,868	141,499	51	51
Fourth Quintile	€41,121	39	154,725	126,653	51	51
Top Quintile	€63,304	43	185,209	96,162	52	52
2010						
Bottom Quintile	€7,227	38	116,099	165,303	26	34
Second Quintile	€19,125	39	118,315	163,065	46	49
Third Quintile	€28,669	39	136,065	145,297	50	51
Fourth Quintile	€39,545	40	150,167	131,216	50	51
Top Quintile	€60,698	43	185,843	95,531	51	51

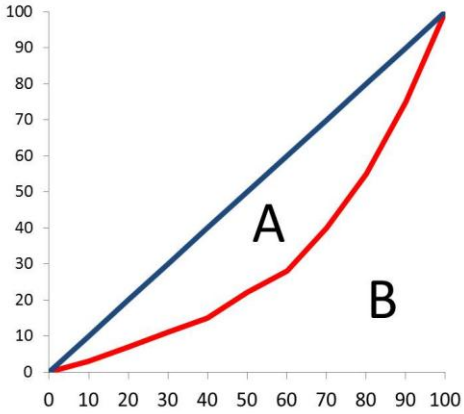
The median pay of those in the bottom quintile has increased from €5,909 in 2006 to €10,032 in 2008 and has subsequently dropped again in 2010 to €7,227. It should be remembered that we have not included information on any transfer payments and this is only based on employer P35L returns. The average age of those in the bottom quintile has increased over the period from 30 years in 2006 to 38 years in 2010. The first and second quintiles display this trend of increasing average age more so than the other quintiles. The average age of those in the top quintile has remained relatively stable between 41 and 43 years. A possible explanation for this increasing average age in the lower quintiles is that perhaps older people are seeing a decrease in their income relative to others.

There are a greater number of females in the bottom 2 quintiles in all years and a greater number of males in the top two quintiles in all years. This represents a significant gap in the top quintile of 102,138 more males than females in 2006 and 90,312 more males that females in 2010. The reasons for this are not immediately obvious. Women work more weeks than males in all years in the bottom quintile and the same number of weeks in the top quintile but again, we don't know how many days/hours per week this represents. In the bottom quintile, the actual number of weeks worked by males and females has increased since 2006.

Appendix 2: The Gini Coefficient

The Gini coefficient is the most commonly used measure of income inequality. The coefficient varies between 0 and 1, which reflect complete equality and complete inequality respectively.

Graphically, the Gini coefficient can be easily represented by the area between the Lorenz curve and the line of equality. In the figure to the right, the Lorenz curve maps the cumulative income share on the vertical axis against the distribution of the population on the horizontal axis. In this example, 40% of the population obtains around 15% of total income. If each individual had the same income, or total equality, the income distribution curve would be the straight line in the graph – representing total equality. The Gini coefficient is calculated as the area A divided by the sum of areas A and B.



If income is distributed completely equally, then the Lorenz curve and the line of total equality are merged and the Gini coefficient is zero (area A would be zero). If one individual receives all the income, the Lorenz curve would pass through the points (0,0), (100,0) and (100,100), and the surfaces A and B would be similar, leading to a value of one for the Gini-coefficient.

The Gini coefficient formula for inequality in pay is:

$$\text{GINI(Pay)} = -2\ \text{Cov}\left(\frac{Pay}{mean(Pay)},\ (1 - F(Pay))\right)$$

where is a random variable of interest (i.e. pay) with mean μ(X), and F(X) is its cumulative distribution function. Cov is the covariance between pay and population share and F (pay) is the cumulative distribution function for pay.

Appendix 3: Nace Rev.2 codes and names

Sector	NACE Rev. 2 Code
Mining & Quarrying	B
Manufacturing	C
Electricity, gas, steam and air conditioning supply	D
Water supply; sewerage, waste management and remediation activities	E
Construction	F
Wholesale and retail trade; repair of motor vehicles and motorcycles	G
Transportation and storage	H
Accommodation and food service activities	I
Information and communication	J
Real estate activities	L
Professional, scientific and technical activities	M
Administrative support and service activities	N
All other NACE Rev. 2 sectors	Other

Source: Eurostat, 2008

Appendix 4: Numbers Employed by NACE Sector Quarter 1, 2008

NACE Sector	Numbers Employed	Percent
Mining and quarrying (B)	7,400	0%
Manufacturing (C)	212,500	12%
Electricity, water supply and waste management (D,E)	14,600	1%
Construction (F)	146,700	8%
Wholesale and retail trade; repair of motor vehicles and motorcycles (G)	319,000	18%
Transportation and storage (H)	69,800	4%
Accommodation and food service activities (I)	152,700	9%
Information and communication (J)	64,800	4%
Financial, insurance and real estate activities (K,L)	97,500	6%
Professional, scientific and technical activities (M)	81,600	5%
Administrative and support service activities (N)	88,700	5%
Public administration and defence; compulsory social security (O)	118,500	7%
Education (P)	133,600	8%
Human health and social work activities (Q)	206,000	12%
Arts, entertainment, recreation and other service activities (R,S)	53,800	3%
All NACE economic sectors	1,767,300	

Source: Central Statistics Office (2012)