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An Analysis of Employment within Ireland from 2011 to 2016

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Contents

Abstract

In the years between Ireland's 2006 Census and 2011 Census, a major financial crash occurred causing a global recession. Ireland's 2011 Census was taken in the midst of the recession, and as such provides an accurate representation of the financial climate at the time within Ireland. Ireland experienced significant re-growth of its economy in the following years, and as such the 2016 Census captures a completely different financial climate, with Ireland emerging strongly from the recession. The purpose of this analysis is to analyse employment in Ireland as of the 2011 and 2016 Census' and illustrate the differences in employment across age and socio-economic groups between these two Census' *(CSO, 2016)*.

Age Profiles of Employment & Unemployment

Employment

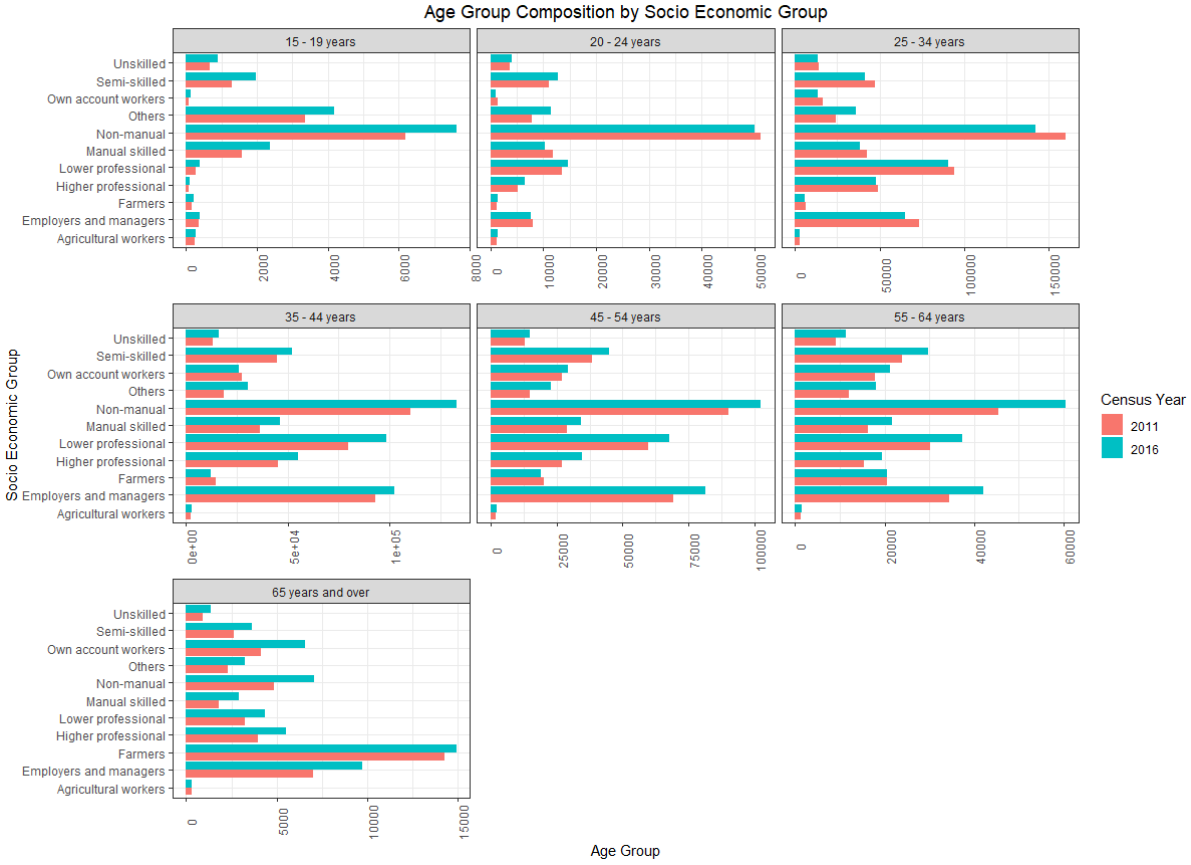

Fig.1.

As illustrated above, there has been a marked increase in the numbers of people employed in 2016 from 2011. This is in keeping with our initial statement that the numbers of people employed in Ireland would be greater than in 2011 due to increased economic indicators and consumer confidence. Of note, there is an apparent decrease in the number of people farming in the following age groups:

- 25 – 34
- 35 – 44
- 45 – 54

Two other instances appear where the numbers of people employed (by age group) has decreased, namely those engaged in non-manual and manual labour in the 20 – 24 and 25 – 34 years group as well as those noted as 'own account workers' in the 25 – 34 years group.

Taking the total numbers of people employed by Age Group, we can see the overall number of people employed in the 25 – 34 years group has decreased.

Age_Group	Census_Year	Total	Age_Group	Census_Year	Total
15 - 19 years	2011	14261	15 - 19 years	2016	18494
20 - 24 years	2011	116025	20 - 24 years	2016	120881
25 - 34 years	2011	530104	25 - 34 years	2016	496255
35 - 44 years	2011	484636	35 - 44 years	2016	574633
45 - 54 years	2011	390373	45 - 54 years	2016	453631
55 - 64 years	2011	226643	55 - 64 years	2016	283123
65 years and over	2011	45318	65 years and over	2016	59624

Table 1

The greatest percentage increase in employment by Age Group was those who are 65 years and older, with the sole reduction being in the 25 – 34 years group, where there was a 31.6% increase for the former and 6.4% decrease in the latter.

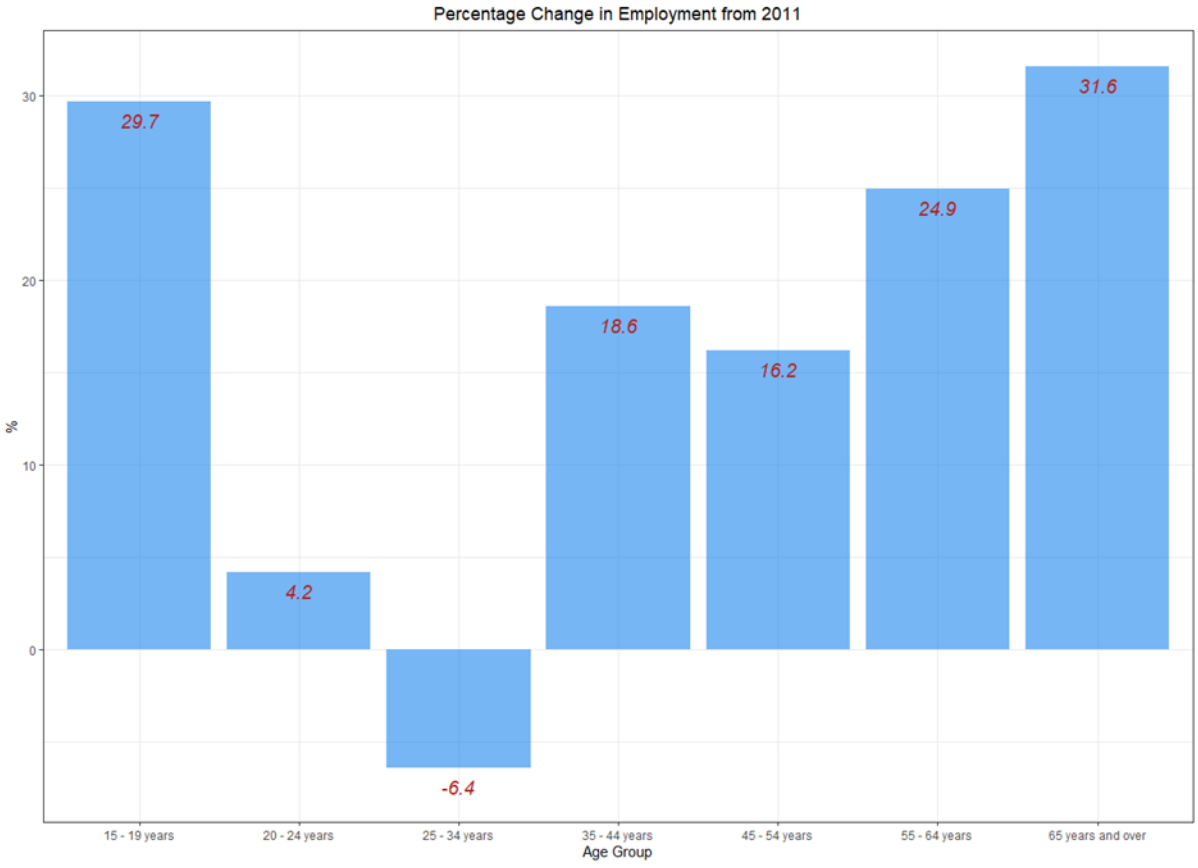

Fig.2

In order to illustrate differences in Employment in the 2016 Census from the 2011 Census with greater clarity, the below dumbbell graph was created. This graph shows charts the difference between two discrete points in time (2011 and 2016) in a visually coherent manner, enabling the data being visualised to be grasped quicker. This chart, as well as the bar chart immediately below quantify the preceding visualisations, illustrating the differences in numerical terms.

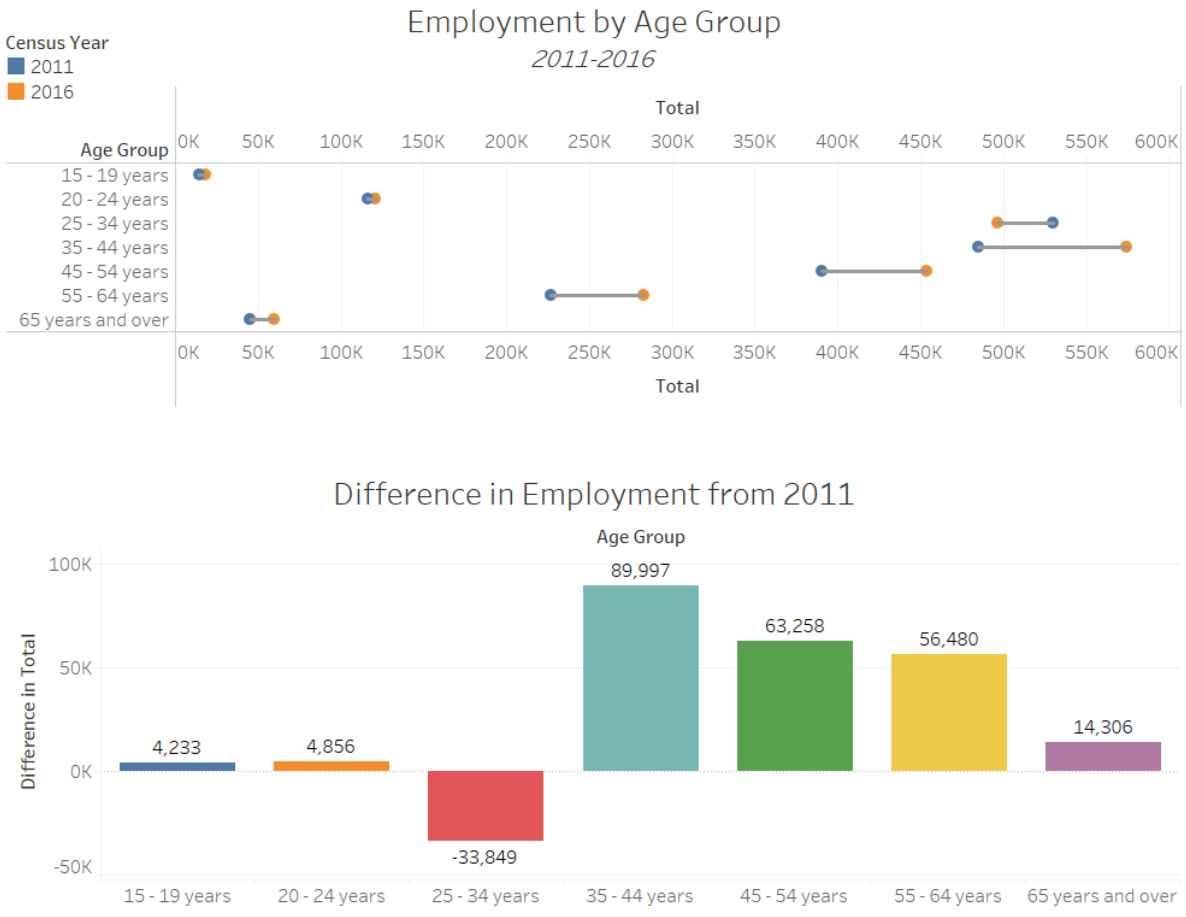

Fig.3

It is interesting to note that of the increase in employment by age groups, the greatest increase is in the 35-44 years group and up. It could be interpreted that these groupings were perhaps the hardest hit by the recession – that is those, who were generally speaking, in long term employment. There has been a noticeable trend in Ireland of people having a longer working life and this may also have contributed towards there being an increase in the numbers aged 65 years and over working (*Slowey & Zubrzycki, 2018).*

In order to visualise the total numbers of people working in Ireland by Age Group in relation to other Age Groups, the below donut charts were created, with one created based on the 2011 Census Year and the other the 2016 Census Year. As can be seen, the overall structure of employment in Ireland (by age group) has not changed markedly. Notably, the 35 – 44 years Age Group has the largest proportion of persons employed in Ireland as of 2016, which differs from 2011 where the 25 – 34 years Age Group contained the greatest number of persons employed in Ireland.

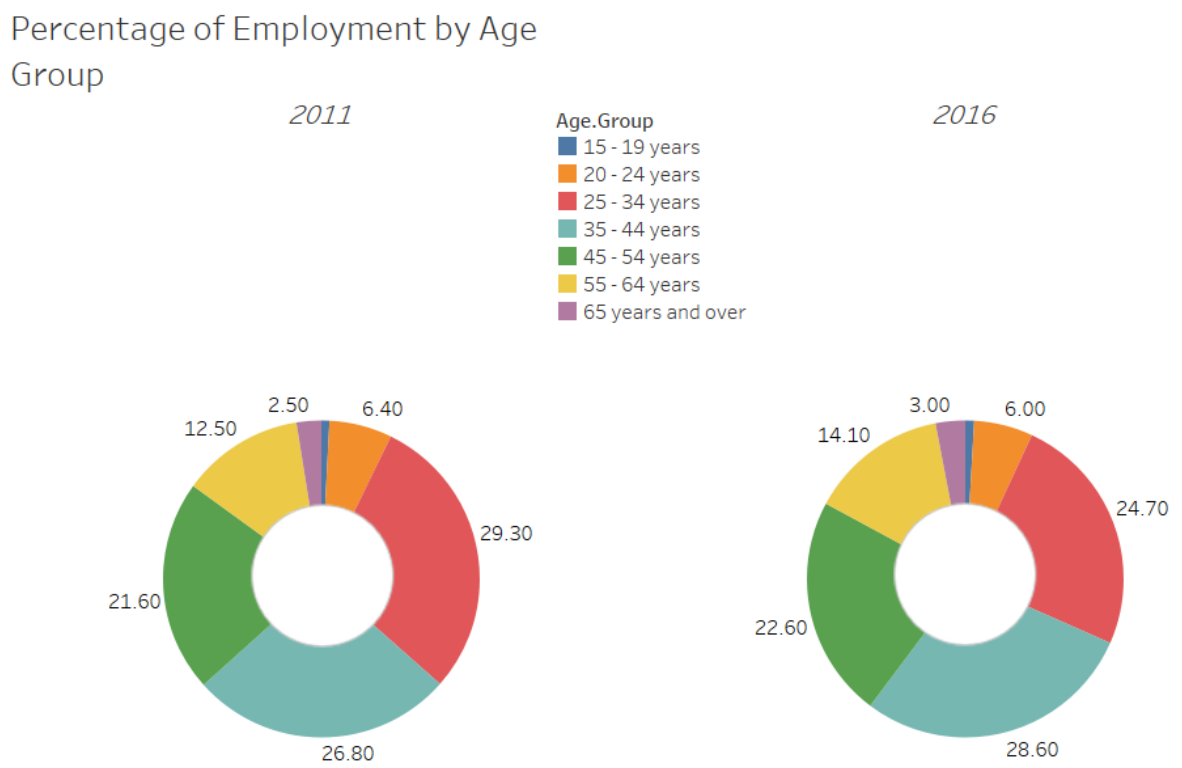

Fig.4

Viewing Employment by Age Group in the form of a dot plot helps identify the overall composition of Employment and further confirms this observation with there being a clear increase in the proportion of persons employed in the 35 – 44 years age group at the expense of those employed in the 25 – 34, 45 – 54 and 55 – 64 years age groups.

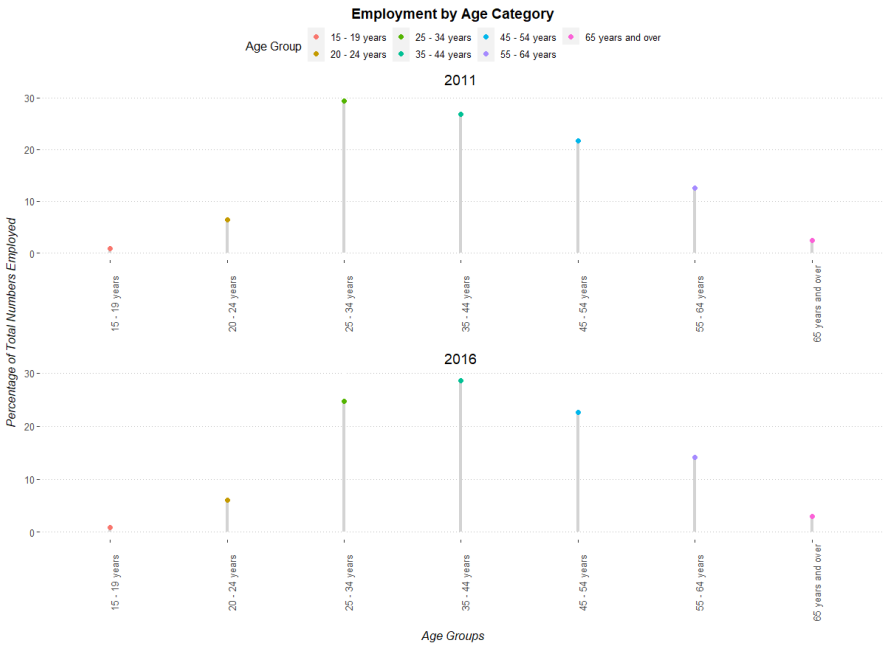

Fig.5

As can be seen in the below boxplots, the sum of the increase in employment from the 20 – 24 years age groups and up across job categories since 2011 has pushed up the baseline of employment in these age groups. Using a 95% confidence interval, and standard error bars to identify what may be considered as 'outliers', we can see that the sum of persons employed in certain job categories in the 15 – 19, 20 – 24, 25 – 34, 55 – 64 and 65 years and over age groups are flagged as being outliers. In this context, this means that there is a disproportionately greater number of persons employed in certain job categories in these age groups than in others. Relating this to fig.1, we can see this clearly refers to the number of persons employed in non-manual and manual skilled job categories for the 15 – 19 through 25 – 34 year groups, and farmers in the 55 -64 and 65 years and over age groups.

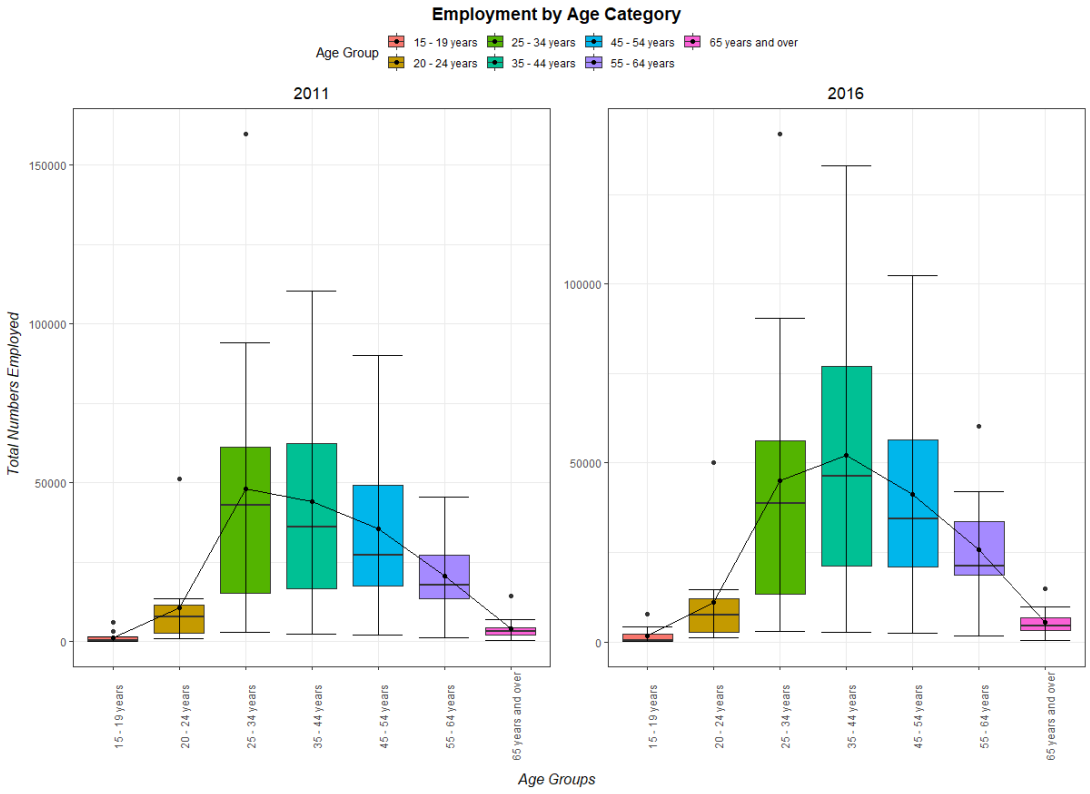

Fig. 6

Unemployment

As before, a dumbbell chart was used to visualise the difference in the numbers of persons unemployed by Age Group in the 2011 and 2016 Census'. The greatest difference in unemployment can be seen in the 25 – 34 years age group in which there were 48,610 less persons unemployed in 2016 from 2011. This is extremely interesting in that paradoxically; fig.5 shows that this group actually decreased as a percentage of total numbers employed in 2016 from 2011.

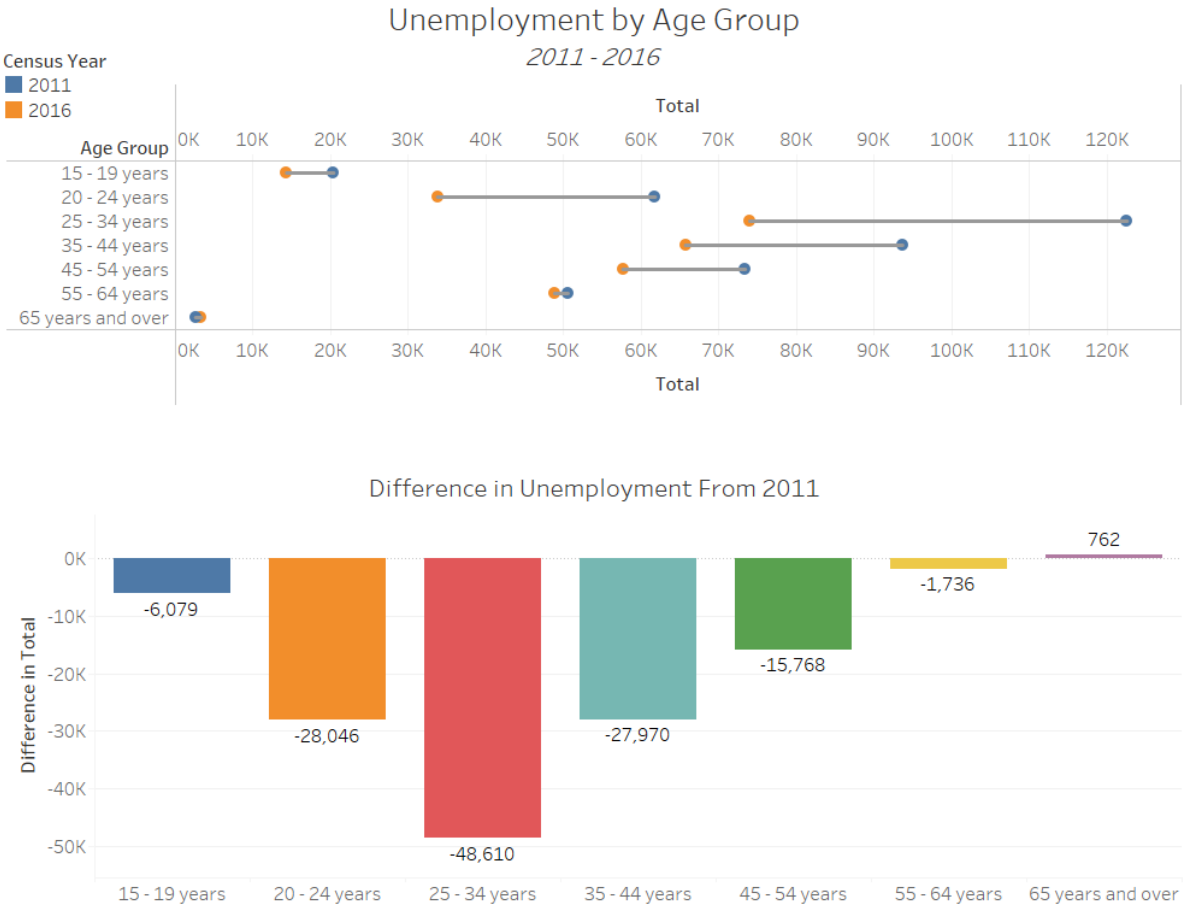

Fig.8

As can be seen below, the greatest number of persons unemployed by age group in 2011 was the 25 – 34 years age group, followed by the 35 – 44 years age group. Interestingly, the numbers of persons unemployed in the 20 – 24 years age group is less than the numbers unemployed in the 55 – 64 years age group which is the inverse of the results of the 2011 Census'.

Age_Group	Census_Year	Total	Age_Group	Census_Year	Total
15 - 19 years	2011	20378	15 - 19 years	2016	14299
20 - 24 years	2011	61775	20 - 24 years	2016	33729
25 - 34 years	2011	122559	25 - 34 years	2016	73949
35 - 44 years	2011	93638	35 - 44 years	2016	65668
45 - 54 years	2011	73375	45 - 54 years	2016	57607
55 - 64 years	2011	50547	55 - 64 years	2016	48811
65 years and over	2011	2571	65 years and over	2016	3333

Table 2

While it would appear the increase of 762 persons in the 65 years and over category is miniscule, it is interesting that when this is normalised in tandem with other age groups and expressed as a percentage, it reflects a 29.6% increase in unemployment – almost a third.

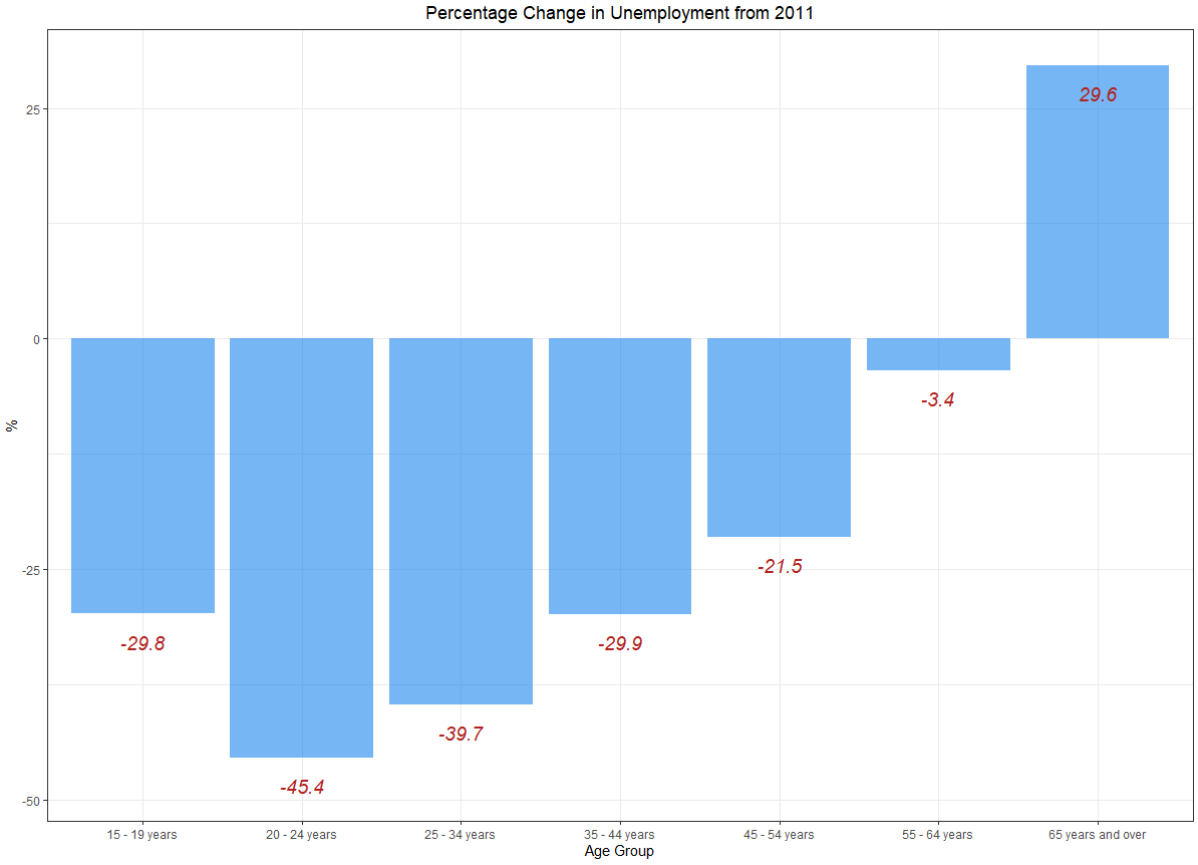

Fig.9

In order to view the composition of unemployment in 2011 versus 2016, the below pie charts were created. While we have previously observed all age groups decreased in employment apart from the 65 years and over age group, it is noteworthy that the number of persons unemployed is more evenly distributed amongst the 25 through 54 years age groups in 2016 as opposed to 2011 which would hint that the labour market approached relative equilibrium in 2016, that is; it returned to a more *normal* dispersion of unemployment.

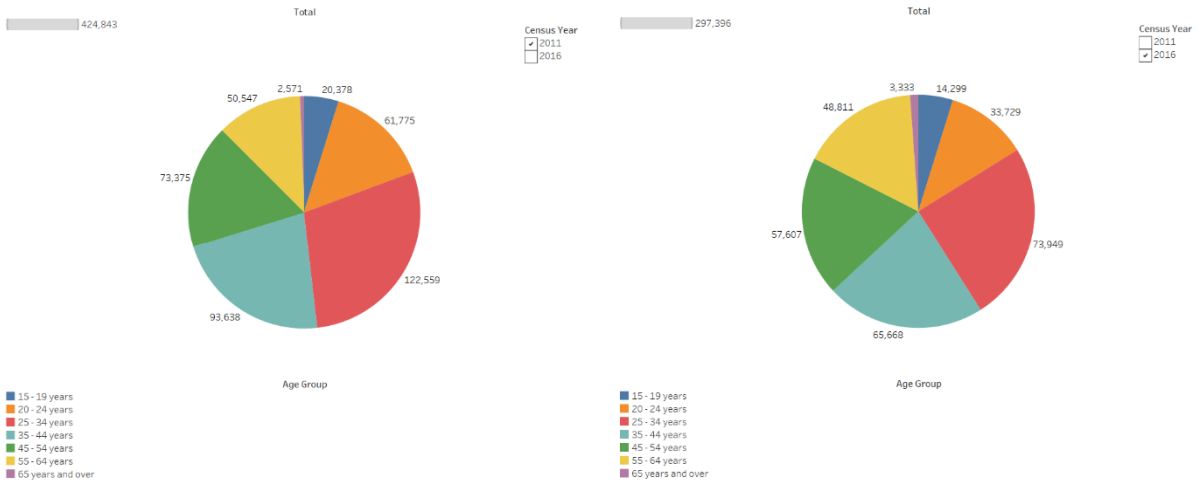

Fig.10

Finally, the below bar chart was created in order to neatly condenses our previous observations into one graph. The distribution of employment clearly reached a more normal distribution in 2016. It is evident that the 20 – 24 and 25 - 34 years age groups were affected to a much greater extent by the recession than all other age groups. This perhaps illustrates why there was such extensive emigration observed amongst young adults in the years immediately following and prior to 2011 (Mosca and Barrett, 2014) – *the jobs just weren't there* for this demographic.

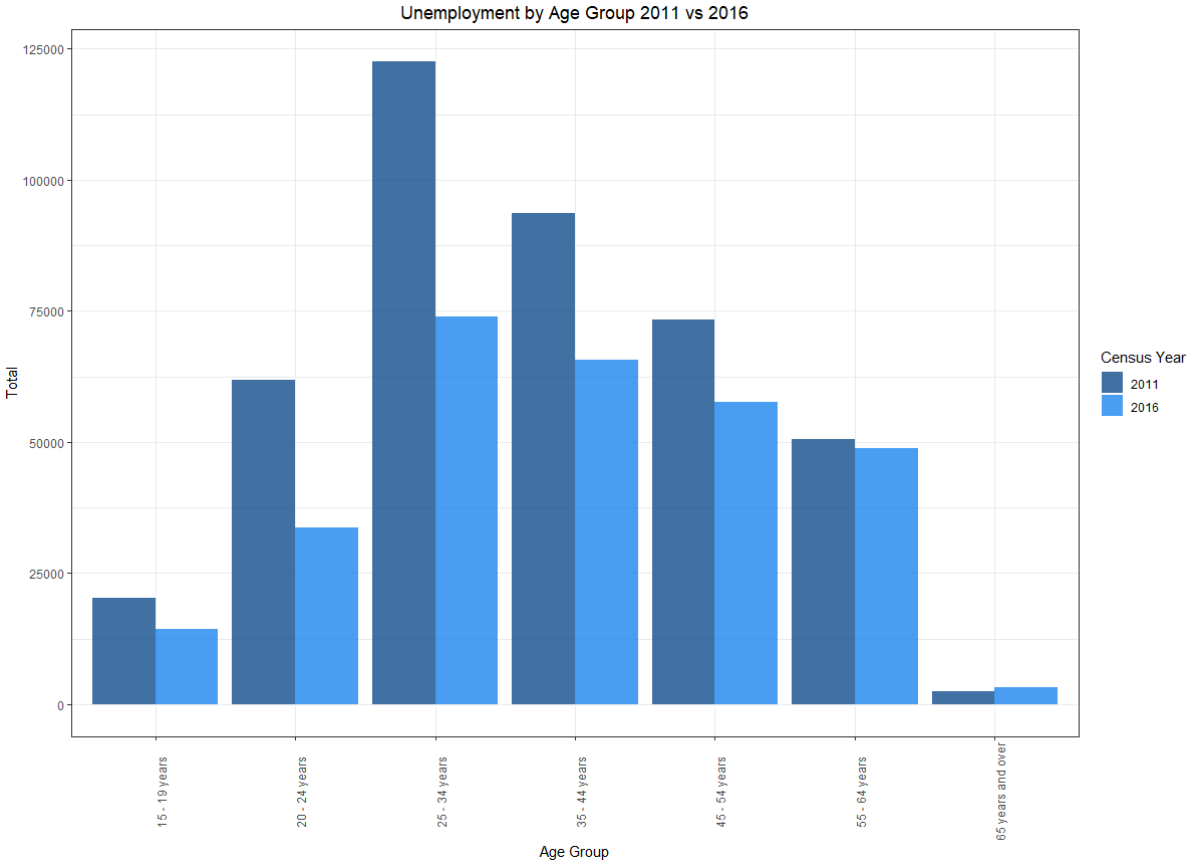

Fig.11

Breakdown of Employment & Unemployment by Socio Economic Groups

Employment

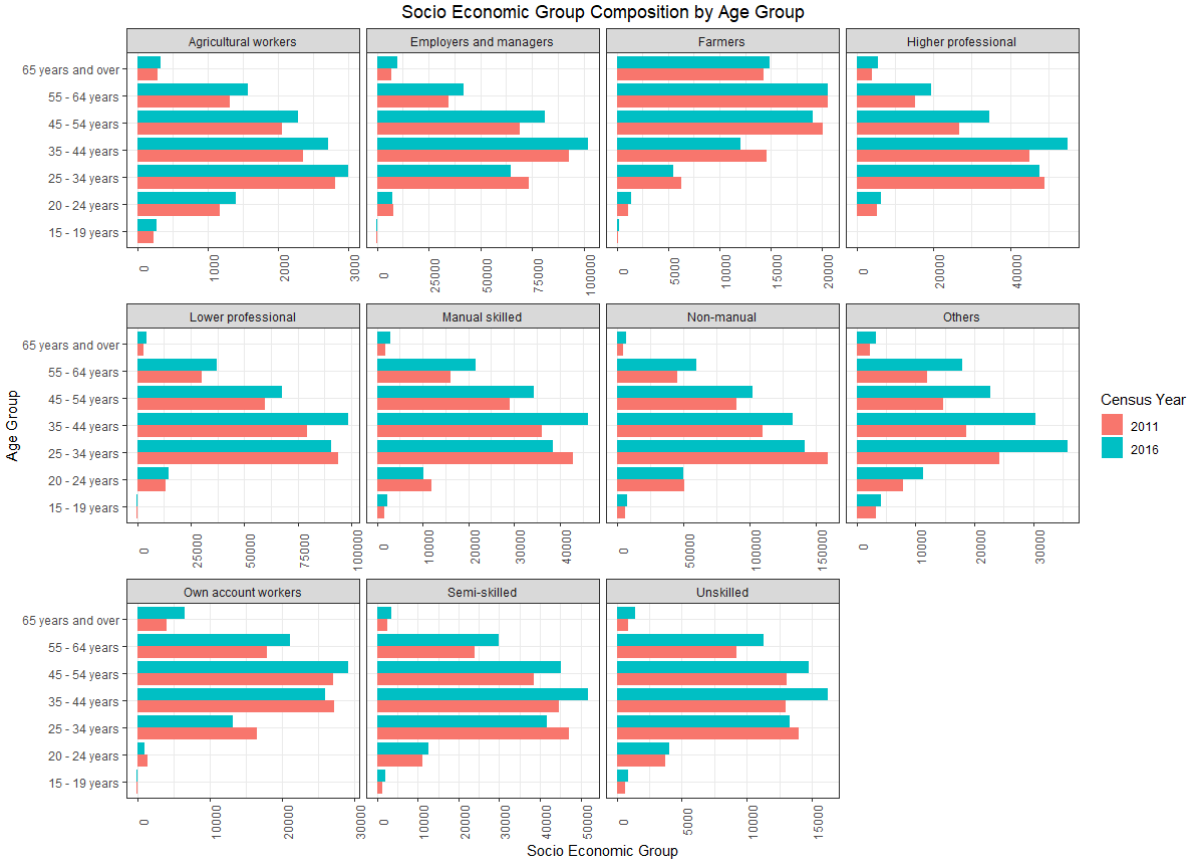

Fig.12

From the above, we can see that there has been a marked increase in employment across almost all job categories by Age Group in the 2016 Census from the 2011 Census. It is notable that there appears to be an increase across all job categories for those aged 65 years and over, which as stated before is in keeping with the general trend as developed upon by Slowey and Zubrzycki.

Most significantly, there has been a reduction in employment across several job categories for those who are aged 25 – 34 years, including Higher and Lower Professionals which is at odds with what would generally be assumed – that these job categories would increase in employment for this age group given Ireland's economy in 2016 as opposed to 2011. The economy in 2016 was at the time, characterised as being very strong with increased opportunities for 'young professionals' as more specialised jobs came on the market which would cater for those who received a third level education – e.g. – software programming, data analytics and pharmaceuticals *(Murray, 2016).*

Below we can see the total numbers of persons employed in the 'others' and 'lower professional' job categories experienced the largest increase in 2016 Census when compared to 2011 Census. Notably, the Farmers job category in the 2016 Census experienced a *decrease* in numbers employed compared to the 2011 Census, the sole job category to do so. It would stand to reason that the aforementioned decrease in the numbers employed in the 25 – 34 years age group in Higher and Lower professional jobs is correlated with an increase in the 'others' category. It could very well be the case that a cohort

of this age group identified as being employed in a job that could be categorised as falling into the 'others' category as opposed to the Higher and Lower professional categories.

Socio_Economic_Group	Census_Year	Total	Socio_Economic_Group	Census_Year	Total
Employers and managers	2011	285450	Employers and managers	2016	308294
Higher professional	2011	145446	Higher professional	2016	168823
Lower professional	2011	280300	Lower professional	2016	313740
Non-manual	2011	467807	Non-manual	2016	502426
Manual skilled	2011	139495	Manual skilled	2016	156293
Semi-skilled	2011	169380	Semi-skilled	2016	186658
Unskilled	2011	54472	Unskilled	2016	61888
Own account workers	2011	94525	Own account workers	2016	97283
Farmers	2011	76975	Farmers	2016	73740
Agricultural workers	2011	10247	Agricultural workers	2016	11577
All others gainfully occupied and unknown	2011	83263	All others gainfully occupied and unknown	2016	125919

Table 3

Indeed, the 'others' category experienced an increase in employment of 51.2% by the time of the 2016 Census as evidenced in the below illustration. A startling increase when compared to the moderate increases for several other job categories. There are two potential reasons for this increase:

- People could not identify otherwise appropriate job categories on their census forms or;
- The CSO has gathered together a variety of small job categories and combined them into the 'others' job category

In the former event, it could reasonably be suggested the CSO allow a more open interpretation of job categories, or a greater number of job categories for selection while in the latter, the release of this information could help identify the various subgroupings of job categories that when combined contributed to this increase.

On a sidenote, the Farmers category experienced a decrease of 4.2%.

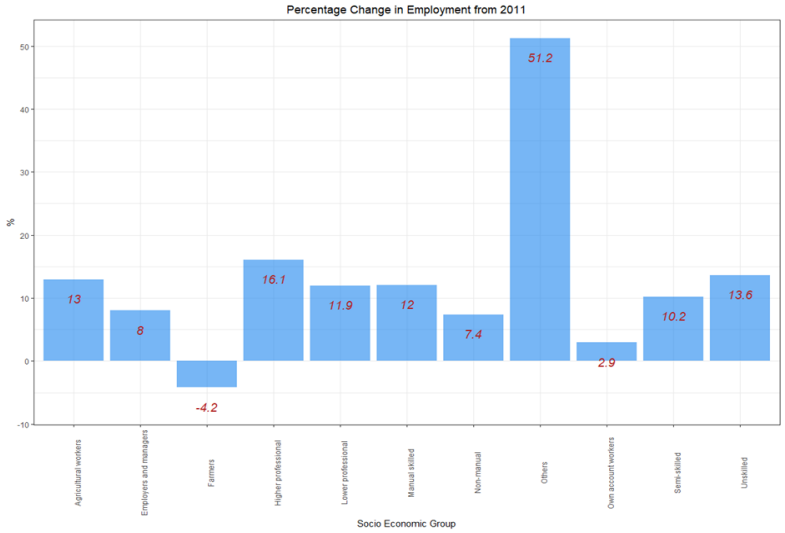

Fig.13

To put our previous observations into numerical terms, there was a reduction of those employed as Farmers of 3235 and 42,656 more persons employed in the 'others' category. One might naively assume it to be interesting to note that as of the 2016 Census, there was a greater increase in the number of persons employed in the Lower Professionals job category than the High Professionals Job category. Given however where these numbers were for these job categories in 2011, and as evidenced above, this is insignificant as there was a *greater percentage increase* in the High Professionals Job category.

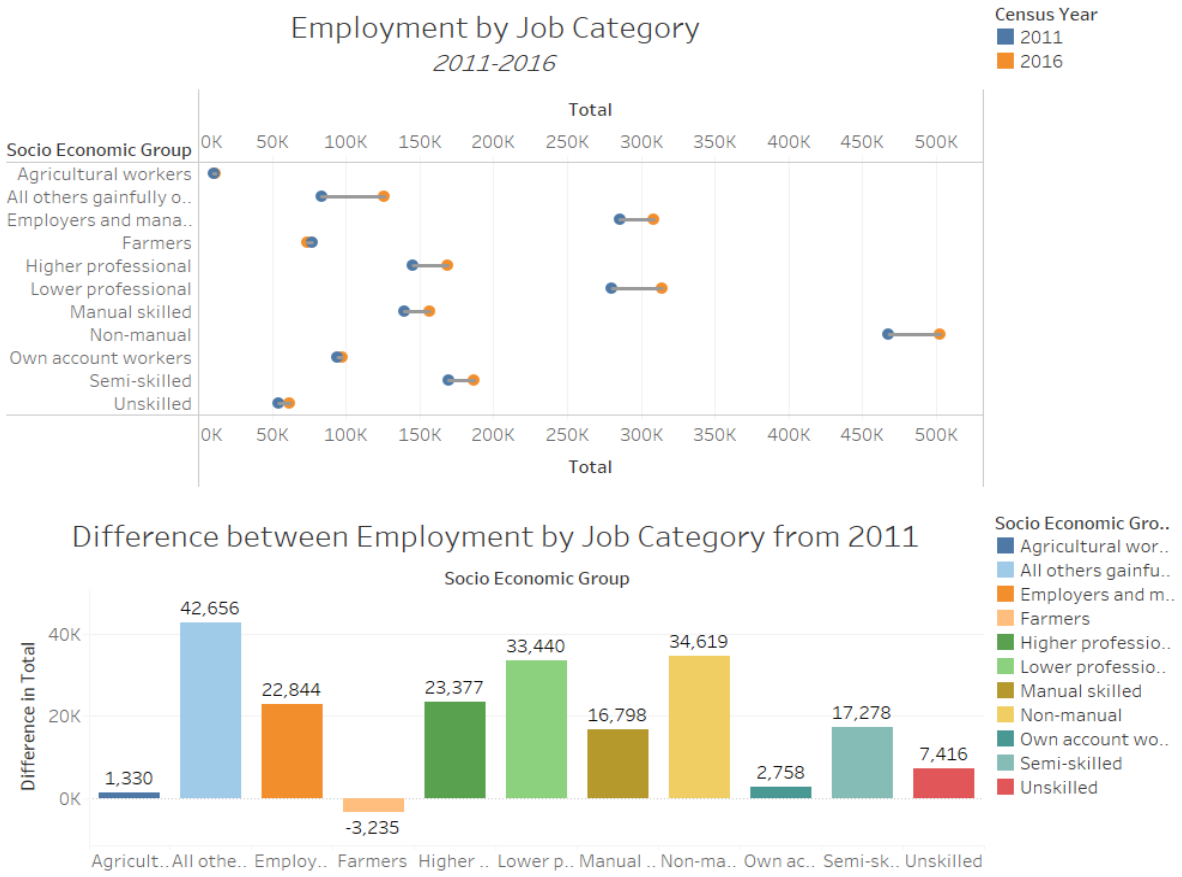

Fig. 14

As before, Donut Graphs were created to aid visualisation of the total number of persons working in Ireland by Job Category with one relating to the 2011 Census Year and the other the 2016 Census Year. In these graphs, we can see the overall structure of employment in Ireland by Job Category has experienced very little change. Only the 'others' job category experienced an increase of more than 1 percentage point suggesting that whilst employment has markedly increased as previously evidenced; the job sector is relatively stagnant in terms of take-up across job categories ala it's the employment market's composition.

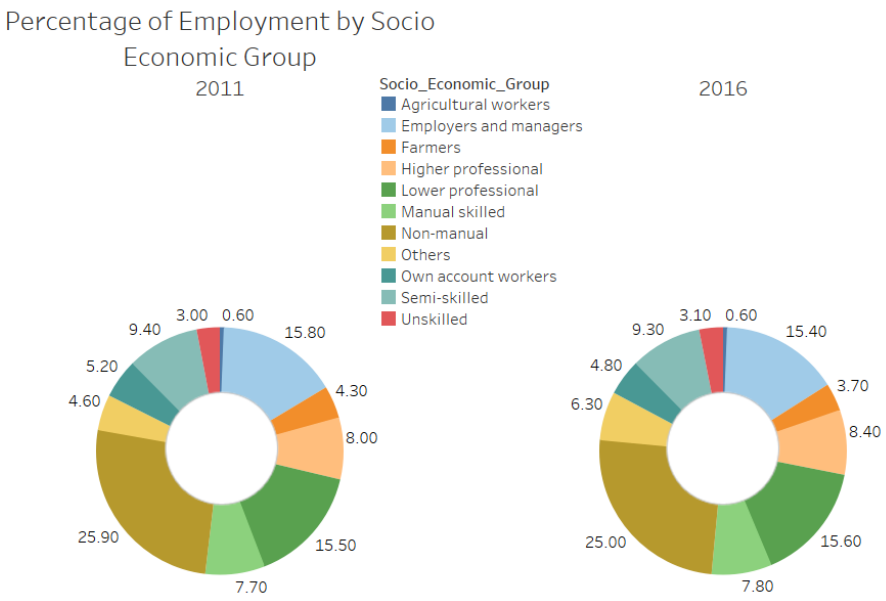

Fig.15

While the previous dot plot (fig.6) was created without any ranking order, I elected to order the job categories by the numbers employed in each category and compare this across the 2011 and 2016 Census Years. In this way, we can readily see where a job category has superseded another in the composition of the Irish jobs market. In this case and as evidenced immediately above, the Lower Professional job category is the second biggest employment category as of the 2016 Census.

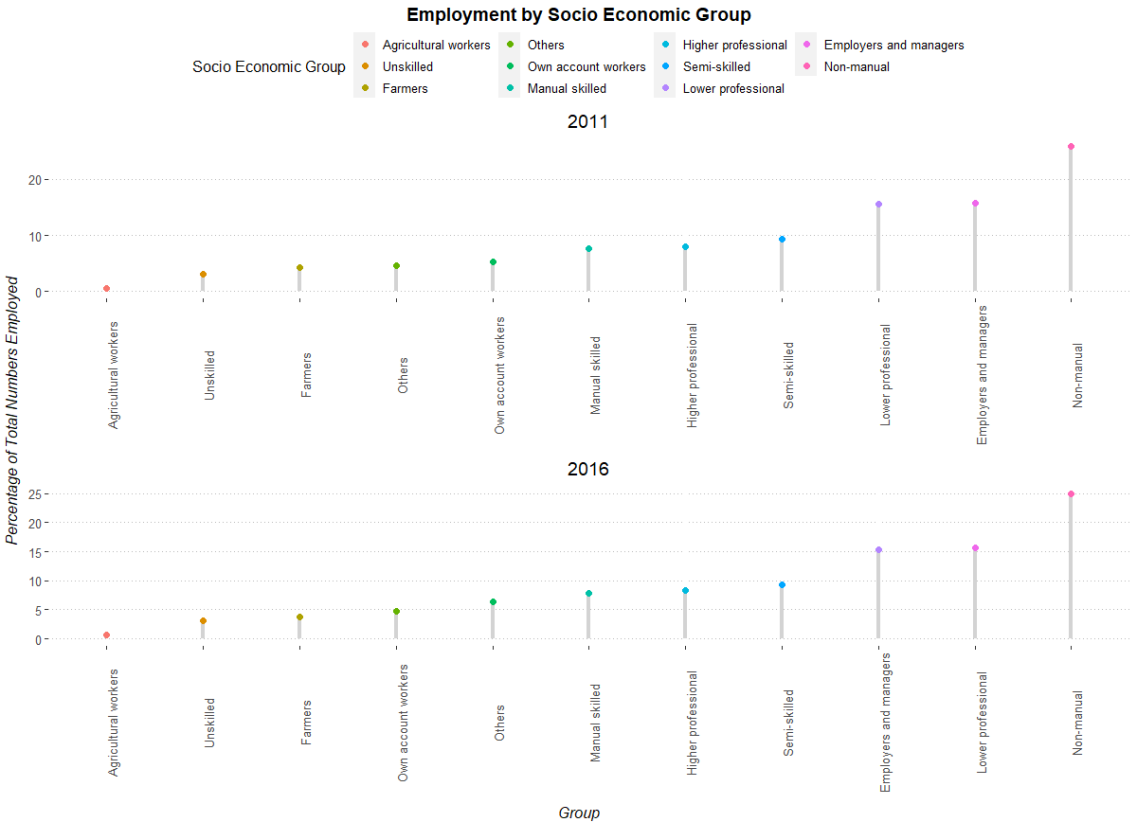

Fig. 16

Waffle Charts are very interesting ways to visualise the composition of something, in this case employment by job category. A weight is applied to the object - in this case a square, with each square representing 1000 persons. By doing this, we can readily see and quantify numerical values from a compositional perspective. It lets us see the data in a manner that is not quite replicated using any other form of visualisation. In this case, nothing immediately jumps out at us, however this is to be expected given previous analysis of employment by job categories and confirms what we have come to know – the Irish Job Industry is for the most part stagnant in terms of it's composition as of the 2016 Census.

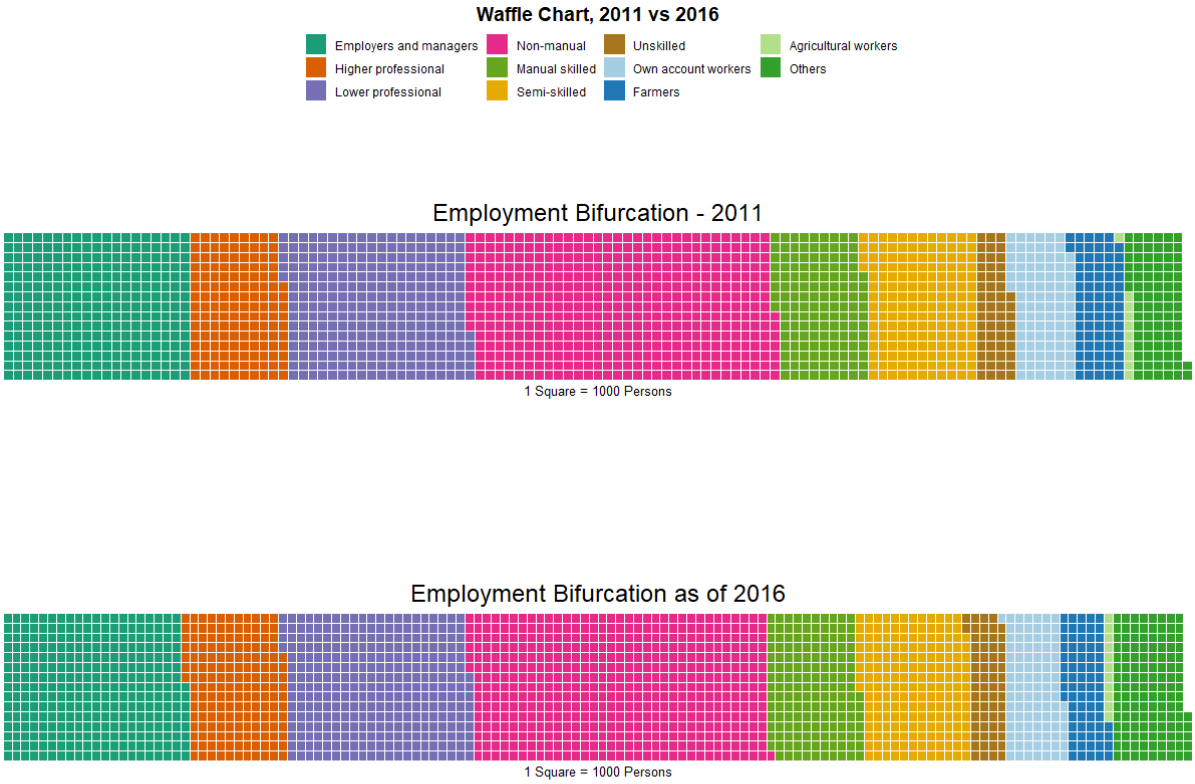

Fig.17

Unemployment

Unemployment decreased across all job categories by the 2016 Census from the 2011 Census. A significant decrease in unemployment of 40,947 persons occurred in the Manual Skilled job category, with notable decreases of 14,383 and 18,657 in the Employers and Managers and Non-manual job categories, respectively.

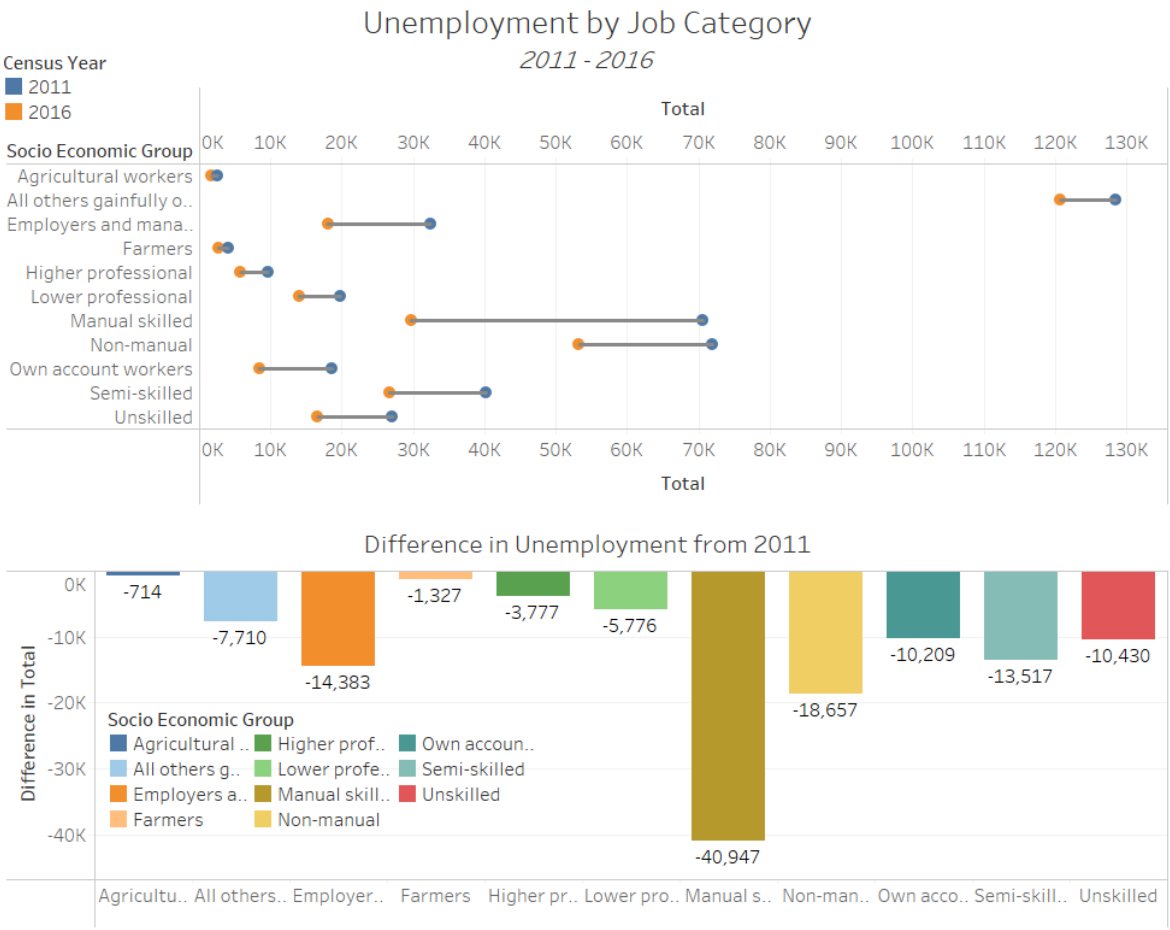

Fig.18

The smallest decreases occurred in the Agricultural and Farmers categories, with 714 and 1327 less persons unemployed, respectively.

Socio_Economic_Group	Census_Year	Total	Socio_Economic_Group	Census_Year	Total
Employers and managers	2011	32362	Employers and managers	2016	17979
Higher professional	2011	9569	Higher professional	2016	5792
Lower professional	2011	19753	Lower professional	2016	13977
Non-manual	2011	71906	Non-manual	2016	53249
Manual skilled	2011	70591	Manual skilled	2016	29644
Semi-skilled	2011	40154	Semi-skilled	2016	26637
Unskilled	2011	27039	Unskilled	2016	16609
Own account workers	2011	18572	Own account workers	2016	8363
Farmers	2011	3999	Farmers	2016	2672
Agricultural workers	2011	2465	Agricultural workers	2016	1751
All others gainfully occupied and unknown	2011	128433	All others gainfully occupied and unknown	2016	120723

Table 4

Expressing these findings as a percentage change, we can see there has been a 58% and 55% increase in the Manual Skilled and Other account workers categories. Where before we observed a huge increase in the numbers of persons employed in the 'others' category as in fig.15, we can see there has been *only* a reduction in unemployment of 6%. Drawing on this, it could be inferred that there was a noticeable increase in the number of jobs created in the 'others' category in the intervening years between the 2011 and 2016 Census.

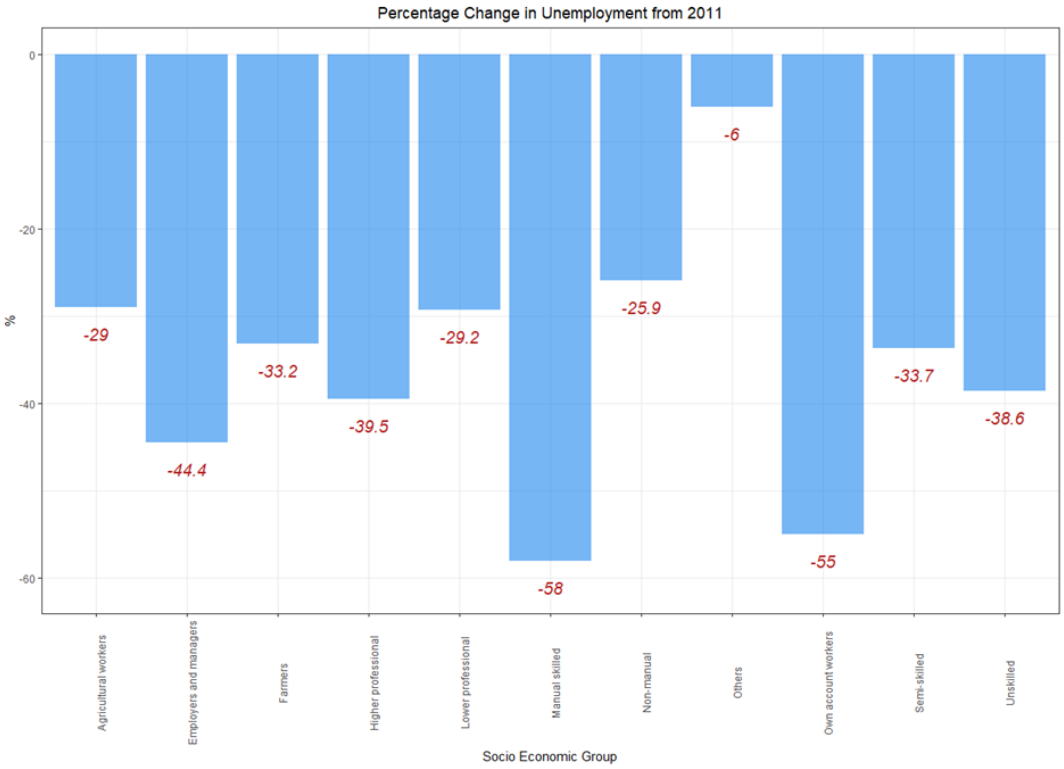

Fig.19

As can be seen below, the 'others' job category accounted for the greatest level of unemployment in both the 2011 Census and the 2016 Census. The overall composition of unemployment across job categories changed slightly with the Non Manual job category remaining the job category with the second highest level of unemployment in 2016, followed by the Manual Skilled category, albeit with the latter having a much reduced proportion of unemployment as opposed to 2011 where it was very close to having the second highest level of unemployment falling just short of the Non Manual category.

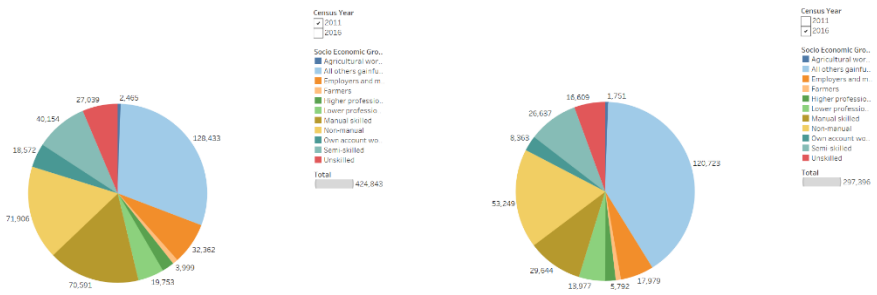

Fig.20

Using Waffle Charts to illustrate these findings, we can see that the number of squares has significantly reduced in 2016, with them appearing much less clustered as in keeping with the reduction in unemployment by job category as previously observed. While it would appear the farming category in 2016 has a miniscule degree of reduction in unemployment when compared to 2011, it is important to bear in mind the weight used in creating these Waffle Charts. Given each square represents a thousand people, the reduction from three squares to two may appear miniscule however as previously observed, this represents a 33.2% reduction in unemployment and so is a significant difference.

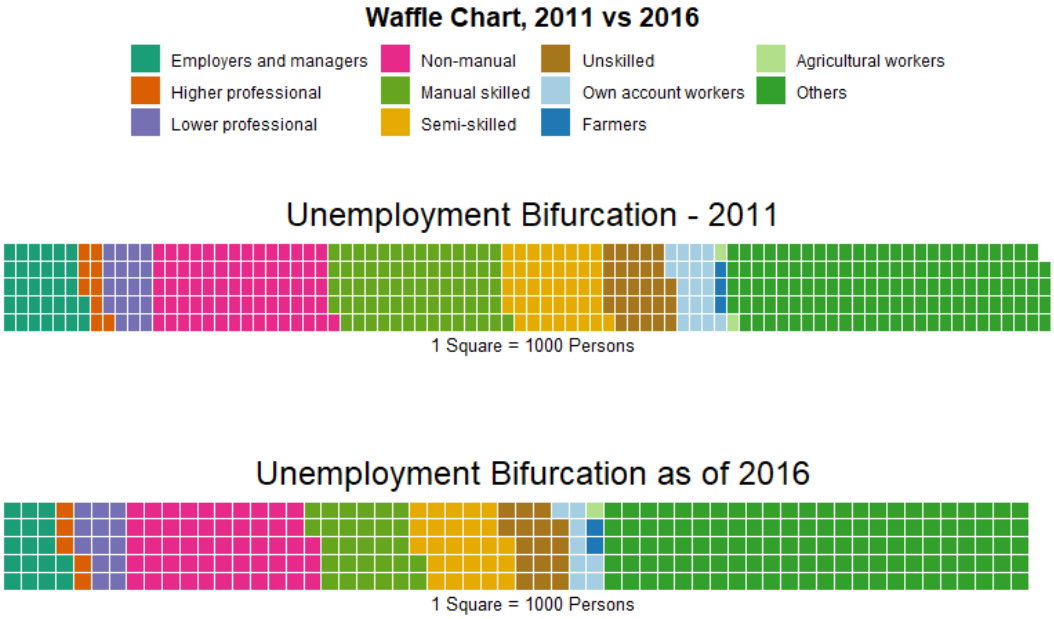

Fig.21

Finally, the bar chart below helps illustrate and reinforce the insights previously observed in this analysis as we can clearly see where the biggest reductions in unemployment have occurred between the 2011 and 2016 Census'.

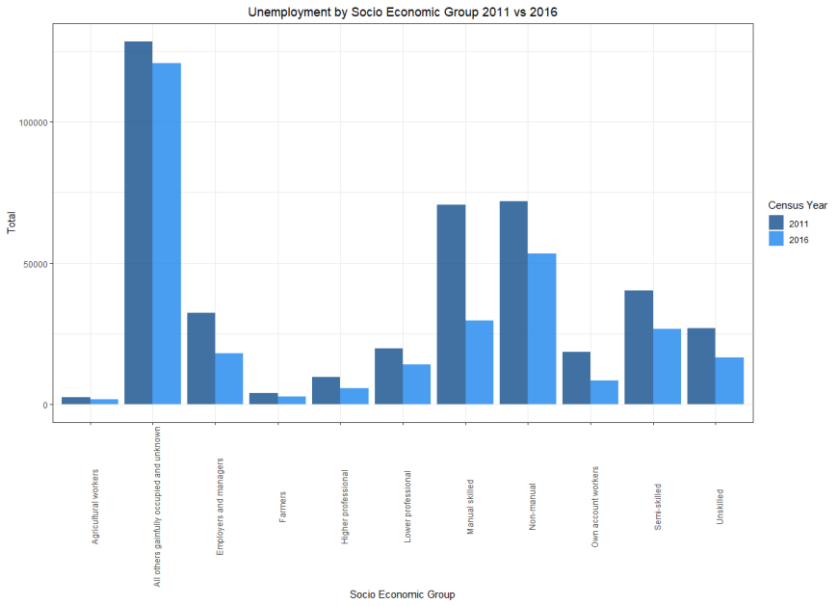

Fig.22

Conclusion

In conclusion, Ireland experienced a significant reduction in unemployment between the 2011 and 2016 Census' going from 424,843 persons unemployed in 2011 to 297,396 in 2016 culminating in a reduction in unemployment of 30%. There were significant increases in employment, and associated decreases in unemployment across almost all job categories and age groups. The job category that most *bucked the trend* was the Farmers job category while the age group that could be interpreted as doing likewise was the 25 – 34 year old age grouping. These results are strongly indicative of a comprehensive recovery from the recession, and a robust employment sector that retains a healthy compositional makeup.

Methodologies

In undertaking this analysis, I sought to utilise several different visualisation methods to get across my story, that is; the story of Ireland's employment statistics from 2011 to 2016. R was used to transform and manipulate most of the data used. Placement of text titles, labels, colours, and adjustments of fonts were done in R for several of the graphs displayed, and in doing so, close attention was paid to how these would appear to the user so as to ensure they are intelligible. A similar approach was taken in Tableau which is admittingly much kinder in regard to the degree of manual work required to get the graphs in their desired form. Furthermore, in deciding on a visualisation tool to utilise, consideration was given to it's appropriateness. For example, Dumbbell plots were used as they are well suited to showing differences across categorical variables between two dates (discrete data).

There are many other visualisations that could have been used yet I either did not see them fit for this analysis, or deemed they were beyond it's scope. Interesting insights that could yet be explored as part of this analysis are to:

- Review employment by region by transforming data – e.g. – using R, subsetting, and Dplyr summarisation to create a column called 'Region' for each province that is composed of counties relating to each individual province, eventually overwriting the associated column for each subset with the Region name, and using rowSums or an alternative to combine the subsets into one cohesive dataframe for the purpose of illustration via Tableau
- Use Mekko Charts to illustrate findings/as an exploratory tool
- Analyse unemployment between counties via percentages by dividing unemployment levels in each county by the total number of persons aged 15 and over (in each county) so as to normalise each percentage and subsequently identify counties that are disproportionately more affected by unemployment

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Appendix

1. Percentage Change in Employment by Age Group

Age_Group	CensusYear	Total	pct_change
15 - 19 years	2011	14261	NA
15 - 19 years	2016	18494	29.682350
20 - 24 years	2011	116025	NA
20 - 24 years	2016	120881	4.185305
25 - 34 years	2011	530104	NA
25 - 34 years	2016	496255	-6.385351
35 - 44 years	2011	484636	NA
35 - 44 years	2016	574633	18.570020
45 - 54 years	2011	390373	NA
45 - 54 years	2016	453631	16.204502
55 - 64 years	2011	226643	NA
55 - 64 years	2016	283123	24.920249
65 years and over	2011	45318	NA
65 years and over	2016	59624	31.568030

2. Percentage change in Unemployment by Age Group

Age_Group	Census_Year	Total	pct_change
15 - 19 years	2011	20378	NA
15 - 19 years	2016	14299	-29.831190
20 - 24 years	2011	61775	NA
20 - 24 years	2016	33729	-45.400243
25 - 34 years	2011	122559	NA
25 - 34 years	2016	73949	-39.662530
35 - 44 years	2011	93638	NA
35 - 44 years	2016	65668	-29.870352
45 - 54 years	2011	73375	NA
45 - 54 years	2016	57607	-21.489608
55 - 64 years	2011	50547	NA
55 - 64 years	2016	48811	-3.434427
65 years and over	2011	2571	NA
65 years and over	2016	3333	29.638273

3. Percentage change in Employment by Socio Economic Group

Socio_Economic_Group	CensusYear	Total	pct_change
Agricultural workers	2011	10247	NA
Agricultural workers	2016	11577	12.979409
Employers and managers	2011	285450	NA
Employers and managers	2016	308294	8.002803
Farmers	2011	76975	NA
Farmers	2016	73740	-4.202663
Higher professional	2011	145446	NA
Higher professional	2016	168823	16.072632
Lower professional	2011	280300	NA
Lower professional	2016	313740	11.930075
Manual skilled	2011	139495	NA
Manual skilled	2016	156293	12.042009
Non-manual	2011	467807	NA
Non-manual	2016	502426	7.400274
Others	2011	83263	NA
Others	2016	125919	51.230438
Own account workers	2011	94525	NA
Own account workers	2016	97283	2.917747
Semi-skilled	2011	169380	NA
Semi-skilled	2016	186658	10.200732
Unskilled	2011	54472	NA
Unskilled	2016	61888	13.614334

4. Percentage change in Unemployment by Socio Economic Group

Socio_Economic_Group	Census_Year	Total	pct_change
Agricultural workers	2011	2465	NA
Agricultural workers	2016	1751	-28.96552
All others gainfully occupied and unknown	2011	128433	NA
All others gainfully occupied and unknown	2016	120723	-6.00313
Employers and managers	2011	32362	NA
Employers and managers	2016	17979	-44.44410
Farmers	2011	3999	NA
Farmers	2016	2672	-33.18330
Higher professional	2011	9569	NA
Higher professional	2016	5792	-39.47121
Lower professional	2011	19753	NA
Lower professional	2016	13977	-29.24113
Manual skilled	2011	70591	NA
Manual skilled	2016	29644	-58.00598
Non-manual	2011	71906	NA
Non-manual	2016	53249	-25.94637
Own account workers	2011	18572	NA
Own account workers	2016	8363	-54.96985
Semi-skilled	2011	40154	NA
Semi-skilled	2016	26637	-33.66290
Unskilled	2011	27039	NA
Unskilled	2016	16609	-38.57391

5. Infographic