





B183102

APRIL 2024

Word Count: 9738

# RELIGIOUS DIFFERENTIALS IN THE LABOUR MARKET: THE IMPACT OF THE GOOD FRIDAY AGREEMENT ON A DIVIDED SOCIETY 25 YEARS ON

## **Abstract**

This dissertation investigates religious differentials in the labour market, focusing on Catholics and Protestants in Northern Ireland. The conflict between these two communities led to the violent period known as 'The Troubles', which had significant economic implications. The Good Friday Agreement (1998) put an end to this conflict. This study investigates whether there is still a religious gap in the labour market 25 years after the GFA. To achieve this, the UK Labour Force Survey is used, where the primary empirical strategy is a difference-in-differences regression to evaluate the impact of GFA exposure to education by cohort on unemployment, income, and managerial status. The results indicate an unemployment and managerial status improvement for both religious groups. However, Catholics continue to face income inequality, which is likely due to occupational differences.

## **Acknowledgements**

I would like to thank Diego Battiston for his valuable advice and support throughout the process of researching and writing this paper

## Table of Contents

<b>1. Introduction</b> .....	4
<b>2. Background</b> .....	6
<b>2.1 A Summary of the NI Labour Market History</b> .....	6
<b>2.2 The Influence of Religion and Identity in NI</b> .....	6
<b>2.3 The Good Friday Agreement and Education</b> .....	7
<b>3. Previous Literature</b> .....	9
<b>4. Data</b> .....	15
<b>4.1 Sample and Data Source</b> .....	15
<b>4.2 Variables</b> .....	16
<b>4.3 Descriptive Statistics</b> .....	19
<b>5. Methodology</b> .....	21
<b>5.1 Identification Strategy</b> .....	21
<b>5.2 Model</b> .....	21
<b>5.3 Empirical Specification</b> .....	23
<b>5.4 Limitations</b> .....	30
<b>6. Results</b> .....	31
<b>6.1 Linear Regression Model</b> .....	31
<b>6.2 Difference-in-Differences Regression</b> .....	33
<b>6.3 Oaxaca-Blinder Decomposition Results</b> .....	41
<b>6.4 Summary of Results</b> .....	43
<b>6.5 Robustness Checks</b> .....	44
<b>7. Conclusion</b> .....	45
<b>8. Appendix</b> .....	46
<b>9. Bibliography</b> .....	49

## 1. Introduction

The phenomenon of religious conflicts has been detrimental to economic welfare across many parts of the world. A prominent example of such a conflict is Northern Ireland (NI), where the violent conflict between Catholics and Protestants, known as the Troubles, was brought to an end through a political process, the Good Friday Agreement (GFA) of 1998. The origins of this conflict were both political and economic, with perceived discrimination against Catholics in the labour market leading to inequality and mistrust between the two communities. Despite the ceasefire, Northern Ireland remains a deeply divided society, which is evident in several aspects, including the well-known Catholic-Protestant unemployment differential.

The human capital theory, a fundamental concept in economics, posits that educational investments enhance an individual's human capital, leading to a lower risk of unemployment, higher earnings, and better job opportunities. This study builds on existing literature by investigating labour market differentials between Catholics and Protestants in Northern Ireland and makes the new contribution of assessing how an individual's school education exposed to the GFA affects their labour market outcomes.

Using the UK Quarterly Labour Force Survey, this study employs a double difference-in-differences model to estimate the causal effect of the degree of education exposed to the Good Friday Agreement between 2002 and 2020. Following Duflo's (2001) identification strategy, this method uses cohort analysis. Specifically, the study investigates the impact of the Good Friday Agreement on three labour market outcomes: unemployment, income, and managerial status, and the results are interpreted relative to Christians in England. Additionally, the study investigates the existence of discrimination through income decompositions under the Oaxaca-Blinder (1973) method.

The study's results confirm the existence of a religious gap in labour market outcomes. Additional years of education exposed to the GFA improved both religious groups' unemployment and managerial role status, albeit modestly. However, each group experienced opposing effects on

income; Protestants experienced a beneficial effect, whereas Catholics did not. Catholics consistently exhibited a lower mean income than Protestants, even for cohorts entering the labour force after the Good Friday Agreement.

The findings of this research can inform a framework for policy intervention in future economic and political situations that involve discrimination and conflict.

The paper will proceed as follows. Section 2 provides a background summary. Section 3 briefly overviews existing literature relating to labour market outcomes and discrimination. Section 4 outlines the data and sample used in conjunction with descriptive statistics of the sample. Section 5 discusses the methodology, empirical specification and limitations. Section 6 presents and discusses the findings while addressing the robustness checks. Finally, the paper concludes with Section 8.

## 2. Background

### 2.1 A Summary of the NI Labour Market History

Previously a thriving industrial hub, Northern Ireland was a global leader in shipbuilding and textiles in the early twentieth century (McCreesh, 2023). However, in alignment with deindustrialisation, NI, like mainland Britain across the Irish Sea, experienced an economic downturn in the 1950s and 1960s. Despite the rest of the economies adapting to the new post-industrial economic landscape and transitioning to high-tech production, NI failed to make this shift.

During the period of economic change, simmering tension between Catholics and Protestants, rooted in cultural and political differences rather than religious ones, resulted in the outbreak of what became known as the Troubles. This violent conflict began with a Catholic Civil Rights march in 1968 and ended with the Good Friday Agreement (GFA) in 1998, and this had a significant negative impact on the already struggling Northern Irish economy. Not only was there an apparent disparity between NI and the other parts of the United Kingdom, but there was also an economic divide within NI between Catholics and Protestants. This divide was reflected in labour market outcomes, with the well-known Catholic-Protestant unemployment differential being a prime example. The economic history of NI is so well intertwined with its political history.

### 2.2 The Influence of Religion and Identity in NI

The issue of religious differentials in employment outcomes has been at the forefront of a significant debate. The focus has been on identifying the main factors that lead to higher unemployment rates among Catholics. There are two main sides to the discussion, arguing that the gap is due to (i) group differences in economic characteristics, such as age, occupation, socioeconomic status, and education levels (Compton, 1981, as cited in Rowland et al. 2018), or (ii) discrimination against Catholics. This inquiry has sparked a vast body of literature and intense debate, however not much in recent years.

Although religion is used to label the two conflicting communities, it was accepted that it was not the driving force behind their division. Instead, it was the identity associated with each group. In

Northern Ireland, religious affiliation is a form of social identity, as it strongly influences political beliefs regarding identity's significant role in politics. Therefore, when approaching this dissertation, it is essential to consider identity's critical political role. In addition, religious identity can often act as a visual identifier, revealed by personal attributes such as name, school attended, and area of residence, among others (Trew, 1986 as cited in Rowland et al. 2018), providing insight into an individual's cultural and political background. As a result, it can be used as grounds for discrimination. Whilst there has been research into the variations in characteristics between Christian denominations, such as, for example the Protestant work ethic (Weber, 2013), this dissertation will focus more on the role of identity in politics and its subsequent economic implications, assuming that characteristics such as those discussed by Weber are not pertinent here. An added element of this dissertation addresses discrimination using income decompositions. Like other discrimination studies, its specific impact on labour market differences cannot be accurately quantified solely through observational data.

### **2.3 The Good Friday Agreement and Education**

The Catholic civil rights movement aimed to achieve equal opportunities in employment, housing, education, and other areas of society. The violent conflict of the Troubles cost more than 3,500 lives, but the signing of the GFA in 1998 ended the worst of the violence. The Agreement, built on anti-discrimination legislation, was a major development in the peace process. It established a power-sharing arrangement in Northern Ireland and provided a framework for peace and prosperity. Despite the widespread optimism following the GFA, the deep-rooted sectarian conflict continues to impact NI. This division is most evident in the education system, which stays divided between Catholic and Protestant communities despite the peace agreement being over two decades old. A distinctive feature of NI's education system, making it unusual to the rest of the UK, is the segregation of schoolchildren based on religion. While integrated schooling has gradually increased since then, the segregated approach still dominates the system.

The Agreement is comprised of three strands, including the establishment of the British-Irish Council (BIC), which committed to working towards cooperation on issues such as education. Incentives to encourage integrated education to work towards reconciliation were also included in the Agreement (Evans, 2023). While the GFA was not a direct education policy, it had the potential to positively impact the Northern Irish education system alongside the broader aim of peace.

### **3. Previous Literature**

Previous studies have revealed the extent of religious inequality present in various sectors of the job market. Early literature used Census data for analysis, such as Aunger (1975), Osborne (1978), and Borooah (1999). Data from the 1971 Census indicated a significant inequality in unemployment between male Catholics and Protestants. The ratio was 2.6:1, with 17.3% of male Catholics and 6.6% of male Protestants unemployed (Osborne, 1978), which can be compared to the 1970 black/white unemployment rate in the US, which was 2:1 (Fairlie & Sundstrom, 1999 as cited in Rowland et al., 2018). There has been extensive research on the relationship between occupational class and religious denomination in Northern Ireland. In the 1960s and 70s, data showed that Protestants were more likely to work in skilled labour while Catholics were more likely to work in unskilled labour (Aunger, 1975). Osborne (1980) found similar results and highlighted the underrepresentation of Catholics in higher-status positions, particularly in the managerial category. Throughout the 1970s, 80s, and 90s, the unemployment rate for Catholics remained higher than that for Protestants, although the overall unemployment rate decreased significantly by more than half during this time (Breen, 1998).

Recognition of the Catholic-Protestant divide sparked the implementation of equality legislation to address discrimination in the labour market. Also, it led to discussions about the root causes of the divide, whether this religious divide was due to (i) economically relevant characteristics or (ii) discrimination against Catholics. Public policy ensures equal treatment for all individuals, regardless of gender, ethnicity, religion, or race. Studies such as Borooah et al. (1995) and Blackaby et al. (2008) have primarily employed the methodology developed by Oaxaca (1973) in his novel study on wage differences between men and women in urban labour markets. However, these authors, and many others who use this methodology, stress that an unexplained gap in unemployment rates between Catholics and Protestants should not automatically be attributed to discrimination, and thus their findings should not be considered definitive.

The Catholic-Protestant employment differential is well known and can be a helpful indicator of the welfare differences between these two groups. To gain further insight into the income differences between these two communities, Borooah et al. (1995) use the methodology of Oaxaca (1973) to investigate Catholic-Protestant income inequality. The study considers two possible factors: (i) higher unemployment rates among Catholics or (ii) lower overall incomes of Catholics, even among those who are employed. The sample for the Oaxaca decomposition contained 685 individual earners over a 2-year period, of which 252 were Catholics and 433 were Protestants. The study focused on the head of the household's income at the family household level. It revealed that 99 per cent of total inequality among individuals in the employed category was due to income differences within the separate subgroups of employed Catholics and employed Protestants, with only 0.5 per cent due to mean income differences between the two groups. The findings for economic status were similar. The study also found that the primary drivers of income differences between Catholics and Protestants were differences in educational attainment and gender. The paper concluded that labour market discrimination is at the root of income differences between Catholics and Protestants and that eliminating Catholic-Protestant income differences would not have a significant impact on overall inequality due to greater inequality within each community.

Blackaby et al. (2008) analyse the effect of the Good Friday Agreement (1998) on employment discrimination against Catholics in Northern Ireland. Using data from the Northern Ireland Quarterly Labour Force Survey from 1995 to 2005, they estimate logit models and follow the methodology of Oaxaca and Ransom (1994) to decompose earnings functions to separate differences in employment into components attributed to characteristics and coefficients. The study found that the position of Catholics in the labour market relative to Protestants improved, and over time, the employment rate gap declined. By modifying a time-wise decomposition set out by Smith and Welch (1989), they analysed the change in relative employment performance of Catholics and Protestants before and after the GFA. The results of this method showed that all the components of the male

decomposition favour Catholics, indicating that male Catholics experienced an improvement in employment-related characteristics and benefits relative to Protestants. This reduction in the gap could be the result of legislation and social activism aiming to decrease discrimination against Catholics after the GFA. However, the study notes that despite the focus on anti-discrimination laws post-GFA, the primary reason for the employment gap remains the differences in factors that boost employment opportunities, indicating that Catholics may still be experiencing unequal opportunities in the labour market.

Heath and Martin's (2013) paper explores whether religious affiliation can explain 'ethnic' inequalities in the labour market. Many studies focus on overall differences in outcomes such as unemployment rates, economic activity, employment, income or access to higher-level occupations. However, when comparing these outcomes for different ethnic groups with the white British majority, these comparisons still show significant differences between the groups. Even after controlling for factors that may affect the differences between the groups, there are still unexplained differences generally referred to as 'ethnic penalties' (Heath & Martin, 2013). Religion, in addition to ethnicity, may play a role in determining labour market outcomes. Specifically, their research highlights a significant "Muslim penalty" concerning economic activity and unemployment. This suggests that Muslims in Britain may potentially experience the equivalent of what in NI is called the 'chill factor', feeling unwelcome in some establishments and, therefore, not applying for jobs. However, this study does not delve into the mechanisms behind this phenomenon.

Borooah (1999) coined the term 'religion penalty' to describe the occupational discrimination faced by Catholics and Protestants in NI. Using regression and simulation-based model approaches, he cautioned that the simulation model should be approached with care. For the regression-based models, he developed a multinomial logit model to analyse the connection between religion and occupational success, using 1991 Census data. The study finds that Catholic men were disproportionately represented among the unemployed and underrepresented in professional and

managerial roles due to religious bias – the 'Catholic penalty'. This bias persisted even when accounting for their qualifications, indicating discrimination based on their religious identity.

Rowland et al.'s (2018) study investigates the evolution of Catholic-Protestant labour market inequality in NI using a broader observation period relative to the other papers discussed here, from 1983 to 2014. The motivation for this study stemmed from existing evidence that ethnic and religious differentials in the labour market within many countries have remained persistent even after policy implementation to address them. The study found a decline in the religious labour market differential in NI over the years and further assessed the factors that contributed to this decline, including the Good Friday Agreement (1998), the introduction of the Fair Employment Legislation, an increase in hidden unemployment and other major structural changes in NI. The research presents empirical evidence that indicates a decline in the religious unemployment gap, particularly for males. However, Armstrong (1999) suggests that official unemployment figures are unrepresentative of the true extent of unemployment, as they do not account for long-term sickness, early retirement and participation in government employment and training schemes. According to Armstrong's findings, when accounting for the hidden component of joblessness, total male unemployment in NI is more than a third higher than official reports suggest. According to Rowland et al. (2018), the gap in unemployment rates was significant in 1991 and the years leading up to it, but it notably decreased by 2001, with little change after that. However, it was evident by 2011 that unemployment inequality had not been eradicated. The study suggests that changes in observable characteristics, the growth of industries that do not primarily employ Protestants, higher education levels among the NI workforce in general, and the consecutive enactments of equality legislation likely contributed to the changes observed (Rowland et al., 2018).

However, turning to the focus of this paper, education has been extensively researched in terms of labour market outcomes. As an essential element of human capital, lower education levels within a

group could result in being disadvantaged in the labour market. Chen & Wu (2007) find that, in the context of China, the development of education is beneficial to the increase in the employment rate. Similarly, Jamison et al. (2007) show that higher levels of education quality led to increased national income growth rates. O'Neill (1995) conducts a cross-country analysis and finds that, for developed countries, convergence in education levels within a country leads to a reduction in income inequality. In Duflo's (2001) research, the impact of policy implementation on earnings was investigated in the context of school construction in Indonesia between 1973 and 1978, using extensive cross-sectional data. The interactions between the variables denote the individual's age at the first treated year in 1974, and the program's intensity in their birth region. After controlling for region and cohort of birth fixed effects, the interactions are considered potentially exogenous variables. These interactions serve as instrumental variables in the analysis of wages. The findings indicate that for every new school built per 1,000 children, there was an increase of 1.5 to 2.7 per cent in earnings for the first fully treated cohort. Card and Krueger (1992) use similar methods to assess the impact of school quality on the economic benefits of education, finding that when controlling for state-fixed effects, there are significant positive effects of school quality on both the average years of schooling and the mean earnings of students.

There is a lack of literature surrounding the religious unemployment gap since the GFA, perhaps due to the assumption that the religious unemployment gap would continue to lessen with time.

Rowland et al. (2018) is one of the more recent studies. While many studies were conducted before the GFA in 1998, many were conducted during the height of the Troubles, and the Catholic-Protestant labour market differential was widely known. While some research has been undertaken to assess the impact or 'success' of the GFA, including Rowland et al. (2018) and Blackeby et al. (2008), there has been little exploration into the intricacies of the Agreement and what labour-efficient performance characteristics it may have improved.

The relationship between education quality and earnings is a primary concern for development economics; previous research has shown that education expansion has positive effects on growth and equality of opportunity (Battiston et al., 2014). Rowland et al. (2018) suggest that educational achievement could contribute to the differences in labour market outcomes. There has been much research on the impact of school quality on labour market outcomes, such as Duflo (2001), Card and Krueger (1992), Chen & Wu (2007), Jamison et al. (2007), and O'Neill (1995). This dissertation has two aims. The first is to explore how education exposure to the GFA has impacted labour market outcomes, particularly unemployment, earnings, and managerial status, and whether it favours Catholics. The second aim is to investigate Catholic-Protestant income differences using more recent and extended data from 2002 to 2020, utilising the methodology of Oaxaca-Blinder (1973).

## 4. Data

### 4.1 Sample and Data Source

The data is sourced from the UK Labour Force Survey (LFS), the UK's largest household survey, providing quarterly official employment and unemployment figures. This survey constitutes a sizeable random sample of UK individuals, including approximately 60,000 households and over 155,000 individuals (ONS, 2022). It operates on a system of five waves each quarter, with around 12,000 households interviewed across five consecutive quarters. The LFS provides variables on earnings, employment status, and socio-economic attributes, including age and marital status.

According to the International Labour Organisation (ILO) definitions, the workforce is categorised into three main groups: employed, unemployed, and economically inactive (ILO, 2022). An individual is considered employed if they engaged in any paid work during the week of the survey, were temporarily absent from their job, or participated in a government-run employment or training program. An individual is considered unemployed if they are jobless, available to start work within two weeks at the time of the survey and have either actively sought employment in the past four weeks or are waiting to start a job they have already secured. Individuals who do not fit into either of these categories are considered economically inactive. This category usually includes retirees, individuals with long-term illnesses or disabilities, and most full-time students. Economic inactivity is not included in this analysis.

The sample is limited to working-age individuals, with men aged 16-64 and women aged 16-59<sup>1</sup>. The LFS is UK-wide, but this sample excludes Scotland and Wales, making the sample exclusive to NI and England. Non-Christian individuals or those who did not state their religious denomination are excluded. Therefore, the sample consists of only Christians in England and Catholics and Protestants in NI.

---

<sup>1</sup> There was a state pension age change for women from 2010 to 2020, increasing from 60 to 65 and for men to 65 plus. However, for consistency, the sample remains restricted to the previously stated ages

Additionally, those who did not respond to economic activity prompts are excluded. These adjustments result in a pooled cross-sectional dataset from 2002 to 2020 with 2,785,427 observations. However, there are some concerns about data availability, as the question of religion was not introduced in England until 2002, which limits the use of England as a control group. Care is taken when analysing quarter-specific questions, as the LFS has been run on calendar quarters since 2006 and, before that, seasonal quarters.

## 4.2 Variables

Table 1 describes the variables used in this analysis, Table 2 shows the summary statistics, and Table 3 defines the cohorts.

### *Outcome Variables*

This study focuses on three outcome variables. The primary outcome variable is unemployment status. This variable is defined per the International Labour Organisation (ILO) definition stated in Section 4.1. The second outcome variable is gross income, which is in logarithm form for a straightforward interpretation. The third is managerial status.

### *Explanatory Variables*

For Northern Ireland, religious denomination is denoted by the variable *Religion*. The variables *Catholic* and *Protestants* equal one for their respective denominations and 0 for otherwise (for example, Catholic equals one if the individual identifies as Catholic, and equals zero if they identify as Protestant or Christian in England). As a result, the DID analysis is relative to the control group of Christians in England. The Protestant group includes Presbyterian, Church of Ireland, Methodist, and other smaller denominations. In England, individuals are not asked to specify their Christian denomination. Therefore, the variable only indicates "Christian". For clarification, Christian encompasses Protestant, Catholic and other Christian denominations. As previously mentioned,

individuals with no religion, no stated religion or a non-Christian religion are excluded from both NI and England.

Additionally, the term "Protestant" is not recognised in the LFS. Instead, the options include Presbyterian, Church of Ireland, Methodist, and "other." Thus, "Protestant" is a derived term used in this analysis to encompass all these denominations.

### *Control Variables*

Previous literature has shown that the control variables outlined in Table 1—sex, age, education, and marital status—collectively impact labour market outcomes. Therefore, they are used as control variables in this study.

The education variable has been derived from a LFS variable which indicates the age at which an individual completed full-time education. It is assumed that individuals who completed full-time education at 18 years or older have completed 14 years of education, while those who completed education at a younger age have completed fewer years.

### *Time Indicator Variable*

This study aims to gauge the effect of GFA exposure to education on labour market outcomes. Instead of a binary variable that distinguishes pre- and post-policy intervention, a continuous variable called *Degree of Exposure* indicates the degree of GFA exposure based on the years an individual has spent in education since 1998 when the GFA was implemented. This variable is calculated by assuming all individuals complete 14 years of education from ages 5 to 18. Variables that indicate the year of birth and age in the survey year are used to derive this variable. The degree of exposure is expressed as the proportion of education years post-GFA out of the total fourteen years. The variable ranges from zero to one, where zero indicates no exposure (education ended in 1998 or before), and one indicates full exposure (education started after 1998). Values between zero and one indicate partial exposure, corresponding to the number of education years post-GFA.

**Table 1. Variable Descriptions**

Religion	= 1 if Catholic = 0 if Protestant
Catholic	= 1 if Catholic = 0 otherwise
Protestant	= 1 if Protestant = 0 otherwise
Degree of Exposure	Measures the degree of GFA exposure to education in no. years and ranges from 0 to 1
Unemployed	= 1 if unemployed = 0 otherwise
Manager	= 1 if holds a managerial or supervisory role = 0 if otherwise
Log (Gross Income)	The logarithm of gross income
Sex	= 1 if male = 0 if female
Marital Status	= 1 if married = 0 if otherwise
Age	Working age 16-64 for men and 16-59 for women
Education	No. years of school education

*Note: The Religion variable includes only those in Northern Ireland*

### 4.3 Descriptive Statistics

This section presents descriptive statistics of the sample.

Variable	Obs	Mean	Std. dev.	Min	Max
Religion	208,556	.4433773	.4967847	0	1
Catholic	2,785,427	.0331974	.1791518	0	1
Protestant	2,785,427	.0416766	.199849	0	1
Degree of Exposure	2,785,427	.1198064	.2675154	0	1
Unemployed	2,785,427	.0395763	.1949617	0	1
Manager	1,828,661	.3839372	.486343	0	1
Log (Gross Income)	485,337	8.052368	2.015025	0	11.51283
Sex	2,785,427	.4900627	.4999013	0	1
Marital Status	2,785,410	.5311958	.499026	0	1
Age	2,785,427	40.82232	13.18946	16	64
Education	2,581,333	12.75643	1.176964	1	14
<b>No. of observations</b>	<b>2,785,427</b>				

Cohort Pooled by Graduation Year	Catholics (NI)	Protestants (NI)	Christian (Eng)	Total
<b>1963-1967 (1)</b>	2,987	4,978	171,386	179,351
<b>1968-1972 (2)</b>	5,505	8,015	235,317	248,837
<b>1973-1977 (3)</b>	8,215	11,603	300,414	320,232
<b>1978-1982 (4)</b>	10,716	14,600	351,134	376,450
<b>1983-1987 (5)</b>	11,034	14,632	343,754	369,420
<b>1988-1992 (6)</b>	10,373	13,532	286,587	310,492
<b>1993-1997 (7)</b>	10,004	11,249	226,121	247,374
<b>1998-2002 (8) Partially Exposed</b>	10,669	11,077	216,436	238,182
<b>2003-2007 (9)</b>	10,084	10,839	195,154	216,077
<b>2008-2012 (10)</b>	6,409	7,401	116,067	129,877
<b>2013-2017 (11) Fully Exposed</b>	3,677	4,258	55,778	63,713
<b>2018-2022 (12)</b>	1,815	1,982	18,282	22,079
<b>Total</b>	<b>92,469</b>	<b>116,087</b>	<b>2,576,871</b>	<b>2,785,427</b>

*Note: The sample composition is based on cohort. The graduation year is derived from the year of birth and assumes that all individuals complete 14 years of school education, thus graduating from secondary school at age 18. These cohorts are pooled into five years.*

The proportion of the sample representing Northern Ireland is relatively small, making up just 7.5% of the total sample size. This is representative of the NI England population ratio (Park, 2022). While there are some missing values for income, this is due to the exclusion of data for the unemployed.

Additionally, there are a few missing observations for education, with an average of approximately 12.8 years of education completed.

Of the NI sample, there is a relatively even split between Catholics and Protestants, with Catholics making up 44.33% and Protestants comprising 55.67%. This is fairly reflective of the NI population, as shown in the 2011 NI Census, where 45% were Catholic and 48% were Protestant, other Christian, or Christian-related denomination (NISRA, 2011).

Given that age is a key factor in the analysis, the sample is divided into several cohorts based on graduation year (derived from age), summarised in Table 3.

As illustrated in Table 3, the sample is not split completely evenly between cohorts and groups (Catholics and Protestants in NI and Christians in England). The oldest and youngest cohorts have smaller sample sizes.

## **5. Methodology**

### **5.1 Identification Strategy**

This study aims to assess the impact of education exposed to the GFA on labour outcomes and its differential impact on Catholics and Protestants. This is executed through cohort analysis inspired by Duflo's (2001) identification method. The research also explores the impact of the policy on various cohorts based on their age relative to the policy implementation. Typically, children in Northern Ireland attend school between the ages of 5 and 18. By using age and assuming an average school completion age of 18, we can derive an individual's graduation year and group cohorts by school graduation year. All children born before 1980 were 18 or older in 1998 when the Good Friday Agreement was signed and therefore were not exposed. The cohort that graduated in 1998 is also considered unexposed since the Agreement was signed in April of that year, and schools finish for the academic year in June. As the policy is expected to be a gradual implementation, 1998 graduates are considered with the rest of the unexposed cohorts. For younger children, the exposure to the policy is an increasing function of their date of birth (Duflo, 2001), indicating that the policy's effect should be negligible for children aged 18 or older in 1998 and increasing for younger children. While Duflo's paper focuses mainly on Instrumental Variable (IV) estimation, this study instead uses DID methodology for policy evaluation by comparing changes over time between the treatment and control groups. Furthermore, income decompositions are performed using the Oaxaca-Blinder (1973) methodology to explore the possibility of discrimination in the labour market.

### **5.2 Model**

The following section will outline the DID estimation strategy and its assumptions.

#### **Differences-in-Difference Model:**

Difference-in-differences estimation methods are commonly employed to identify and estimate the average impact of treatment on individuals who change from being untreated to being treated. In this study, the DID model is used to evaluate the causal effect of the Good Friday Agreement's

exposure to education on labour market outcomes between Protestants and Catholics in Northern Ireland. The DID estimation strategy requires several assumptions:

First, DID strategies require observing units over time, both before and after they receive treatment (Callaway, 2023). In this study, the treated groups are Protestants in NI and Catholics in NI, while the control group comprises Christians in England<sup>2</sup>. The average treatment effect of the policy can be obtained by comparing the estimates of the two treatment groups to the control group.

Second, the main identifying assumption of DID analysis is the parallel trends assumption, which is vital for ensuring internal validity. Essentially, this assumption states that in the absence of exposure to the treatment, the outcomes for the treated group should follow the same path as the outcomes the untreated group experienced (Callaway, 2023). This is a critical concept to remember when examining the outcomes for Catholics in NI, Protestants in NI, and Christians in England concerning the GFA policy. While testing this assumption for Christians in England may be challenging since they are only observed after the policy is implemented, pre-trends can be examined to support this assumption. This assumption is tested using pre-trends and is outlined in section 5.3.

Third, DID allows for the consideration of heterogeneity in treatment effects. This means that the impact of the exposure may vary across different units across various time periods, and in terms of the duration of exposure to the treatment (Callaway, 2023).

The DID approach offers several valuable advantages by deducing the distinction between the control group pre- and post-policy implementation from the disparity between the treatment groups pre- and post-policy implementation. This method utilises multiple time periods, diverging from the conventional pre- and post-structure with only two time periods, and instead involves the level of exposure each year after the intervention as the DID time indicator.

---

<sup>2</sup> Treated and exposed are used interchangeably in the Section 5, however the rest of the paper refers to the treatment groups as *exposed* groups

### 5.3 Empirical Specification

The following section outlines the econometric specification of the model.

#### Linear Regression Model:

The following equation is estimated as a Linear Regression Model and is used as a basis for the following analysis:

$$y_i = \alpha + \delta c_i + \beta \mathbf{X}_i + \varepsilon_i, \quad i = 1, \dots, n. \quad (1)$$

Where  $y_i$  is the outcome variable for individual  $i$  (for example equals 1 if individual  $i$  is unemployed and 0 otherwise),  $c_i$  is equal to 1 if Catholic and 0 if Protestant, and  $\mathbf{X}_i$  is a set of observed control variables as set out in Table 1.  $\alpha$  is a constant term, and  $\varepsilon_i$  is the error term, which captures idiosyncratic changes in the dependent variable.  $n$  is the number of observations in the sample.

#### Differences-in-Differences Specification:

The DID regression model is as follows:

$$Y_{ict} = \alpha + \beta_1 Exp_c + \beta_2 Cath_i + \beta_3 Prot_i + \beta_4 (Exp_c \times Cath_i) + \beta_5 (Exp_c \times Prot_i) + \mathbf{X}_i + \delta_c + \gamma_t + (Cath_i \times t) + (Prot_i \times t) + \varepsilon_{ict} \quad (2)$$

$Y_{ict}$  is the outcome variable for individual  $i$  for cohort  $c$  at time  $t$ . The outcomes include unemployment, log of gross income and managerial status. Unemployment and managerial status are dummy variables indicating whether the individual  $i$  in cohort  $c$  at time  $t$  is unemployed or not, or has managerial status or not, respectively.  $Cath_i$  is used to identify Catholic individuals, and  $Prot_i$  is used to identify Protestant individuals, both binary variables.  $Exp_c$  is a continuous variable used to indicate the degree of exposure a cohort's education received to the GFA, ranging from zero to one, zero prior to 1998 and 1 being all 14 years of education exposed to the GFA. This is used instead of a

standard dummy variable to enable the effect of the GFA exposure to education to vary over time and, therefore, observe dynamic effects.  $X_i$  is a set of demographic controls including sex, education and marital status.  $\delta_c$  is cohort fixed effects, which control for time-invariant heterogeneity between cohorts that could influence the effect of the GFA.  $\gamma_t$  is time (survey year in NI) fixed effects that controls for contemporaneous shocks common to all individuals.  $(Cath_i \times t)$  and  $(Prot_i \times t)$  are group-specific linear trends.  $\alpha$  is a constant term, and  $\varepsilon_{ict}$  is the error term, which captures idiosyncratic changes in the dependent variable. Therefore,  $\beta_4$  and  $\beta_5$  are the DID coefficients of interest, which capture the average treatment effect of an additional year of education exposed to the GFA on Catholics and Protestants in NI. They are equal to the causal effect of being exposed to the treatment. This interpretation relies on the identification assumption that there are no omitted time-varying and cohort-specific effects correlated with the program.

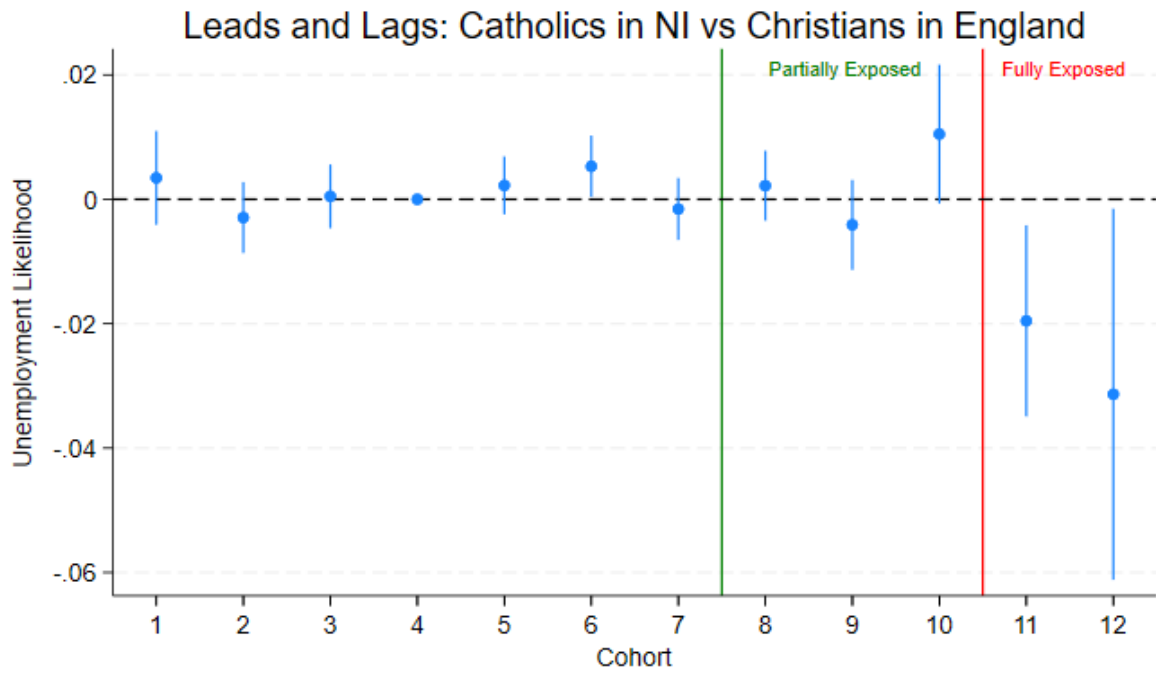
To estimate cohort-by-cohort contrasts and test the plausibility of the parallel trends assumption via leads and lags, equation (2) is altered and estimated in the following way:

$$\begin{aligned}
 Y_{ict} = \alpha + \sum_{c=1}^{12} (Cath_i \times d_{ic})\beta_{1c} \\
 + \sum_{c=1}^{12} (Prot_i \times d_{ic})\eta_{1c} + \mathbf{X}_i + \delta_c + \gamma_t + (Cath_i \times t) + (Prot_i \times t) + \varepsilon_{ict}
 \end{aligned}
 \tag{3}$$

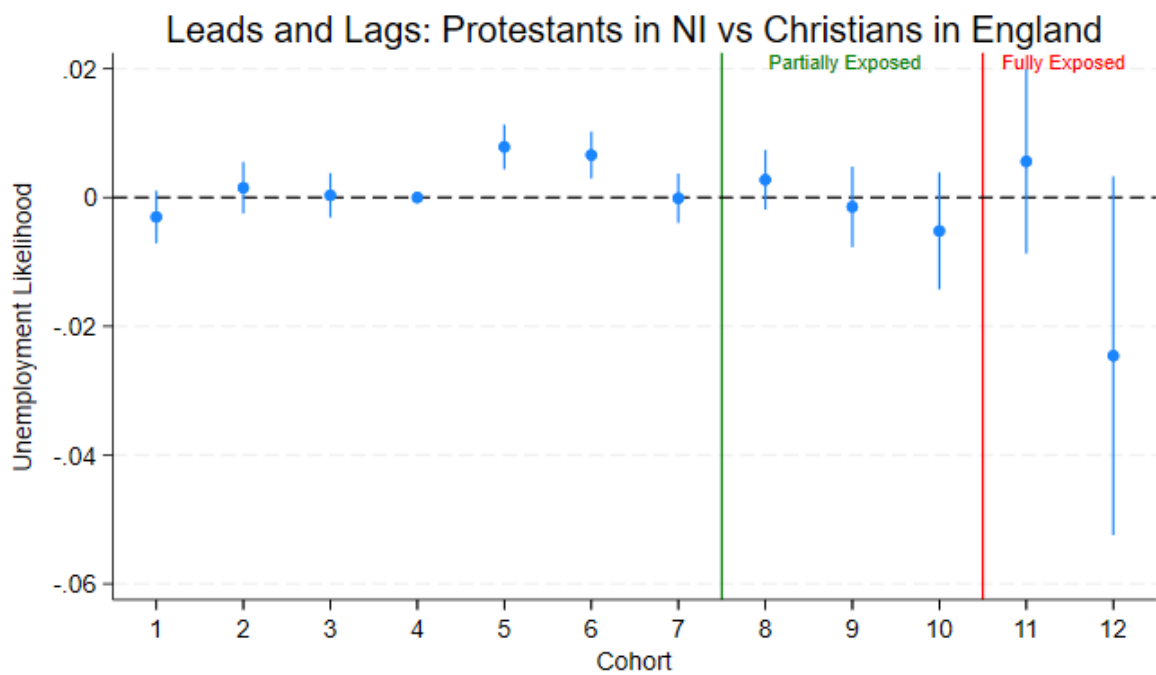
There is a testable restriction on the pattern of coefficients  $\beta_{1c}$  and  $\eta_{1c}$ . Because cohorts who graduated in 1998 or before did not benefit from the program, the coefficients should be 0 for  $c < 8$  and start growing in magnitude for  $c$  greater than some threshold (the oldest age at which an individual could be exposed to the policy and still benefit from it).

Figures 1 and 2 plot the coefficients of the likelihood of unemployment for each cohort from the leads and lags regression. The cohorts are defined in Table 3.

**Figure 1:**



**Figure 2:**



The y-axis represents the likelihood of unemployment, with positive values indicating higher-than-average outcomes and negative values indicating lower-than-average outcomes. The data points indicate the average outcome for each cohort, while the vertical lines through each data point represent the confidence intervals or the range of statistical uncertainty around the estimate. The green line indicates the policy intervention and the cohorts after this line are partially exposed. The cohorts after the red line indicate fully exposed cohorts.

The pre-intervention trends appear reasonably flat and close to zero, with minor violations of parallel trends. Notably, the impact of the policy intervention is observed mainly in the fully exposed cohorts, with the youngest cohort (cohort 12) benefitting the most from the GFA.

Despite the unusual observed positive estimates for different cohorts (cohort 10 for Catholics and cohort 11 for Protestants), which are likely due to effects that the survey year fixed effect, cohort fixed effects, or linear trends failed to capture, the results of this analysis provide valuable insights into the dynamic effects of the Good Friday Agreement on unemployment likelihood. Additionally, the younger cohorts have wider confidence intervals, suggesting more uncertainty about the estimate. However, all Catholic coefficients are statistically different from zero for the fully exposed cohorts after the graduation year 2013, and the Protestant coefficient of the youngest cohort, graduating after 2013, is statistically different from zero.

Furthermore, the leads and lags plots for unemployment and the logarithm of gross income (Figures 3 and 4 in the Appendix) provide a reasonable case for the parallel trend assumption to hold as the plots are fairly flat and close to zero before the GFA. The managerial status plots (Figures 5 and 6 in the Appendix) are noisy and exhibit more significant variation from the trend, hence yielding less robust results for the parallel trend assumption.

Overall, this analysis contributes to a better understanding of the impact of the Good Friday Agreement on the selected labour market outcomes, highlighting the importance of considering the timing and extent of exposure to the policy in determining its effectiveness.

### The Decomposition of Wage Differentials:

Previous studies have investigated the gap in labour market outcome between Catholics and Protestants (Borooah et al., 1995; Blackeby et al., 2008). This particular analysis investigates income differences between the two religious groups using the Oaxaca-Blinder (1973) decomposition methodology. This empirical method involves accounting for all individual characteristics that contribute to differences in pay with a sample of employees from each religion. Then a residual is isolated which these normal factors of income inequality cannot explain. This residual is indicative of Catholic discrimination; however, this is not completely definitive. In other words, the aim is to assess the percentage of the average income gap between Protestants and Catholics that can be attributed to religious discrimination.

The formulation of the analysis model is as follows:

$$\omega_{gi} = \beta_{g0} + \sum_{k=1}^K X_{gik} \beta_{gk} + \varepsilon_{gi} \quad i = 1, \dots, n \quad (4)$$

where  $\omega_{gi}$  is the logarithm of the gross income of an individual  $i$  of religious group  $g$  (P = Protestant; C = Catholic).  $X_{gi1}, X_{gi2}, \dots, X_{gik}$  are  $k$  observable characteristics that explain  $\omega$  (here: age, sex, education, and marital status) valued differently according to the individual's religion.  $\varepsilon_{gi}$  is the error term conditionally independent of  $X_{gi}$  such that  $E(\varepsilon_{gi} | X_{gi}) = 0$  (conditional null mean).  $\beta_{g0}$  and  $\beta_{gk}$  are parameters to be estimated. Thus, the natural logarithm of income is modelled by a linear function of the individual's characteristics and the error term.

The Oaxaca-Blinder (1973) decomposition estimates the wage equations for men and women separately so the same is done here, Protestants and Catholics incomes are estimated separately.

$$\bar{W}_C = \beta_{C0} + \sum_{k=1}^K \bar{X}_{Ck} \beta_{Ck} \quad (5)$$

And

$$\bar{W}_P = \beta_{P0} + \sum_{k=1}^K \bar{X}_{Pk} \beta_{Pk} \quad (6)$$

The gap  $\Delta_0$  between the logarithm of the average Protestant income ( $\bar{W}_P$ ) and the logarithm of the average Catholic income ( $\bar{W}_C$ ) is then decomposed into the explained gap ( $\Delta_{explained}$ ) and the unexplained gap ( $\Delta_{unexplained}$ ). This is the difference between equation 5 and 6.

$$\widehat{\Delta}_0^\mu = \bar{W}_P - \bar{W}_C = \left( \beta_{P0} + \sum_{k=1}^K \bar{X}_{Pk} \beta_{Pk} \right) - \left( \beta_{C0} + \sum_{k=1}^K \bar{X}_{Ck} \beta_{Ck} \right) \quad (7)$$

$$\widehat{\Delta}_0^\mu = \left( \sum_k (\bar{X}_{Pk} - \bar{X}_{Ck}) \hat{\beta}_{Pk} \right) + \left( (\hat{\beta}_{P0} - \hat{\beta}_{C0}) + \sum_k \bar{X}_{Ck} (\hat{\beta}_{Pk} - \hat{\beta}_{Ck}) \right) \quad (8)$$

With:

$\sum_k (\bar{X}_{Pk} - \bar{X}_{Ck}) \hat{\beta}_{Pk}$  the explained variation noted  $\widehat{\Delta}_X^\mu$  (*explained*), also referred to as the *composition effect*.

$(\hat{\beta}_{P0} - \hat{\beta}_{C0}) + \sum_k \bar{X}_{Ck} (\hat{\beta}_{Pk} - \hat{\beta}_{Ck})$  the unexplained variation noted  $\widehat{\Delta}_S^\mu$  (*unexplained*).

$\bar{X}_{Pk}$  for example, corresponds to the average of the characteristic  $X_K$  for a group of Protestants.

In practice, these coefficients are estimated by separate linear regressions for Catholics and Protestants.  $\Delta_{explained}$ , denotes the explained (composition) effect and is the difference in income due to differences in the individuals' observed covariates (endowments) across the two religious groups. For example, the composition effect is the part of the mean religious income gap that is explained by observable differences in mean characteristics,  $\bar{X}_{Pk} - \bar{X}_{Ck}$ , among Protestants and Catholics, like education and labour market experience. This is the gap that would remain if each characteristic were valued equally across both religious groups, in other words, in the absence of differences in the valuation of characteristics, Catholics would be paid the same as Protestants.  $\Delta_{unexplained}$ , denotes the unexplained effect and is the difference in mean income due to the difference in returns to individual characteristics,  $\hat{\beta}_{Pk} - \hat{\beta}_{Ck}$ . The intercept difference,  $\hat{\beta}_{P0} - \hat{\beta}_{C0}$ , is interpreted as part of the unexplained gap attributed to group membership. The unexplained component is the religious income gap often associated with labour market discrimination, omitted variables, and unobserved heterogeneity (Oaxaca-Blinder, 1973).

Year-fixed effects are included to ensure the analysis's robustness; only the necessary ones are included. Some are dropped due to missing income observations for the cohort, often due to individuals not being in the workforce, such as students or retirees. On occasion, year-fixed effects are dropped due to unexplained zero variance, but this is rare and unlikely to have much effect on the analysis.

In accordance with Oaxaca's (1973) definition, discrimination against Catholics can be said to exist whenever Protestants' relative income exceeds that which would prevail if Protestants and Catholics were paid according to the same criteria.

#### 5.4 Limitations

It is important to acknowledge the potential spillover effects of the GFA on other groups, particularly the control group of Christians in England. The less exposed groups may still be affected, which can lead to an underestimation of the effect. Events such as cohorts moving to England may result in underestimation, causing the effect not to be seen in NI as strongly as expected. The migration of people from Northern Ireland to England during the Troubles was not uncommon in the 1970s and 1980s, resulting in net-out migration. Conversely, the region has experienced an approximate balance between incoming and outgoing migration flows since the late 1990s (Russell, 2012).

Existing literature explores the idea of relaxing or allowing the assumption of parallel trends to be violated. The pre-testing approach illustrated in Figures 1 and 2 (Figures 3, 4, 5 and 6 in the appendix) aids the plausibility of the parallel trend assumption. There may be slight pre-trends, but previous literature has allowed this as researchers may still wish to learn something about the treatment effect of interest, especially if the violation of parallel trends is "small" in magnitude (Roth et al., 2023). Hence, this study will assume that the parallel trends criterion is reasonable while considering pre-trends' potential when interpreting the results.

Moreover, missing data and a small sample size for younger cohorts may cause bias in the estimation. Again, this is considered in the interpretation. Additionally, it is worth noting that the youngest cohorts may be negatively selected since only individuals with low income and little experience are observed, as many others from these cohorts are in university and are not included, resulting in a small sample size. Therefore, cohorts 10, 11 and 12 are pooled together for the income decompositions outlined in section 5.3 to address this issue.

## 6. Results

This section presents the results. In line with Section 5's structure, it will address the findings for each relationship individually.

### 6.1 Linear Regression Model

The results of the Linear Regression Model outlined in Section 5.3 are presented below, in Table 4.

This serves as a basis for further analysis.

VARIABLES	Linear Regression Model					
	(1) Unemployed	(2) Additional Controls	(3) Log Gross Income	(4) Additional Controls	(5) Managerial Status	(6) Managerial Status
Religion	0.00993*** (0.000857)	0.0101*** (0.000915)	-0.164*** (0.0259)	-0.175*** (0.0236)	-0.00475* (0.00274)	-0.00552** (0.00271)
Sex		0.0263*** (0.000897)		0.512*** (0.0234)		0.0701*** (0.00268)
Age		-0.00145*** (0.000047)		0.0331*** (0.00118)		0.00580*** (0.000130)
Education		-0.00988*** (0.000404)		0.658*** (0.0129)		0.0977*** (0.00135)
Marital		-0.0393*** (0.000961)		0.377*** (0.0256)		0.106*** (0.00305)
Constant	0.0339*** (0.000531)	0.231*** (0.00628)	7.791*** (0.0165)	-2.566*** (0.187)	0.332*** (0.00178)	-1.267*** (0.0194)
Observations	208,556	188,490	25,008	24,274	121,020	116,649
R-squared	0.001	0.031	0.002	0.157	0.000	0.079

Table 4: Regression results illustrate the relationship between being Catholic in NI and the referenced outcome variables. The reference group is Protestants in NI. Religion = 1 for Catholic and = 0 for Protestant. Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

According to the analysis, there appears to be a significant and positive relationship between being Catholic and the likelihood of unemployment in Northern Ireland. The findings remain statistically significant even after controlling for other factors, indicating that, as evidenced in column (2), being Catholic is associated with a 0.0101 increased likelihood of being unemployed compared to Protestants. In addition, the study shows in column (4) that Catholics have an income approximately 17.5% lower than Protestants, which is statistically significant at the 1% level. Finally, the findings of column (6) suggest that Catholics are less likely to hold managerial positions than Protestants, although this effect is small.

These findings align with previous research indicating that Catholics are at a disadvantage in the labour market (Rowland et al., 2018; Osborne, 1980). However, it is essential to note that these results do not necessarily prove that religious identity is the sole cause of this disparity.

Nevertheless, the study suggests that religious identity does play a role in labour market outcomes.

Further research will investigate the root cause of these outcomes and whether the Good Friday Agreement has had a positive impact on both Catholic and Protestant labour market outcomes.

## 6.2 Difference-in-Differences Regression

The results of the DID regression from equation (2) are presented below in Table 5.

Difference-in-Differences Regression on Unemployment					
VARIABLES	(1) Baseline	(2) Additional Controls	(3) Year FE	(4) Year and Cohort FE	(5) Linear Trends
Degree of Exposure	0.0818*** (0.000661)	0.0822*** (0.000972)	0.0886*** (0.00101)		
Catholic	0.00680*** (0.000726)	0.00775*** (0.000736)	0.0232*** (0.00386)	0.0221*** (0.00387)	
Protestant	-0.00421*** (0.000544)	-0.00317*** (0.000547)	0.0124*** (0.00383)	0.0117*** (0.00383)	
Catholic*Exposure	-0.0458*** (0.00243)	-0.0159*** (0.00398)	-0.0108*** (0.00404)	-0.00786* (0.00405)	-0.00502 (0.00416)
Protestant*Exposure	-0.0348*** (0.00223)	-0.0149*** (0.00342)	-0.00827** (0.00353)	-0.00608* (0.00353)	-0.00837** (0.00361)
Sex		0.0105*** (0.000235)	0.0105*** (0.000235)	0.0119*** (0.000239)	0.0119*** (0.000239)
Education		-0.00586*** (0.000101)	-0.00537*** (0.000102)	-0.00691*** (0.000110)	-0.00691*** (0.000110)
Marital Status		-0.0323*** (0.000254)	-0.0313*** (0.000253)	-0.0285*** (0.000254)	-0.0285*** (0.000254)
Constant	0.0303*** (0.000118)	0.119*** (0.00133)	0.111*** (0.00138)	0.135*** (0.00147)	0.136*** (0.00144)
Observations	2,785,427	2,581,332	2,581,332	2,581,332	2,581,332
R-squared	0.012	0.021	0.023	0.024	0.024

Table 5: Regression results illustrate the impact of the degree of education exposure to the GFA on the likelihood of unemployment for Catholics and Protestants in NI relative to Christians in England. Model (1) includes no controls, Model (2) includes sociodemographic control variables, Model (3) adds survey year fixed effects, Model (4) adds cohort fixed effects, and Model (5) adds linear trends. Model (5), therefore, includes control variables, year and cohort fixed effects, and linear trends. Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Across models (1) - (3), the Exposure variable shows a positive significant coefficient at the 1% level.

This finding suggests that individuals in Northern Ireland are more likely to be unemployed before accounting for religious affiliation than the control group in England. The coefficients for Catholics consistently show a positive relationship with unemployment, indicating a higher likelihood of unemployment than the control group. This relationship remains statistically significant across all model specifications. Initially, the relationship between Protestants and unemployment appears negative in models (1) and (2), but changes to positive and remains highly significant in models (3) and (4). When accounting for survey year and cohort fixed effects, the results reveal that Protestants

in NI are more likely to be unemployed relative to Christians in England. This shift highlights the importance of considering temporal and cohort-specific variations in the analysis.

The interaction terms play a crucial role in this analysis, as they measure the effect of the DID and show how the exposure affects Catholics and Protestants in NI compared to the control group of Christians in England. The results suggest that each additional year of GFA exposure to education reduces the probability of unemployment for these exposure groups. However, the magnitude of the effect decreases as more controls and trends are added.

According to the Baseline model, the impact of education exposure to the GFA on reducing the likelihood of unemployment is greater for Catholics than Protestants, with a difference of 0.011. This finding suggests that education is crucial in reducing unemployment, particularly for Catholics. The statistical significance of both interaction coefficients, at the 1% level, further supports this conclusion.

In Model (2), where sex, education and marital status are included as additional controls, the two treatment groups' negative and statistically significant interactions persist at the 1% level. However, the magnitude of these interactions is now quite similar, with only a minor discrepancy observed between Protestants and Catholics.

The magnitude diminishes and is significant at the 10% level when including survey year and cohort fixed effects. Based on model (4), it appears that each additional year of education exposed to the GFA has a negative effect on the likelihood of unemployment for Catholics of 0.00786, while for Protestants, the negative impact is slightly smaller at 0.00608.

The inclusion of linear trends, as illustrated in model (5), reduces the impact on exposed Catholics, rendering it non-significant. However, the magnitude of the effect on exposed Protestants is larger than on exposed Catholics and is statistically significant at the 5% level. This interesting shift could be attributed to the addition of linear trends that contributed to a more accurate depiction of the actual effect of exposure on Protestants rather than Catholics. Referring to Figures (1) and (2), the

dynamic effects can be observed to infer that fully exposed cohorts for both groups experience the greatest exposure effect, especially for Catholics. Overall, from Table (5), both groups experience an improvement in unemployment relative to Christians in England, albeit small, and for Catholics, non-significant.

Additionally, it is plausible that economic and political trends over time in NI have affected Protestants and Catholics differently. For instance, Protestants could benefit more from additional years of education exposed to the GFA in terms of employment, possibly due to factors like differential access to opportunities or networks not adequately captured in earlier models. Furthermore, the inclusion of both cohort fixed effects and linear trends, followed by identifying a shift in magnitude and significance, indicates that the influence of education exposure to the GFA on unemployment may exhibit distinct temporal variations for the cohorts in the two groups. This shift could reflect changes in the labour market, policy environment, or other exogenous factors unaccounted for in the model.

Furthermore, it appears that the educational exposure to the GFA has a more consistent and robust effect on unemployment over time for Protestants, as indicated by the statistical significance of exposed Protestants but not Catholics in model (5). On the other hand, the effect may be more variable or influenced by other factors for Catholics, resulting in a lack of statistical significance. This suggests heterogeneity in the treatment effect, possibly due to differences in how education interacts with other variables such as discrimination, region-specific economic conditions, or industry composition. Unfortunately, the QLFS does not provide region-specific data for Northern Ireland, precluding further investigation in this area. While industry composition is not explored in this study, it could be a valuable subject for future research, given the evidence of occupational differences between Catholics and Protestants in NI from older data (Aunger, 1975; Osborne, 1980). Discrimination is investigated through wage decompositions later in this section.

Regarding the control variables, the likelihood of being unemployed is most affected by sex, followed by years of education and marital status. This suggests that females, those with more education, and married individuals are less likely to be unemployed. These findings are consistent and statistically significant at the 1% level.

Difference-in-Differences Regression on Log Gross Income

VARIABLES	(1) Baseline	(2) Additional Controls	(3) Year FE	(4) Year and Cohort FE	(5) Linear Trends
Degree of Exposure	-1.868*** (0.0152)	-1.047*** (0.0160)	-1.586*** (0.0161)		
Catholic	-0.356*** (0.0220)	-0.527*** (0.0208)	-0.669*** (0.175)	-0.619*** (0.174)	
Protestant	-0.266*** (0.0182)	-0.386*** (0.0170)	-0.518*** (0.174)	-0.480*** (0.174)	
Catholic*Exposure	0.262*** (0.0716)	-0.150** (0.0736)	-0.0399 (0.0733)	-0.0947 (0.0721)	-0.126* (0.0738)
Protestant*Exposure	0.609*** (0.0635)	0.0587 (0.0625)	0.146** (0.0632)	0.105* (0.0627)	0.130** (0.0640)
Sex		0.669*** (0.00536)	0.680*** (0.00525)	0.689*** (0.00526)	0.689*** (0.00526)
Education		0.478*** (0.00243)	0.435*** (0.00240)	0.449*** (0.00254)	0.449*** (0.00254)
Marital Status		0.258*** (0.00571)	0.196*** (0.00564)	0.162*** (0.00576)	0.162*** (0.00576)
Constant	8.223*** (0.00305)	1.633*** (0.0319)	2.258*** (0.0329)	1.984*** (0.0343)	1.956*** (0.0331)
Observations	485,337	470,805	470,805	470,805	470,805
R-squared	0.041	0.113	0.146	0.149	0.149

*Table 6: Regression results illustrate the impact of the degree of education exposure to the GFA on the logarithm of gross income for Catholics and Protestants in NI relative to Christians in England. Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$*

Table 6 shows that regardless of GFA exposure, Catholics and Protestants in NI consistently earn less than Christians in England, with Catholics earning 52.7% less and Protestants earning 38.6% less than the control group, holding sex, education, and marital status constant (model 2)<sup>3</sup>. When year and cohort-fixed effects are considered, Protestant's income benefits from additional years of education exposed to the GFA, while Catholics do not. The study finds that an additional year of education exposed to the GFA increases income by approximately 13.0% for Protestants and decreases income by approximately 12.6% for Catholics (model 5). Both are statistically significant from zero.

<sup>3</sup> It is worth noting that the policy's impact on income is estimated with less precision than its effect on unemployment. This is due to the greater variability in income and the smaller sample size resulting from excluding self-employed individuals from income data collection.

Referring to Figures 3 and 4 (in the Appendix), Catholics experienced a downward trend in income after the policy intervention, with the fully exposed cohorts experiencing the largest negative impact. For Protestants, there appears to be an upward trend in income for the partially exposed cohorts, which is consistent with the DID results in Table 6. However, the youngest cohort unexpectedly exhibits a negative effect. This could be due to the small sample size for cohort 12. Furthermore, the study shows that females have lower incomes than males and that educational attainment is positively associated with income, highlighting the importance of education for higher income levels.

Difference-in-Differences Regression on Managerial Status

VARIABLES	(1) Baseline	(2) Additional Controls	(3) Year FE	(4) Year and Cohort FE	(5) Linear Trends
Degree of Exposure	-0.376*** (0.00121)	-0.332*** (0.00165)	-0.337*** (0.00172)		
Catholic	-0.0482*** (0.00245)	-0.0752*** (0.00241)	-0.0492*** (0.0148)	-0.0369** (0.0146)	
Protestant	-0.0508*** (0.00206)	-0.0698*** (0.00200)	-0.0437*** (0.0148)	-0.0356** (0.0146)	
Catholic*Exposure	0.0547*** (0.00581)	0.0493*** (0.00679)	0.0460*** (0.00695)	0.0279*** (0.00695)	0.0244*** (0.00717)
Protestants*Exposure	0.0700*** (0.00505)	0.0495*** (0.00575)	0.0455*** (0.00599)	0.0305*** (0.00599)	0.0331*** (0.00615)
Sex		0.111*** (0.000713)	0.111*** (0.000713)	0.113*** (0.000715)	0.113*** (0.000715)
Education		0.0772*** (0.000318)	0.0768*** (0.000321)	0.0822*** (0.000339)	0.0822*** (0.000339)
Marital Status		0.0809*** (0.000771)	0.0801*** (0.000775)	0.0654*** (0.000804)	0.0654*** (0.000804)
Constant	0.424*** (0.000407)	-0.667*** (0.00412)	-0.663*** (0.00429)	-0.752*** (0.00447)	-0.754*** (0.00436)
Observations	1,828,661	1,760,016	1,760,016	1,760,016	1,760,016
R-squared	0.033	0.068	0.069	0.074	0.074

*Table 7: Regression results illustrate the impact of the degree of education exposure to the GFA on the likelihood of having a managerial role for Catholics and Protestants in NI relative to Christians in England. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1*

The findings presented in Table 7 suggest that Catholics and Protestants in Northern Ireland face a persistent disadvantage in attaining managerial positions compared to their Christian counterparts in England. The results consistently demonstrate a negative association between religious affiliation and managerial status across all models.

The interaction terms reveal that an additional year of education exposed to the GFA positively affects the probability of both Catholic and Protestant groups obtaining a managerial role. The coefficients for the interaction terms are positive in all models, indicating potential benefits for both groups.

When controlling for other variables in model (2), the analysis shows that each additional year of education exposed to the GFA has a highly statistically significant positive effect on the probability of

Catholics and Protestants holding managerial positions. Specifically, Catholics experience a positive effect of 0.0493, while Protestants experience a very similar positive effect of 0.0495.

After incorporating fixed effects and linear trends in Model (5), the results still show a benefit to both groups, particularly for Protestants - a statistically significant positive effect of 0.0331 for Protestants and 0.0244 for Catholics at the 1% level.

Figures 5 and 6 (in the Appendix) demonstrate an upward trend in managerial status likelihood for partially exposed cohorts of both groups, with the youngest fully exposed cohort (cohort 12) experiencing the greatest impact. However, this outcome variable does not have a strongly robust parallel trend assumption. Overall, both Catholics and Protestants experience a modest improvement in their likelihood of obtaining a managerial position with each additional year of GFA-exposed education relative to Christians in England.

Although the R-squared values are small for all specifications in Tables 5, 6 and 7, the inclusion of controls leads to an increase in R-squared values across all models, indicating a better ability of the Model to explain the variance in outcome variables. The highest R-squared value is observed in models incorporating control variables, survey year fixed effects, cohort fixed effects, and linear trends, indicating a better fit. Nonetheless, this is of little concern, given the context of DID analysis.

### 6.3 Oaxaca-Blinder Decomposition Results

The findings of the Oaxaca-Blinder decomposition estimation by religion and cohort are displayed in Figures 7 and 8, with the estimations themselves included in Table 8 (in the Appendix). The income differentials due to unexplained components, as indicated in Table 8, are largely statistically significant. The main story that can be drawn from the income decompositions estimates in Table 8 is that Catholics are more educated (more endowments) yet still have lower incomes than Protestants.

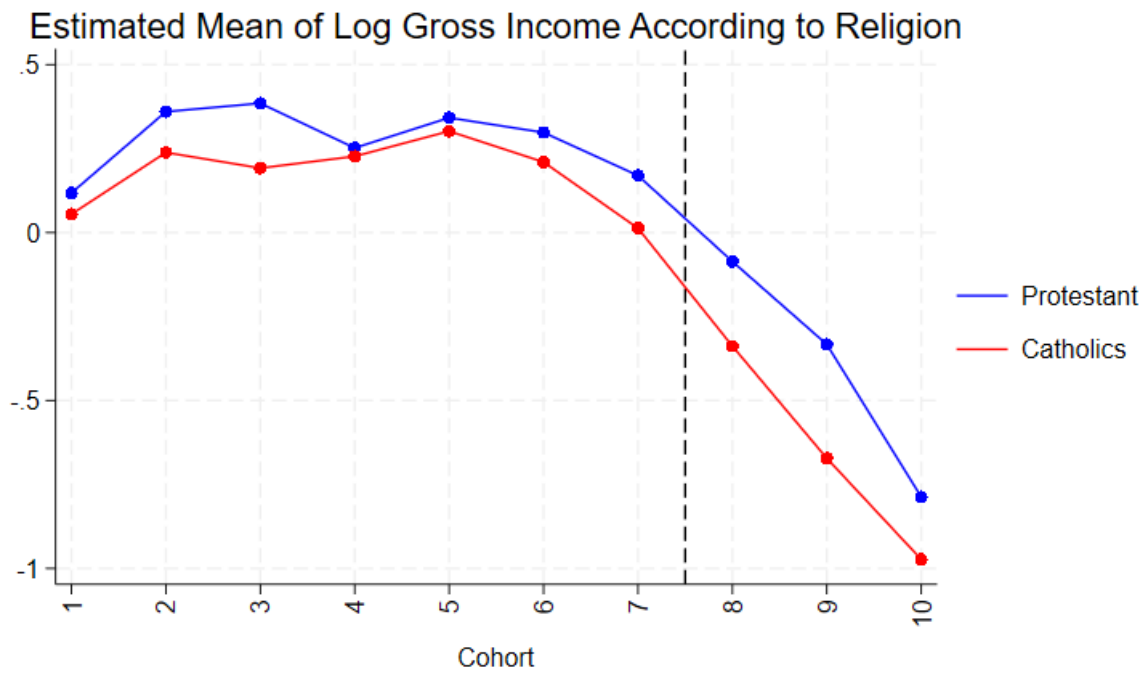
There is a gradual increase in income differentials between cohorts 5 and 9, encompassing those who graduated between 1978 and 2007 (Figure 7). The most significant gap between the difference and the unexplained component in Figure 8 occurs for cohorts 4, 5, and 6 - the same cohorts that graduated during the Troubles from the 1970s to the 1990s. This gap appears to converge afterwards. Figure 7 shows that Catholics consistently have a lower mean income across the cohorts, and the overall mean income decreases across both groups. After the GFA (indicated by the dashed line), the mean income gap increases slightly for younger cohorts<sup>4</sup>.

Also, while the mean income gap isn't particularly prominent for cohorts 4-6, it's interesting that the largest proportion of the difference is unexplained, which can be attributed to discrimination. While the mean income gap increases across cohorts after that (Figure 7), non-discriminatory controls gradually explain it less (Figure 8).

---

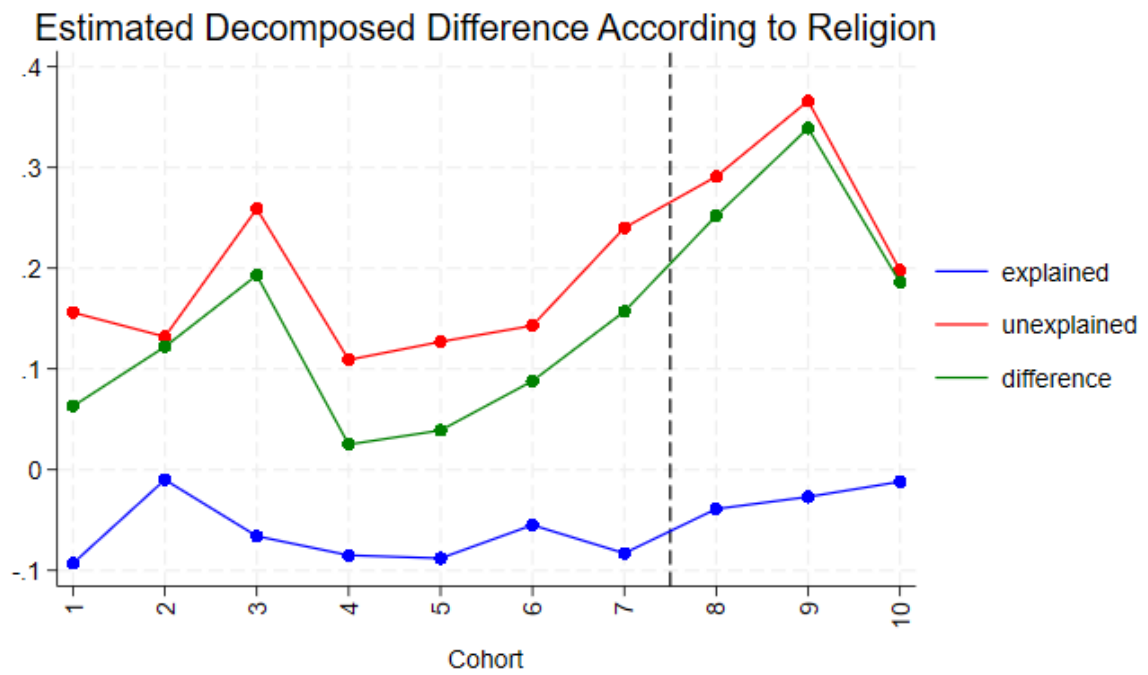
<sup>4</sup> As mentioned in section 5, cohorts 11 and 12 have small sample sizes, which may affect the estimation's robustness, so they are pooled together with cohort 10.

**Figure 7:**



*Note: the dashed line indicates the GFC in 1998*

**Figure 8:**



#### 6.4 Summary of Results

This study investigates the impact of the degree of school education exposed to the Good Friday Agreement on the labour market outcomes of Catholics and Protestants in Northern Ireland. The linear regression model results indicate that Catholics are more disadvantaged than Protestants in various labour market outcomes, namely employment, income, and managerial status. From the DID analysis, the findings suggest that both groups in NI appeared to benefit from GFA exposure to their school education in the form of a reduction in the likelihood of unemployment and an increase in the likelihood of possessing a managerial role relative to Christians in England. In terms of income, the DID and decompositions reveal that Catholics have lower returns to education, as well as showing that although unemployment went down and managerial roles went up for Catholics, the jobs that Catholics are going into may be of lower occupational class therefore lower pay. These income results could be due to omitted variable bias or discrimination (Figure 8 suggests that this may be plausible for older cohorts). However, previous studies found that in the 1960s and 70s, Catholics were more likely to work in unskilled labour (Aunger, 1975) and were underrepresented in higher-status positions (Osborne, 1980), thus these facts may have remained true in recent years. Historical influences and lingering effects from when discrimination was prevalent may still shape career trajectories among Catholics. Community identities remain a powerful force in influencing occupation decision and perpetuating differences. Moreover, further research into the occupational preferences and its link to income inequality is needed to better understand these dynamics.

## 6.5 Robustness Checks

Robust standard errors are incorporated into the models to account for variance in the error terms across observations, thus correcting the standard errors of the coefficient estimates to avoid overstating the significance of coefficients due to heteroskedasticity or autocorrelation issues (Woolridge, 2020).

Additional variables are included to address endogeneity arising from unobserved factors that correlate with both the treatment and outcome, accounting for sociodemographic factors such as sex, years of education, and marital status. Age is included when appropriate, but this is often already controlled due to the nature of cohort analysis.

Pre-trend analysis is conducted, and entity-specific time trends are incorporated to account for time-specific effects that could bias the estimation of exposure effects or other coefficients of interest.

Continuous treatment effects are explored to incorporate heterogeneity in DID analysis, enhancing the robustness of the findings and improving policy relevance.

## 7. Conclusion

This dissertation explores the complexities of labour market outcome dynamics and income inequality between Catholics and Protestants in Northern Ireland after the Good Friday Agreement in 1998. By employing cohort analysis and recent data, this paper provides unique insights into how the degree of school education exposed to the GFA has impacted the labour market outcomes of both groups.

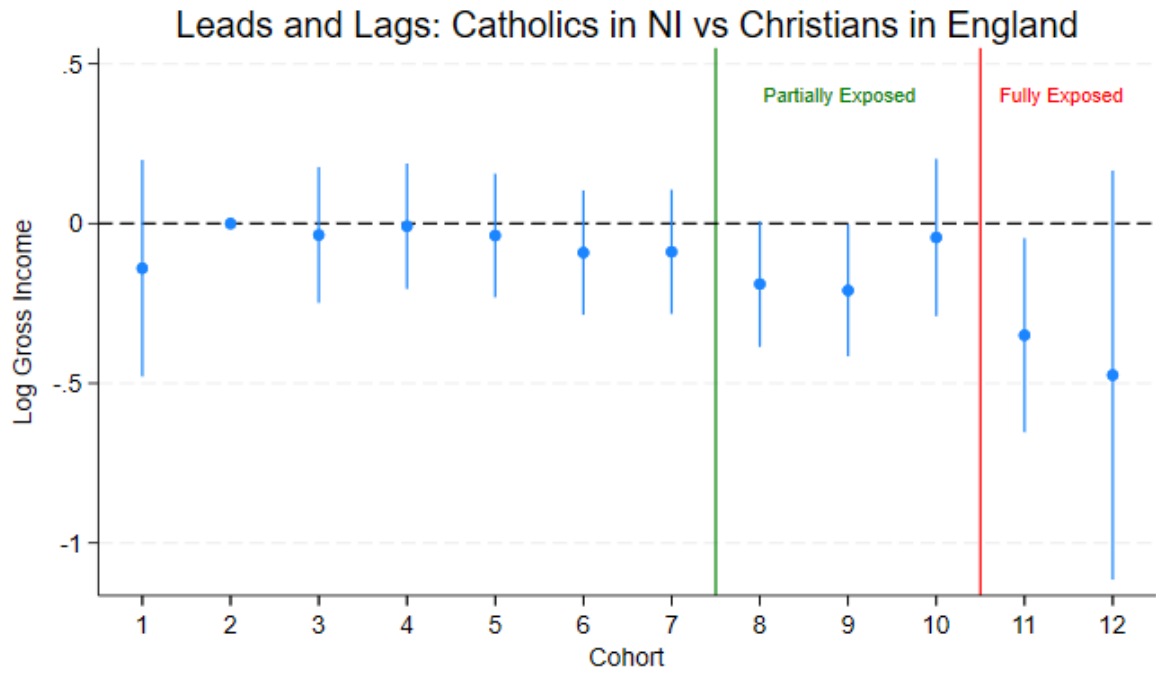
The findings are encouraging, revealing a decrease in unemployment and an increase in the likelihood of managerial roles for both Catholics and Protestants relative to Christians in England. Additionally, Protestants have experienced a benefit in income. The results show that fully exposed cohorts receive the most significant improvement, thus indicating that the GFA has delivered on its promise and further providing optimism for Northern Ireland's future.

However, this analysis also highlights the persistent income inequality between Catholics and Protestants. While religious discrimination has reduced as a primary factor, the results suggest that there must be other causes for the gap. Occupational class disparities are the most likely cause, with previous research showing that Catholics are more likely to hold lower-class jobs. Therefore, further research is necessary using more recent data to investigate the differences in occupations that Catholics and Protestants dominate. These insights are important for informing future policies in economic and political settings that involve discrimination and conflict.

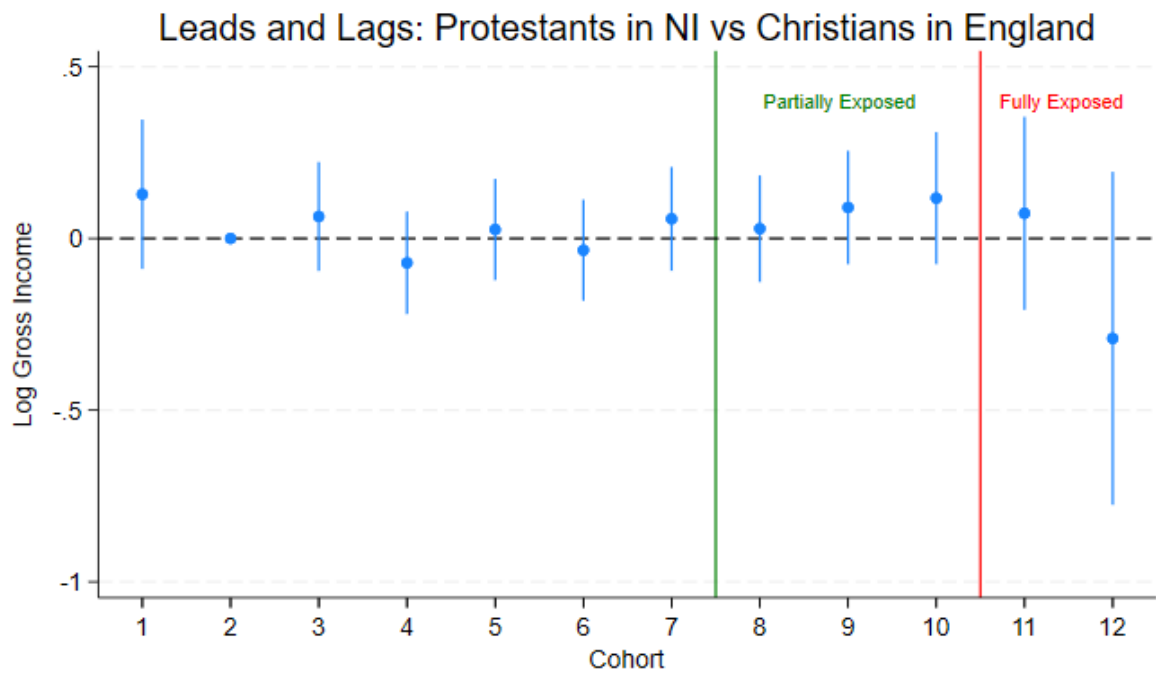
Looking forward, as Northern Ireland progresses, improvements in the economy and increased opportunities are anticipated to lead to more equitable job market outcomes. However, addressing lingering historical effects and identity-related barriers is important to ensure true equality. As younger cohorts enter the workforce, it is hoped that these differences will decline, paving the way for a more equitable and prosperous future in Northern Ireland for all.

## 8. Appendix

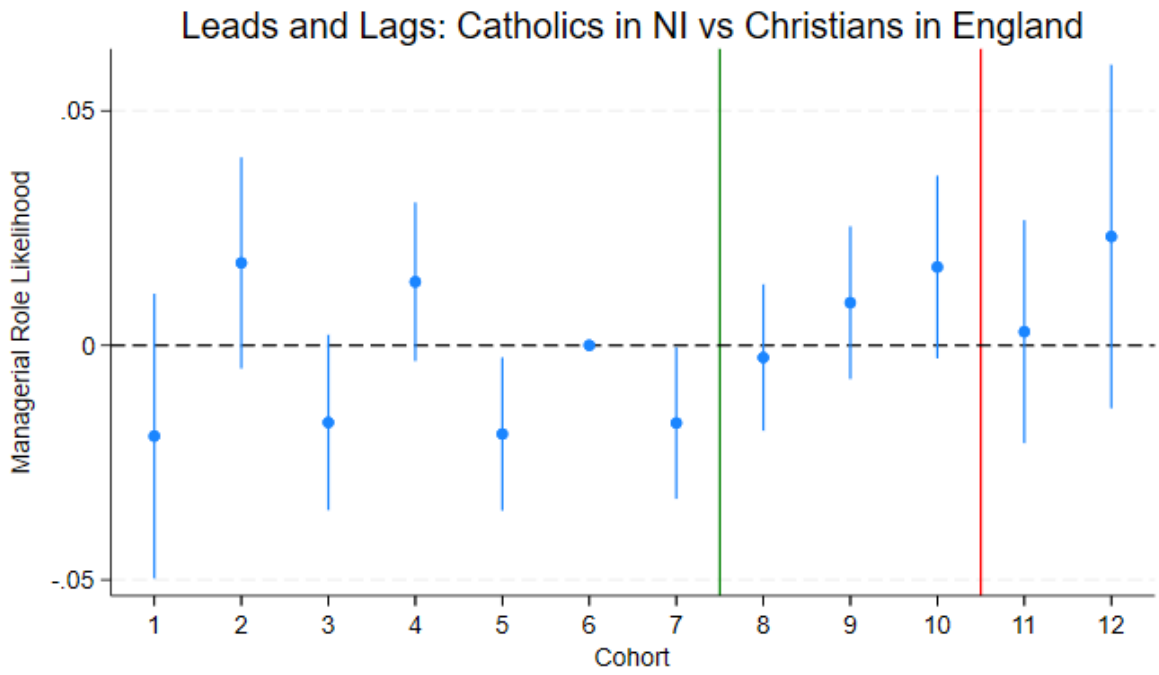
**Figure 3:**



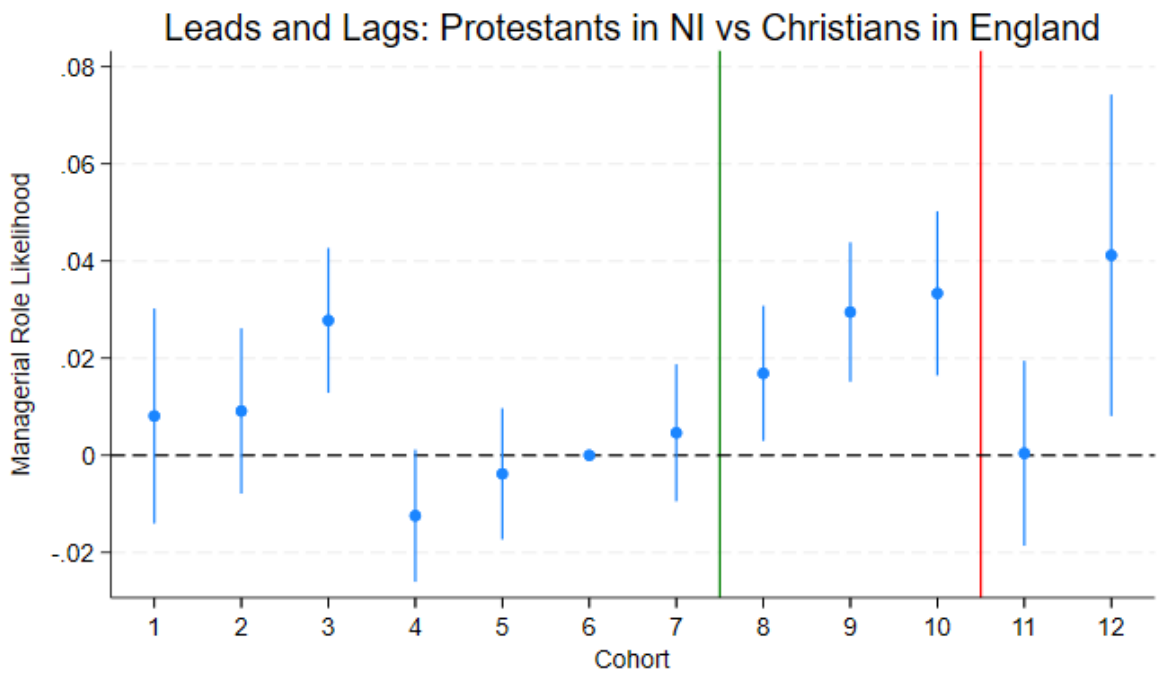
**Figure 4:**



**Figure 5:**



**Figure 6:**



<b>Table 8. Oaxaca-Blinder Decompositions According to Religion</b>						
<b>Cohort Pooled by Graduation Year</b>	<b>Catholic</b>	<b>Protestant</b>	<b>difference</b>	<b>explained</b>	<b>unexplained</b>	<b>sample size</b>
<b>1963-1967 (1)</b>	.055	.118*	.063	-.093	.156	1,408
<b>1968-1972 (2)</b>	.238***	.360***	.122	-.010	.132*	2,315
<b>1973-1977 (3)</b>	.192***	.385***	.193***	-.066**	.259***	3,396
<b>1978-1982 (4)</b>	.227***	.252***	.025	-.084***	.109**	4,408
<b>1983-1987 (5)</b>	.302***	.342***	.039	-.088***	.127**	4,890
<b>1988-1992 (6)</b>	.210***	.298***	.088	-.055***	.143***	4,595
<b>1993-1997 (7)</b>	.013	.170***	.157***	-.083***	.240***	3,928
<b>1998-2002 (8) Partially Exposed</b>	-.338***	-.086*	.252***	-.039	.291***	3,141
<b>2003-2007 (9)</b>	-.672***	-.333***	.339***	-.027	.366***	2,206
<b>2008-2022 (10) Combo of Partially and Fully Exposed</b>	-.974***	-.787***	.186**	-.010	.196**	1,714

Note: Cohort 10 is pooled with cohorts 11 and 12 as defined in Table 3 in Section 4.3

## 9. Bibliography

- Armstrong, D., 1999. Hidden male unemployment in Northern Ireland. *Regional Studies*, 33(6), pp.499-511.
- Aunger, E.A., 1975. Religion and occupational class in Northern Ireland. *Economic and Social Review*, 7(1), pp.1-18.
- Battistón, D., García-Doménch, C. and Gasparini, L., 2014. Could an increase in education raise income inequality?: evidence for Latin America. *Latin American journal of economics*, 51(1), pp.1-39.
- Bediakon, K.S.B., Croi, K.F., Koko, K.B. and Boua, A.A.D., 2022. Wage inequality between men and women in Côte D'Ivoire: An Oaxaca-blinder decomposition method. *Theoretical Economics Letters*, 12(1), pp.52-75.
- Breen, R.I.C.H.A.R.D., 1998. The ratio of unemployment rates and fair employment: a reply to John Bradley. *Economic and Social Review*, 29, pp.87-94.
- Blackaby, D.H., Murphy, P.D. and O'leary, N.C., 2008. Employment discrimination in Northern Ireland and the good friday agreement. *Economics Letters*, 99(2), pp.282-285.
- Blinder, A.S., 1973. Wage discrimination: reduced form and structural estimates. *Journal of Human resources*, pp.436-455.
- Borooah, V.K., McKee, P.M., Heaton, N. and Collins, G., 1995. Catholic-Protestant income differences in Northern Ireland. *Review of Income and Wealth*, 41(1), pp.41-56.
- Borooah, V.K., 1999. Is there a penalty to being a Catholic in Northern Ireland: an econometric analysis of the relationship between religious belief and occupational success. *European Journal of Political Economy*, 15(2), pp.163-192.
- Callaway, B., 2023. Difference-in-differences for policy evaluation. *Handbook of Labor, Human Resources and Population Economics*, pp.1-61.
- Card, D. and Krueger, A.B., 1992. Does school quality matter? Returns to education and the characteristics of public schools in the United States. *Journal of political Economy*, 100(1), pp.1-40.
- Chen, Z. and Wu, Y., 2007. The relationship between education and employment: A theoretical analysis and empirical test. *Frontiers of Economics in China*, 2, pp.187-211.
- Compton, P.A. ed., 1981. *The contemporary population of Northern Ireland and population-related issues*. Institute of Irish Studies, The Queen's University of Belfast.
- Doherty, P. and Osborne, R.D., 1979. Denomination and unemployment in Northern Ireland. *Area*, 11(3), pp.216-219.
- Duflo, E., 2001. Schooling and labor market consequences of school construction in Indonesia: Evidence from an unusual policy experiment. *American economic review*, 91(4), pp.795-813.
- Evans (2023) *The belfast/good friday agreement: 25 Years on*. Available at:  
<https://researchbriefings.files.parliament.uk/documents/CBP-9547/CBP-9547.pdf> (Accessed: 18 April 2024).
- Fairlie, R.W. and Sundstrom, W.A., 1999. The emergence, persistence, and recent widening of the racial unemployment gap. *ILR Review*, 52(2), pp.252-270.
- Gudgin, G. and Murphy, A., 1992. The Labour Market Context and Potential Effectiveness of Fair Employment Legislation in Northern Ireland. *International Journal of Manpower*, 13(6), pp.41-51.
- Heath, A. and Cheung, S.Y., 2006. Ethnic penalties in the labour market: Employers and discrimination.
- Heath, A. and Martin, J., 2013. Can religious affiliation explain 'ethnic' inequalities in the labour market?. *Ethnic and racial studies*, 36(6), pp.1005-1027.
- ILO. (2022). Labour force statistics (LFS, STLFS, Rurban databases). Retrieved from  
<https://ilostat.ilo.org/resources/concepts-and-definitions/description-labour-force-statistics/>
- Jamison, E.A., Jamison, D.T. and Hanushek, E.A., 2007. The effects of education quality on income growth and mortality decline. *Economics of Education Review*, 26(6), pp.771-788.

- Lee, M.J., 2016. *Matching, regression discontinuity, difference in differences, and beyond*. Oxford University Press.
- Lee, Y.W. and Sun, J.W., 2023. WAGE DIFFERENTIAL STRUCTURE IN GENDER AND NATIONALITY. *Hitotsubashi Journal of Economics*, 64(2), pp.86-108.
- Liu, C. and Sun, Y., 2019. A simple and trustworthy asymptotic t test in difference-in-differences regressions. *Journal of econometrics*, 210(2), pp.327-362.
- Manski, C.F. and Pepper, J.V., 2018. How do right-to-carry laws affect crime rates? Coping with ambiguity using bounded-variation assumptions. *Review of Economics and Statistics*, 100(2), pp.232-244.
- Mc Creesh, S., 2023. *Income Inequality in Northern Ireland as a Driver for Irish Unification* (Doctoral dissertation, Georgetown University).
- NISRA (2011) *2011 census - key statistics for Northern Ireland - Report*. Available at:  
<https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/2011-census-results-key-statistics-northern-ireland-report-11-december-2012.pdf> (Accessed: 18 April 2024).
- Northern Ireland Statistics and Research Agency, Central Survey Unit, Office for National Statistics, Social and Vital Statistics Division, 2023, *Quarterly Labour Force Survey, 2002-2020*, [data collection], UK Data Service, Accessed 16 April 2024. SN: 5874, DOI: <http://doi.org/10.5255/UKDA-SN-5874-1>
- \*this reference applies to all quarters of the labour force survey from 2002-2020 that was manually pooled together for my dataset.
- Oaxaca, R., 1973. Male-female wage differentials in urban labor markets. *International economic review*, pp.693-709.
- Oaxaca, R.L. and Ransom, M.R., 1994. On discrimination and the decomposition of wage differentials. *Journal of econometrics*, 61(1), pp.5-21.
- O'Neill, D., 1995. Education and income growth: Implications for cross-country inequality. *Journal of Political Economy*, 103(6), pp.1289-1301.
- ONS. (2022). Labour Force Survey. Retrieved from  
<https://www.ons.gov.uk/surveys/informationforhouseholdsandindividuals/householdandindividualsurveys/labourforcesurvey>
- Osborne, R.D., 1978. Denomination and unemployment in Northern Ireland. *Area. The journal of the Institute of British geographers London*, 10(4), pp.280-283.
- Osborne, R.D., 1980. Religious Discrimination and Disadvantage in the Northern Ireland Labour Market. *International Journal of Social Economics*, 7(4), pp.206-223.
- Park, N. (2022) *Population estimates for the UK, England, Wales, Scotland and Northern Ireland: Mid-2021, Population estimates for the UK, England, Wales, Scotland and Northern Ireland - Office for National Statistics*. Available at:  
<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2021> (Accessed: 17 April 2024).
- Roth, J., Sant'Anna, P. H. C., Bilinski, A., & Poe, J. (2023). What's trending in difference-in-differences? A synthesis of the recent econometrics literature. *Journal of Econometrics*, 235(2), 2218–2244. doi:10.1016/j.jeconom.2023.03.008
- Rowland, N., McVicar, D. and Shuttleworth, I.G., 2018. The evolution of Catholic-Protestant labour market inequality in Northern Ireland, 1983-2014.
- Rowland, N., 2019. *Joblessness, religion and economic opportunity in Northern Ireland* (Doctoral dissertation, Queen's University Belfast).
- Russell, R. (2012). Migration in Northern Ireland: an update. *A Research and Information Service Research Paper, Belfast: Northern Ireland Assembly*.

Scruton, V. L. / J. (2018). The 2008 recession 10 years on. Retrieved from <https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/the2008recession10yearson/2018-04-30>

Shirlow, P., 2006. Measuring workforce segregation: religious composition of private-sector employees at individual sites in Northern Ireland. *Environment and Planning A*, 38(8), pp.1545-1559.

Smith, J.P. and Welch, F.R., 1989. Black economic progress after Myrdal. *Journal of economic literature*, 27(2), pp.519-564.

Trew, K., 1986. Catholic-Protestant contact in Northern Ireland.

Weber, M. and Kalberg, S., 2013. *The Protestant ethic and the spirit of capitalism*. Routledge.

Wooldridge, J.M. (2020) *Introductory econometrics: a modern approach* / Jeffrey M. Wooldridge. Seventh edition.