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1 Project Outline

Through the view of human capital, education is an investment that enhances an individual's knowledge, skills, and productivity, giving the individual greater employment and earnings prospects (Becker (1964)). When scaling this effect from the individual to the economy, an investment in education will, in the long run, increase levels of human capital in the labour market, driving economic growth and productivity (Woodin (2013)). Thus, by implementing policy to extend compulsory schooling, governments can in theory equip the workforce with skills which enhance employability and earnings prospects, benefitting society at large. However, in practice such policy comes with trade-offs, including delayed entry into the workforce and an increased drop-out risk for low performing students ((Card (1999)) (Hall (2016))), highlighting the importance of understanding the nuances of extending compulsory schooling on labour market outcomes for individuals.

Under the 2008 Education and Skills Act, England decided to reform compulsory education to include upper secondary school by raising the participation age from 16 to 17 in 2013 followed by 18 in 2015 (Woodin (2013)).

This study is motivated by the desire to understand if this policy has been successful in improving labour market outcomes in England, as this could indicate whether similar policies are advisable elsewhere. Thus, the research question posed is: What are the long run effects of increasing compulsory education on earnings and unemployment? Specifically, the objective of this investigation is to analyse the causal effects of this compulsory education reform in England on the vital labour market outcomes of earnings and unemployment.

1.1 Data

This paper's policy analysis of the effects of increased compulsory education reform in 2013 and 2015 on income and unemployment in England is based on the Annual Population Survey (APS), specifically a harmonized dataset which has been pooled to including all years between 2011 and 2023. This repeated cross-sectional dataset consists of individual level observational units with over 145,000 units per year. The dataset contains key variables covering topics including but not limited to earnings, unemployment, highest educational qualification, country within the UK, age, marital status, ethnicity, and sex.

1.2 Methodology

To evaluate the impact of this reform with two policy changes in two separate years, a modified Difference-in-Differences (DiD) approach will be applied, with this model being loosely based on Fischer (2020).

$$Y_{it} = \beta_0 + \beta_1 Treat_i + \beta_2 Post_{2013,t} + \beta_3 Post_{2015,t} + \beta_4 (Treat_i \times Post_{2013,t}) \\ + \beta_5 (Treat_i \times Post_{2015,t}) + X'_{it}\beta_6 + \gamma_t + \lambda_c + \epsilon_{it}$$

In this model Y_{it} is the outcome or dependent variable, in this context it will be used to run both earnings and unemployment separately. $Treat_i$ indicates if the individual is in the treatment group, England, or control group, Wales. $Post_{2013,t}$ and $Post_{2015,t}$ are the post policy change binary indicators, meaning they represent whether the time period is after the respective policy implementation. $Treat_i \times Post_{2013,t}$ and $Treat_i \times Post_{2015,t}$ are the interaction terms to capture the effect of the 2013 policy change and the 2015 policy change respectfully. Importantly, this means β_4 is the causal effect of the 2013 policy change and β_5 is the causal effect of the 2015 policy change. X'_{it} represents the transposed vector of all covariates. A sample of the covariates which will be used include those related individual demographics such as age, sex, ethnicity, and marital status. γ_t and λ_c represent time and country fixed effects respectively. Time fixed effects controls for factors that change over time but affect all individuals, while country fixed effects controls for time-invariant factors which differ between the treatment, England, and control, Wales.

Following this methodology, estimates of the causal effects of policy changes in 2013 and 2015 aim to produce causal, robust results.

2 Literature Review

The effects of extending compulsory education on long-term labour market outcomes, particularly income and unemployment, have come into academic discussion over the past few decades. This review highlights the existing literature, comparing methodologies, findings, and limitations.

Angrist and Krueger (1991) is an early seminal work on compulsory schooling, which helped lay the foundation for research on the topic. Using the 1980 US Census Public Use Microdata Sample (PUMS), a natural experiment was conducted with quarter of birth as an instrumental variable (IV) for different compulsory schooling cut-off dates. The IV strategy focused on compliers, individuals who followed compulsory schooling rules by starting at the required age and dropping out when legally allowed, to identify the Local Average Treatment Effect (LATE). By Two-Stage Least Squares (2SLS) estimation, an additional year of schooling was found to increase complier earnings by an average of 5.5%, suggesting positive earnings returns to additional schooling. However, this IV approach could only capture small variation in compulsory schooling through entry and leaving age.

Oreopoulos (2007) instead employed a Difference-in-Differences (DiD) approach to investigate the impacts of changing compulsory schooling laws in the US, UK, and Canada, allowing for greater variation in compulsory schooling to be examined. Census and household survey data from these countries, spanning from 1950 to 2001, provided information on education, income, health, and demographics to utilize policy changes from 1915 to 1970 in the US, 1925 to 1970 in Canada, and 1935 to 1965 in the UK. By leveraging variations in minimum school-leaving ages as an IV, the DiD approach compared outcomes between cohorts affected and unaffected by changes in compulsory schooling laws. By isolating the causal effects of an additional year of compulsory schooling, a 15% increase in lifetime wealth was found for those compelled to stay in school, strengthening support for positive returns to additional compulsory schooling. However, potential biases exist from unobserved differences across regions and cohorts, resulting in possibly uncaptured heterogeneous impacts among different subgroups.

Buscha (2012) avoided these issues by focusing specifically on policy changes in the UK, investigating long-term effects of raising the school leaving age in 1972. Using UKHLS data, a 2SLS estimation focusing on individuals aged 52/53 found those impacted by the compulsory schooling reform had an average increase of 5.5% in hourly pay, indicating a persistent impact even 40 years later. While this still suggests positive income returns from increased compulsory schooling, the causal estimates of this approach were noticeably much lower in value. Effects were slightly more noticeable for women than men, with estimated coefficients of 6.0% and 5.1% respectively. Similarly, Demirel-Derebasoglu and Okten (2022) found that in Turkey extending compulsory schooling had

greater positive effects for women, implying such policies can help reduce gender disparities.

Devereux and Hart (2010) used the 1947 British compulsory schooling law, which increased the minimum leaving age from 14 to 15, to examine returns on wages from additional years of education. Data was combined from the GHS and NESPD to provide more robust estimates compared to previous studies on the 1947 reform. By employing a regression discontinuity design (RDD) alongside a two sample 2SLS estimation, lower returns on wages compared to previous studies were found. An extra year of school increased wages 4-7% for men, but had no impact (0%) for women, implying low earnings returns from extended compulsory schooling, thus highlighting discrepancies in the literature on income returns from increased compulsory schooling, especially between genders.

Moving on from income, Hall (2016) examined the impact of extending vocational upper secondary programs on future unemployment in Sweden using data from Statistics Sweden and PES, covering 1985 to 2010. By leveraging regional and temporal variation from a pilot program preceding the reform, a DiD approach was employed to analyse labour market outcomes during the 2008-2010 recession. Findings indicated extending schooling did not decrease unemployment risk. Instead, the reform led to increased risk of unemployment for students with low GPAs, unintuitively suggesting the policy did not improve labour market adaptability, but negatively impacted it for weaker students. However, the robustness of these results is questionable due to possibly endogenous concurrent education policy changes.

Fischer et al. (2020) evaluated long-term effects of both extending annual term length and compulsory schooling on income and unemployment in Sweden, while managing to independently identify effects of each reform. A DiD analysis was conducted by leveraging variations in reform implementation across school districts, using data from the 1970 Swedish Census. Extending term length was found to increase earnings by 5%, reduce unemployment rates, and narrow the gender income gap. In contrast, extending compulsory schooling had smaller earning returns at 2%, and did not significantly reduce unemployment or the gender income gap, further questioning the effectiveness of compulsory schooling reforms in improving labour market outcomes.

Overall, the literature reveals conflicting findings on the long-term effects of extending compulsory schooling on income and unemployment, leaving inconclusive results. This paper seeks to address this gap by examining recent UK compulsory education reforms in 2013 and 2015, focusing exclusively on UK data to evaluate impacts in a contemporary context.

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