On Immigration, Geographic and Labour Market Mobility

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Summary

This thesis consists of three chapters. The first one is an empirical assessment of the consequences of post-2004 temporary restrictions to welfare access for some European immigrants in the UK in terms of their benefits take-up and their labour supply. I provide evidence that when access to benefits is restricted, immigrants compensate for the foregone income by working more. This is particularly true for females. Nevertheless, even in the absence of any restrictions, immigrants are less reliant on welfare and work more than their native counterparts. The second chapter focuses on the determinants of geographical mobility of British labour market entrants over the period 1991-2008, with an emphasis on the role of education. Given the absence of an appropriate index for mobility in the data, I compute a continuous measure of distance that is then matched to the individual information. Results suggest that having a degree has a positive impact on the mobility of young adults and, hence, on their labour market opportunities. Moreover, an important role is played by previous mobility experience and some other environmental factors. In the third chapter of this dissertation I evaluate the long-term effects of undergoing job turnover during a woman's early career on her demand for children. In doing so, I make a distinction between voluntary and involuntary job separations. The empirical analysis is made on a sample of British women who have left education in the years 1959-1986, for which I construct job experience and family formation variables on the basis of retrospective information. The findings imply that women with stronger preferences for children might self-select into more rewarding career paths, possibly in pursuance of better labour market conditions that can guarantee a more adequate child rearing.

To Margherita and Gian Franco.

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Abstract

This thesis comprises three chapters.

In the first chapter, I use a difference-in-difference setting to investigate the effect of stricter immigration policies in terms of benefit claims and of labour supply of a newly immigrated workforce. I analyse the case of the European 2004 Accession (A8) countries and the temporary limitations in the eligibility to welfare assistance that immigrants from these countries faced until April 2011 in the UK. I find that under the stricter regime A8 immigrants claim less benefits and are more likely to be in employment. Results are consistent with the hypothesis that, if denied welfare support, immigrants may be more keen on increasing their labour supply in order to compensate for the foregone receipt of assistance, especially when they are more financially constrained. Nevertheless, even when restrictions are relaxed, immigrants still work more than their UK-born counterparts and their take-up of benefits is not higher than that of the natives.

In the second chapter, I explore the geographical mobility patterns of labour market entrants in the UK and emphasize the role of education, using BHPS data and building a new distance variable based on geographical coordinates of each individual's Local Authority District of residence. The potential bias generated by unobservable individual and 'environmental' characteristics is dealt with by using family fixed effects and instrumental variables. I find that in the first few years after their transition out-of-education, young adults move farther away from their parental household the higher their educational attainment. In particular, what matters the most is having at least a first degree or not. Also, past movements and family attitude towards education have a major impact on current mobility, while local labour market factors do not seem to be as important. As expected, controlling for family fixed effects gives lower estimates than OLS. The combination of

family fixed effects with instrumental variables suggests that the bias arising in the OLS estimates is generated almost entirely by unobservable factors that pertain to 'environmental', rather than individual, characteristics. The effect of all other covariates is relatively unchanged. Results hold to a number of sub-samplings and robustness checks.

In the third chapter, I investigate the impact of job turnover during the labour market early career of British young women on their fertility choices, using retrospective information from the British Household Panel Survey. The sufficiently wide time-span (1959-2006) allows me to evaluate fertility outcomes in the long-run. I also try to disentangle the effect between voluntary and involuntary job turnover, the first being associated to career advancement and the latter to job loss. In order to account for the endogeneity of job experience to fertility I instrument job turnover with industry-level historical series of the unemployment rate and the growth in the average earnings drawn from the British Labour Statistics, the Labour Force Survey and the New Earnings Survey. Estimates suggest a negative, yet imprecisely estimated, impact of voluntary job turnover during early career on the predicted number of children. Conversely, job losses yield a positive effect on fertility. I find a relative predominance of the substitution effect over the income and other career-related effects in the case of married women. The magnitude of the coefficients implies that the bias stemming from the endogeneity in the model may be due to women with higher preferences for children selecting into more rewarding careers, possibly in pursuance of better labour market conditions that can guarantee a more adequate child rearing.

Chapter 1

The Effects of Welfare Restrictions on the Labour Supply of EU Immigrants in the UK

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1.1 Introduction

On May 2004, a group of countries entered the European Union and since then have become commonly known as Accession Countries or A8 Countries.[1] The 2004 EU enlargement came with a sudden increase of the European population by almost 75 million people (i.e. by 20%) and, evidently, the opening of its labour market to millions of potential workers from the new member states. The fear of massive migration flows within the post-enlargement EU and concerns on the risk of severe shocks to their labour markets and to their welfare systems led the old members to temporarily restrict access to workers coming from the A8 countries, with the UK, Ireland and Sweden being the only exceptions (Boeri et al., 2005). Indeed, in the years 2004-2007 only, 1.2 million A8-born workers moved to these three countries (Elsner, 2013).

In the UK alone, it is estimated that the foreign-born population has increased from around 3.8 million to 7.8 million in the years 1993 to 2013, while the number of foreign citizens has risen from 2 million to 5 million (Rienzo and Vargas-Silva, 2014). Moreover, according to the Office for National Statistics (2013), the population of Polish-born resident over the years 2001-2011 has risen ten-fold, followed by sizeable increases in the number of other A8 nationals, namely Hungarian (59%), Latvian (66%), Lithuanian (65%) and Slovakian (75%), in addition to Romanians, Bulgarians and other groups of extra-European immigrants (mainly Nigerian, Chinese, Nepalese and Filipinos). In view of such figures, inevitably, the debate on the access to and the usage of welfare benefits from migrants who live in the UK is an extremely hot topic in the political agenda and has been widely covered in the media, along with concerns over the widespread belief that the presence of immigrants might jeopardise the employability and the wage level of natives.[2]

The possibility that immigration might harm labour market opportunities of natives has been thoroughly investigated in the literature, yielding extensive evidence that this is not the case.[3]

[1] A8 countries are Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. Malta and Cyprus also joined the EU on the same date.

[2] The former British Foreign Secretary Philip Hammond has publicly stated that Britain would be "'wide open to abuse' by 'freeloading' European Union migrants who are exploiting the welfare state" (http://www.telegraph.co.uk/news/uknews/immigration/11358711/Britain-wide-open-to-abuse-by-freeloading-migrants-says-Foreign-Secretary.html, last accessed 04/01/2017). As a matter of fact, these arguments have come to form one of the cornerstones of the Leave campaign for the 2016 Brexit referendum (Wadsworth et al., 2016).

[3] See Dustmann et al. (2005); Barrett and McCarthy (2007); Clark and Drinkwater (2008); Manacorda et al. (2012).

On the other hand, only a few empirical studies have assessed the participation of immigrants to welfare in the UK. They generally conclude that immigrants, and especially those coming from other European countries, make less use of welfare and social assistance with respect to natives (Barrett and McCarthy, 2008; Drinkwater and Robinson, 2013; Battiston et al., 2014) and, contrary to the resident UK-born population, they positively contribute to the fiscal balance (Dustmann and Frattini, 2014). To my knowledge, however, no study has examined the potential effects of restraining welfare access to the foreign-born sub-population.

This is the first empirical assessment of the consequences of the temporary transitional restrictions that were applied to immigrants from the A8 countries after the 2004 EU enlargement. I evaluate the effect of such restrictions on the take-up of benefits and on the consequences in terms of labour supply for the people affected by the limitations to welfare access. The analysis focuses on the UK as the destination country and refers to the decade immediately following the 2004 EU enlargement.

The case of the UK is convenient to this purpose for two reasons. The first one is found in the set-up of the temporary limitations that were applied to A8 nationals in the years 2004-2011: while they were granted full access to the UK on the basis of the free movement rights, which apply to all citizens of the European Economic Area, up until April 2011 immigrants coming from the A8 countries had to satisfy some additional conditions to the ones in force for EEA nationals in order to gain a Right to Reside (i.e. for welfare purposes). After this date, A8 immigrants were wholly equalised to other EEA citizens. The way the limitations have been designed provides a suitable setting that allows to identify the effect of such restrictions by comparing A8 and EU15 immigrants before and after the change in policy.[4] The second factor that makes the UK a valid unit of analysis consists of the large flows of migrants that have arrived in the country in the past century and especially in the past decade, when it received a considerable influx of workers from the newly accessed countries to the European Union.

This analysis evaluates the effects of limitations to welfare access in terms of two main contexts. I begin with measuring the reduction in the claiming rate of benefits for A8 immigrants in the UK

[4]EU15 countries are essentially those belonging to the EU prior to the 2004 enlargement (including Switzerland).

with respect to their EU15 counterparts when the temporary restrictions to public assistance are in place. Indeed, I find that the transitional limitations yield a decline by around 6 p.p. in the probability of claiming benefits for A8 nationals and that the effect is particularly intense for female immigrants. Yet, this does not appear to be sufficient to make them less likely to claim benefits compared to similar EU15-born immigrants.

Then, I examine whether such reduction in the claim of benefits is accompanied by an increase in the probability to work. In principle, if immigrants are subject to a reduced access to welfare, they may be pushed to make up for the foregone compensation by increasing their willingness to work. This should be especially true for those who are more financially constrained, who usually happen to be also those who are more in need of assistance. I provide evidence that this mechanism does, in fact, take place: A8 immigrants who undergo limitations in access to welfare are 4.5 p.p. more likely to be in employment and symmetrically less likely to be inactive. In line with the results on benefit take-up, I find that female participation is mostly affected by the restrictions. Furthermore, A8 nationals work longer hours, especially if less educated, which would further suggest that the stricter regulations are, indeed, applied to the sub-population of immigrants who might be in deeper distress. Finally, the available data allow to compare the behaviour of A8 immigrants to that of natives, before and after the relaxation of the stricter regime. Figures clearly show that, even when A8 nationals have full access to welfare, they do not appear to claim more than the natives. Moreover, they work longer hours than the UK-born, who, in turn, have higher inactivity rates.

The remainder of this chapter is organised as follows. In the next section I summarise the main literature on immigration, labour supply and welfare. In section 1.3 I describe the the identification strategy and the data used in the analysis. Sections 1.4 and 1.5 are dedicated to the empirical results in terms of claim of benefits and labour supply, respectively, while section 1.6 focuses on the impact of the policy by gender and educational attainment. Finally, section 1.7 concludes.

1.2 Review of the Literature

Immigration is a phenomenon that affects most rich and developed countries as receiving countries. Concerns about the consequences of the increasingly large flows of migrants on their economic and

social conditions have led researchers to thoroughly investigate their effects from the perspective of the host country. Moreover, this trend is particularly recurrent when migration flows involve disproportionately low skilled workforce, which brings about fears of unsustainable pressure on welfare or of negative effects of migration on the labour market opportunities of native workers. Nevertheless, as De Giorgi and Pellizzari (2009) point out, immigration may still act as a profitable force that may counterbalance the relative immobility of the native workforce, especially in places like Europe, where internal mobility rates are much lower than the US.[5] This, of course, would be true if migration is driven by labour market factors and not by the relative generosity of welfare in the host country.

Hence, an extensive theoretical and empirical evidence has developed in order to assess the actual impact of immigration on a number of outcomes. While the main core is focused especially on labour market effects and on the sustainability of the welfare system within the host country, also other dimensions, such as health (Norman et al., 2005; Wadsworth, 2013; Kennedy et al., 2014; Giuntella, 2014), housing (Saiz, 2007; Battiston et al., 2014; Sa, 2015), schools (Geay et al., 2013) and crime (Bell and Machin, 2011; Bell et al., 2013; Mastrobuoni and Pinotti, 2015), have been amply analysed.

In what follows, I briefly present and discuss the existing literature related to the labour market and to welfare participation in the context of immigration, with a special emphasis on the case of the UK and, particularly, on the consequences of the 2004 EU enlargement.

1.2.1 Immigration and the Labour Market

In the last decades, the extensive literature that looks into this relationship finds modest or absent effects of immigration on the employment opportunities and the wages of the native population.[6] The theory predicts that immigration affects the labour market differently depending on the economic structure of the host country and the skill mix of the immigrant population compared to

[5] As a matter of fact, Hatton and Tani (2005) claim that the labour market impact of immigration is underdetected by empirical analyses because this fades out as a result of the resident population relocating elsewhere. They examine the effect of net migration to a British region from abroad on the internal mobility across regions and find that these are negatively and significantly correlated in the Southern regions of the UK, where most immigrants are concentrated.

[6] See Borjas (1999b) and Dustmann and Glitz (2005) for an extensive review.

the natives (Dustmann et al., 2005).[7] Differently from studies on the US, which generally find that immigrants are predominantly less skilled than the natives (Card, 1990; Borjas, 1999b), Dustmann and Fabbri (2005) show that in the UK several groups of immigrants have a higher percentage of graduates compared to the white British-born population.[8]

The impact of immigration on the UK labour market is evaluated for the first time by Dustmann et al. (2005). They overcome the problem of spatially correlated levels of immigration and labour market outcomes (Borjas, 1999b) by instrumenting immigration flows with historic settlement patterns and by estimating the model in differences.[9] They find that the optimistic correlations suggested by the OLS coefficients are wiped out by the use of the more robust instrumental variable estimation and they conclude by arguing that there is no statistically significant overall evidence of any impact of immigration on wages or on participation, employment and unemployment rates of natives. When they split the population in the sample by educational level, they see that there is a small adverse effect on employment for the intermediate qualifications, but this is neutralised by the positive impact on the highly educated groups. In a more recent paper, Dustmann et al. (2013) further analyse whether immigration influences the wages of natives in the UK, with a specific investigation of this relationship along the wage distribution and find an overall slightly positive average effect. When this is decomposed along the wage distribution, however, the authors observe a depression of wages below the 20th percentile, where the presence of immigrants is relatively more dense, and an increase for those above the 40th percentile. Manacorda et al. (2012) offer an explanation to the inconclusive results found in the literature that evaluates the impact of immigration on wages and employment of the natives in the UK. They claim that the puzzling absence of a significant effect is to be attributed to immigrants and natives being imperfect substitutes in

[7]For instance, Olney (2013), using US data, finds that a large inflow of low-skilled immigrants determines an increase in the number of small, predominantly low-skill intensive establishments in an area.

[8]As a matter of fact, Jauer et al. (2014) investigate on the response of migration to labour market shocks, comparing Europe and the United States before and during the financial crisis that struck in 2008. They estimate that the return of migration to labour market shocks was stronger in the years immediately prior to the crisis in the US, while the opposite has happened in Europe.

[9]They argue that immigrants tend to concentrate in areas where they can find a network of people with similar linguistic and cultural endowments and that, if the time lag is sufficiently wide, the pre-existing concentration of immigrants in a particular area would be uncorrelated with current economic shocks. On the other hand, by using changes all area-specific persistent effects are eliminated (Dustmann and Glitz, 2005).

the labour market.[10] In fact, they show that the recent inflows of migrants into the UK, disproportionally composed of highly-educated individuals, have contributed to drive the wages of older immigrants down, while leaving those of natives relatively unaffected.

Part of the literature is specifically focused on the conditions of immigrants in the host country and their position relative to the native population. In his seminal work on the labour market performance of immigrants, Chiswick (1978) argues that because of their lack of knowledge of country-specific information (e.g., language, customs, institutions, etc.) and human capital, immigrants are disadvantaged on the labour market with respect to natives. On the other hand, those who migrate are generally positively selected in terms of motivation and ability and this makes it possible for them, *ceteris paribus*, to become more productive and, consequently, earn more than the native-born (Chiswick, 1978).

Dustmann and Fabbri (2005) analyse the labour market performance of immigrants in the UK prior to the 2004 EU enlargement. Specifically, they shed some light on the characteristics and the participation to the labour force of different groups of foreign-born, their employment rate, their wages and and their likelihood to be in self-employment. Over the period 1979-2004, employment and participation rates for non-white foreign-born were lower than for natives, while white immigrants tend to behave similarly to the white British-born. The authors also find dramatic differences by group and observe that white immigrants tend to have higher wages than natives, while non-white foreign-born have lower wages than their white British-born counterparts. Similarly, Barrett and McCarthy (2007) estimate that immigrants earn 18 percent less than their native counterparts in Ireland, even when controlling for factors such as education and experience. They also find some heterogeneity across groups, with immigrants from non-English speaking countries being the most penalised.

In accordance with the previous investigations, Clark and Drinkwater (2008) observe that migrants who recently arrived to the UK are generally disadvantaged in terms of employment opportunities and wages compared to the natives. They argue that recent A8 immigrants belong to the

[10] Such an argument is also supported by Peri and Sparber (2009), who suggest that immigrant workers in the US specialise in physical-labour-intensive jobs while low-educated natives opt for occupations that are more intensive in communication and language tasks. According to the authors, this may explain why immigration failed to cause an (expectedly) adverse fallout on the wages of low-skilled native workers.

group with the lowest returns to education, being them generally highly-qualified but employed in low-skilled occupations. This is also claimed by Campbell (2013), who estimates that 61% of A8-born immigrants that have arrived in the UK after 2004 are over-educated for their job.

Finally, Elsner (2013) and Dustmann et al. (2015) estimate the effect of the migration shocks following the 2004 European enlargement on the labour market of the sending countries. Both analyses conclude that emigration had an overall positive effect on wage in the country of origin, especially for young workers (Elsner, 2013) and those in the intermediate skill group (Dustmann et al., 2015).

1.2.2 Immigrants and Welfare Participation

From a general perspective, Brucker et al. (2002) identify several reasons why, independent of individual characteristics, immigrants may participate into the welfare system to a greater or lesser extent compared to the native population, i.e. what they refer to as *residual dependency*. First, immigrants may self-select into living in a country with a relatively more generous welfare system; on the other hand, their access to welfare may be restricted or excluded by law in the host country (non-portability of entitlements). Then, some migration-specific effect, such as trauma or inability of speaking the language, may induce immigrants to rely more on welfare. This may also be the case if they face discrimination or other factors that may lead to a reduction in wages and their employment opportunities. Finally, there may be network effects which may either assist immigrants in increasing their chances of finding a job, and therefore make them less reliant on welfare or, conversely, lead them to isolate from the resident society and, consequently, be more likely to receive state benefits. Hence, the two main issues related to immigrants and the receipt of welfare services concern (i) whether immigrants are more prone to claim benefits with respect to natives and (ii) whether more generous welfare systems tend to attract disproportionately more low-skilled immigrants, who may, in turn, have a relatively higher participation rate into welfare services.

With respect to the the attractiveness of welfare systems, Borjas (1999a) develops a model of migration across locations which vary in terms of the generosity of their welfare systems and

of the returns to skills. The model predicts, among other things, that low-skilled workers tend to cluster where institutions are more generous and that the elasticity of welfare participation is higher for immigrants than for natives, although this last prediction is not supported by any statistical significance in the empirical results using US data.[11]

As far as the relative intensity in the use of welfare services by immigrants is concerned, most empirical research focuses on the US and on some European countries. These two cases, however, differ in many aspects, including the types of welfare programs available, the characteristics of the immigrant population they receive, the timing of influx waves of immigrants and the relative mobility of the native population within each country. Hence, there is some heterogeneity in the findings across the two strands of the literature and the policy implications that can be drawn from them. Jensen (1988), argues that, when welfare-related characteristics are opportunely controlled for, immigrants in the US are less likely to receive benefits compared to natives. According to Borjas and Hilton (1996), this is the case only when cash benefits alone are considered, while if also non-cash benefits are taken into account participation of immigrants is much higher than that of natives. When comparing different waves of immigrants, Borjas and Trejo (1991) show that more recent immigrants take up more welfare services than those who settled earlier in the US and that, in general, immigrant households tend to assimilate *into* welfare. In 1996, the US passed the Personal Responsibility and Work Opportunity Act (PRWOA), which remarkably restricted access to benefits to non-citizens. The consequences of the reform in terms of participation in the welfare system are analysed by Borjas (2002), who finds no effect on the take-up by immigrants.[12]

Brucker et al. (2002) provide an analysis at the European level, where they observe the welfare participation of non-EU citizens in 11 European countries. They estimate that immigrants have similar or lower rates of benefit recipiency than natives in Germany, the UK, Greece, Spain and Portugal, while these rates are higher in Denmark, the Netherlands, Belgium, France, Austria, and

[11] See also Brucker et al. (2002), who develop a simple theoretical model referred to the European case where less skilled immigrants move predominantly to countries with more generous welfare systems. An analogous setting is also evaluated empirically by De Giorgi and Pellizzari (2009), who support the hypothesis of generous welfare systems being more attractive, especially for men.

[12] He argues that the neutralisation of the effects of the 1996 reform at the national level is due both to many state governments introducing new benefit programs targeting the foreign-born population and to a sharp increase in the number of immigrants choosing to become naturalised citizens.

Finland. In this latter group of countries, the authors find a positive and significant impact of the indicator for being a non-EU citizen on the probability of taking up unemployment benefits, while this is not the case for the former group (Germany, the UK, Greece and Spain).[13] Research related to immigration and welfare in Europe also does not confirm the findings of Borjas and Trejo (1991) about immigrants assimilating into welfare in the US.[14]

Using the UK-LFS, Drinkwater and Robinson (2013) group immigrants by country of origin and compare them to UK natives in terms of probability of claiming benefits. They find that five out of the seven groups of foreign-born examined are significantly less likely to claim any benefits with respect to natives, with Australasians being the least likely. In particular, their results show that, except for housing benefits and tax credits, immigrants from the A8 countries are five percentage points less likely to claim benefits than the UK-born by making less use of unemployment-related, child-related, sickness benefits and income support.[15] Hence, the authors argue that 'the fears of large numbers of A8 immigrants looking to take advantage of welfare benefits, rather than to work, appear to be unfounded' (Drinkwater and Robinson, 2013, p. 110). Very similar conclusions are reached by Dustmann et al. (2010), who focus specifically on the fiscal impact of immigration from the A8 countries in the UK. They estimate that these recently arrived immigrants are, in fact, 59 per cent less likely to receive state benefits or tax credits and 57 per cent less likely to live in social housing compared to natives. While this may be due to the fact that A8 immigrants are younger, better educated and less likely to be parents than the native population, even after controlling for

[13] Similar patterns are found by Boeri (2010). Barrett and Maître (2013) and Giulietti et al. (2013) find evidence of similar or lower recipiency rates for immigrants (especially those from non-EU countries) across Europe. Barrett and McCarthy (2007, 2008) also find that immigrants in Ireland are more highly educated and less likely to use welfare services, even though they have lower earnings compared to the native population. The results about Denmark are in line with Blume and Verner (2007), while those about Germany are confirmed by Castronova et al. (2001) and Riphahn (2004), who claim that immigrants are more likely to be eligible than the natives because of their income and household structure. Nevertheless, conditional on eligibility, there is no statistically significant difference in take-up between the two groups, i.e. there is no 'immigrant effect'. More recently, Riphahn et al. (2013) evaluate the benefit recipiency of Turkish immigrants and find that conditional rates of participation exceed those of German natives only for the second generation immigrants.

[14] Hansen and Lofstrom (2003) show that immigrants in Sweden tend to assimilate out of welfare, even though the rate of convergence is not sufficiently fast to wipe out the gap between immigrants and natives even in the long run. Likewise, Riphahn (2004) and Blume and Verner (2007) do not find evidence of assimilation into welfare of immigrants in Germany and Denmark, respectively.

[15] Barrett and McCarthy (2008), using the BHPS, find that immigrants in the UK are overall 4% more likely to receive social welfare in the UK. However, the results are driven by the immigrants from English-speaking countries (i.e. essentially Ireland), who are 7% more likely to claim benefits than natives, while immigrants from non-English-speaking countries are 5% less likely to do so.

these factors they are found to receive less welfare assistance. Such findings are corroborated by those of Dustmann and Frattini (2014), who estimate the overall expenditure on and the revenues produced by the population of immigrants in the United Kingdom and compare them to the net fiscal contribution of the natives. They find that, over the period 1995-2011, immigrants residing in the UK are less likely than natives to live in social housing or to receive benefits (both state transfers or tax credits). This is especially true for recently arrived (i.e. since 2000) immigrants from the EU. The authors also estimate a positive net fiscal contribution of immigrants arriving from the EEA (4 billions GBP), while natives and extra-European immigrants contribute less than what they receive in benefits and transfers.[16]

Other forms of utilisation of public services are also investigated in the literature. Battiston et al. (2014) focus on the probability of being in social housing for immigrants in the UK for the years 2007-2013. In this latter study, the authors find that while recent immigrants are more likely to be in private housing, after being in the UK for at least five years they become equally likely to be in social housing than natives. Moreover, they estimate higher probabilities of being in social housing for non-whites, especially black individuals and immigrants from Bangladesh. The demand for health care services in the UK is analysed, among others, by Steventon and Bardsley (2011).[17] In line with the general consensus of the literature on the existence of a 'healthy immigrant effect', i.e. the fact that immigrants are generally positively selected in their actual and self-reported health compared to the native population, the authors observe that first registrants have lower admission ratios than the general population and that this difference persists over the years. Wadsworth (2013) compares health service use of immigrants as opposed to the native population in the UK and Germany. He focuses on self-reported general health status and on both the extensive and the intensive use of health services, measured as the incidence and the number of visits to GPs and hospitals, respectively. The results of his analysis suggest that while foreign-born individuals

[16] These figures amount to negative 591 and 118 billion GBP, respectively. In addition to this, Dustmann and Frattini (2014) point out that immigrants generally arrive to the UK with a consistent endowment of human capital that has been acquired in their native country. This implies implicit savings on education for the British public finances that they estimate to be around 50 billion GBP.

[17] They use administrative data on the number of first registrants to a general practitioner (GP) aged 15 or over as a proxy for the number of international immigrants, under the assumption that UK-born residents register with the GP before the age of 15.

are found to be healthier on arrival in the host country, the gap in health status and utilisation of services with the native population narrows over time. Finally, Giuntella et al. (2015) estimate the causal effect of immigration on efficiency indicators of health services. They uncover a negative and significant effect of the presence of immigrants in the area on waiting times for outpatients but no impact on A&E or on elective care. They argue that this is to be attributed to the combination of both the 'healthy immigrant effect' above mentioned and a 'displacement effect' on natives, who tend to migrate to areas where immigration is scarce and access health services there.

1.3 Setting and Empirical Method

In this section I describe the setting in which the identification of the analysis is framed and how the sample is selected. I also illustrate the empirical model used and how the outcome variables are defined.

1.3.1 Identification Strategy

I consider the case of the European 2004 Accession (A8) Countries, that entered the European Union on May 2004: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.[18] Citizens from these countries have been subject to some additional restriction in terms of access to benefits compared to other EEA nationals: up until 30th April 2011 they had the Right to Reside only if in work and if registered to the UK Border Agency's Worker Registration Scheme (WRS).[19] During this period of time they only had access to in-work benefits and to some other work-related benefits that are payable regardless of immigration status such as Statutory Maternity Pay and Statutory Sick Pay. Only after being registered to the WRS and in continuous employment for 12 months, could they claim out-of-work benefits and tax credits on the same grounds as other EEA nationals.[20] These include: Job Seeker's Allowance, Pension Credit, Housing Benefit and

[18] Malta and Cyprus also entered the EU on the same date but they are excluded from this analysis because they belong to the Commonwealth of Nations and, as a consequence, have been subject to different institutional circumstances.

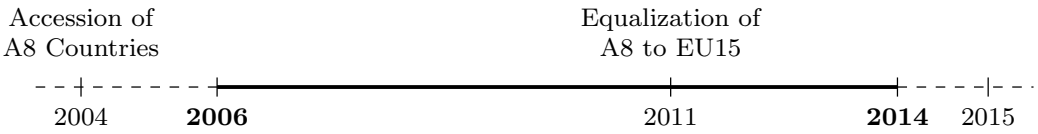
[19] Some evidence, however, suggests that "a fairly high percentage" of A8 migrant workers have not registered to the WRS (Drinkwater and Robinson, 2013).

[20] They could be out of work for no more than 30 days in the 12-month period.

housing assistance from Local Authorities, Council Tax Benefit, Child Benefit, Child Tax Benefit (Kennedy, 2011, 2015; Wilson, 2015). Starting on 1st May 2011, nationals of A8 countries have been wholly equalised to other EEA citizens.[21]

I exploit the change in policy at the 30th April 2011 for A8 nationals to evaluate the effect of having limitations to welfare support access on the probability for immigrants to take up benefits and on the consequences in terms of their labour supply. In the baseline specification the comparison is made against EU15 nationals, who did not go through any change in legislation over the period examined.[22] A sample of UK-born individuals and of immigrants from a comparable group of countries are employed in the descriptive statistics (subsection 1.3.5) and in the robustness checks (subsection 1.4.2), respectively. To my knowledge, this is the very first attempt to empirically verify the impact of the restrictions applied to the A8 countries on their use of welfare services and their labour supply.

Figure 1.1: Change in Welfare Accessibility for A8 Nationals



I use data from the Annual Population Survey (APS), an annual survey based on the UK Labour Force Survey (UK-LFS) plus a boost sample which allows an enhanced representativity at the local level.[23] The data are available for the years 2004-2014 but I only consider individuals who were interviewed in the period 2006q3 - 2014q1 (see Figure 1.1). On the one hand, the year 2005 has

[21] See Appendix A.1 for a brief overview of the UK welfare system and of the types of benefits that apply to immigrants.

[22] EU15 countries include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Sweden and Spain. The UK also typically belong to the EU15 group but they are excluded here for the purpose of the analysis. I also include Switzerland in this group because, even if technically they do not belong to the EEA, they are subject to the same rules as other EU15 countries in view of separate agreements (Kennedy, 2011).

[23] The sampling of the APS ensures the inclusion of at least 510 economically active persons for each Unitary Authority (UA)/Local Authority District (LAD) and at least 450 in each Greater London Borough. Some of the respondents (17.5% of the sample here considered) appear multiple times from one year to the other but the data are treated as a repeated cross-section.

an extremely unbalanced sample size compared to other years; this may be due to the fact that I am selecting only immigrants who arrived since 2005 and that respondents can only appear in the survey if they have lived in the country for at least 6 months. In addition to this, I account for a slight change in the law that came with the application of a European Directive since April 2006 (see Appendix A.1 for details). The year 2005 and the first half of 2006 are, therefore, dropped. On the other hand, most of the year 2014 is excluded because of major changes to the welfare system that came into place with the introduction of the Universal Credit, which is intended to replace the current system of benefits and tax credits.

I consider all foreign-born individuals aged 18 to 65 who come from a EU15 or an A8 country and that have arrived in the UK any time after 2004. Throughout the analysis, an individual is defined as coming from a certain country based on their place of birth.[24] In this particular case, the specification of the origin on the grounds of the country of birth seems preferable to the one based on the nationality because the place of birth is predetermined, while one could potentially change nationality for reasons that may be correlated to their eligibility to benefits and therefore generate endogeneity (Borjas, 2002). On the other hand, as Boeri (2010) points out, when the country of birth is used as a proxy for immigration status, estimates may be biased because of misclassification as immigrants of 'true nationals' born abroad for whatever reason and this issue may be especially important for a country with a large number of former colonies such as the UK. However, given that I include only immigrants from the European continent in the sample and that none of these countries are former British colonies, I opt for the definition based on the country of birth.

I exclude from my sample immigrants that have arrived before the 2004 Accession to avoid any potential selection problems. Prior to 2004, in fact, not only immigrants from A8 countries could not enjoy the free movement rights as EEA nationals, but they also have been found to be significantly different from later waves of immigrants (Longhi and Rokicka, 2012). Moreover, the UK and all EU15 countries already belonged to the EU in 2004 and immigrants from these countries were not subject to any change at the time of the A8 Accession. Finally, I keep all observations for

[24] Nationality is only used in case the stated country of birth yields ambiguity: e.g. individuals who state that they were born in Former Czechoslovakia are assigned to either Czech Republic or Slovakia on the basis of their stated nationality. Those declaring a nationality other than Czech or Slovakian are dropped.

Table 1.1: Sample by Country of Birth

EU15 Countries						**A8 Countries**		
Austria	67	(24)	Ireland	651	(219)	Czech Republic	507	(124)
Belgium	125	(47)	Italy	655	(248)	Estonia	112	(27)
Denmark	88	(38)	Luxembourg	8	(3)	Hungary	720	(209)
Finland	80	(29)	Netherlands	276	(90)	Latvia	862	(225)
France	843	(346)	Portugal	565	(141)	Lithuania	1,493	(287)
Germany	689	(234)	Spain	527	(239)	Poland	11,388	(2120)
Greece	273	(85)	Sweden	171	(78)	Slovakia	1,013	(278)
			Switzerland	75	(23)	Slovenia	17	(4)
			Total	**5,093**	**(1,844)**	**Total**	**16,112**	**(3,274)**

Note: Figures refer to the whole sample of immigrants that arrived in the UK after the year 2004. Numbers in parentheses pertain to the sub-sample of immigrants who have spent less than two years in the country.

which information on benefit claim and on the main individual characteristics are not missing.

The final sample resulting from the selection process described above is tabulated in Table 1.1, divided by country of birth. Figure A.2.1 in the Appendix shows the proportion of immigrants in the sample by country of birth and year (panel above) and by group (A8 or EU15) and year (panel below). It is easily observed that, on average, EU15 nationals constitute around 25% of the whole sample, and this share is quite steady over time. Immigrants from Poland, followed by Lithuanian nationals, are disproportionally more abundant than individuals coming from any other European country and they alone make up the large majority of the A8-born in the sample. This is consistent with previous analyses (Elsner, 2013) and official figures: according to Office for National Statistics (2013), the group of immigrants residing in England and Wales that increased the most during the period 2001-2011 were the Polish-born, with almost a ten-fold increase from 58,000 to 579,000. This considerable increment is to be attributed mainly to Poland having joined the European Union in May 2004. In the years 2004-2009, also a large number of immigrants from other A8 countries arrived in the UK: in 2011 there were 29,000 Hungarian-born residents, 36,000 coming from Latvia, 63,000 from Lithuania and 43,000 that were born in Slovakia (Office for National Statistics, 2013).

1.3.2 Empirical Model

In the main specifications, I estimate a model that is equivalent to a regression difference-in-difference such that:

$$Y_{ict} = \alpha + \beta_1 A8_{ic} + \beta_2 Pre2011_{it} + \beta_3 A8_{ic} * Pre2011_{it} + X'_{ict}\theta + \epsilon_{ict}, \tag{1.1}$$

where $A8_{ic}$ is a dummy for belonging to a A8 country and $Pre2011_{it}$ is a dummy for being interviewed before 30th April 2011, i.e. the date in which restrictions for A8 nationals were lifted. Hence, β_3 is the treatment effect of interest, as it should capture the 'pure' effect of the additional restrictions to welfare access on the outcome. Later, I will also discuss the implication of the policy on the average difference between the two groups (EU15- and A8-born) under the stricter regime, namely the sum of β_1 and β_3, provided this is statistically different from zero. This would display not if the restrictions have any effect on the treated (A8 immigrants) but, rather, whether the policy effectively lowers or increases the average outcome for the treated relative to the control group (EU15 immigrants).

I also include X_{ict}, which is a set of characteristics of individual i from country c at time t. This contains gender, age, age squared, a dummy for being married, the number of dependent children, the number of years since the arrival to the UK, a dummy for having secondary education or lower, whether the individual lives in a household in which residents are born in two or more different countries (i.e. mixed-origin HH), the lagged Local Area-specific unemployment rate (linear and squared) and the lag of the national GDP growth.[25] Finally, ϵ_{ict} is the error term, where standard errors are clustered at the country of origin level.

Various outcomes (Y_{ict}) are considered. I first look at the impact of the limitations to welfare support on the probability of claiming benefits. Then, I evaluate the effect on the labour supply, namely economic status, hours worked, probability of working full-time or having a second job and earnings. All outcome variables are defined as in the following subsection.

[25] Subscripts referred to Local Areas are omitted in favour of an easier notation.

1.3.3 Definition of Benefit Claim and Labour Supply Variables

The APS/UK-LFS questionnaires contain a dedicated section to the respondents' benefit entitlement.[26] Questions related to benefit claims are asked to all survey respondents who are in paid or unpaid work or are aged 16-69. They are referred to as benefit 'claims' but they can, in fact, be intended as the actual take-up of benefits, as the exact question that is posed to the respondents reads: 'state benefits/tax credits that [they] may be receiving or claiming'.[27] All variables concerning the claim of benefits are dummy variables. This is because the only information available in the APS is whether or not an individual claims a particular benefit, while there are no questions asked on the amounts claimed or their duration, which unfortunately greatly limits the potentiality of this investigation.

For the purpose of this analysis and in order to have a systematic and clear definition, I group benefits and tax credits on the grounds of their type and of the claimants' employment status.[28] More specifically, I divide them into three broad categories: in-work benefits, out-of-work benefits and benefits that do not depend on the employment status of the claimant. These are synthesised in Table 1.2 (below panel). In-work benefits include Income Support and Working Tax Credits, which are mainly aimed at subsidising those who are in paid work but earn low income or work for a few hours per week. Out-of-work benefits are primarily unemployment-related benefits. These include National Insurance Credits and Job Seeker's Allowance and are destined to financially support people who are not working. The following benefits belong to the third, residual category: family and child benefits encompass all family- and child-related benefits, including Child Benefit and Child Tax Credits; housing benefits include also Council Tax Reductions (Great Britain) and Rent Rebate (Northern Ireland). Finally, sickness benefits combine all kinds of financial support for ill or disabled individuals.

I also construct three aggregate indicators where I group benefits according to their type (Table 1.2, above panel). The first indicator, 'Any Benefit', takes value 1 if the respondent claims any

[26] Comparison between the data collected by the LFS and administrative data collected by other Government departments shows that the LFS consistently undercounts benefit claimants (see APS/UK-LFS documentation). However, as there is no reason to believe that these figures are systematically undercounted for a particular group (i.e. nationality) of respondents, one should not be concerned over selection issues.

[27] For more details, see APS/UK-LFS documentation: LFS User Guide, Volume 2.

[28] In the remainder of the paper, I will broadly refer to both benefits and tax credits simply as 'benefits'.

Table 1.2: Definition of Benefit Variables

Name of Benefit Indicator	Description
Any Benefit	Any in-work or out-of-work benefit, including Sickness benefits
Any OW Benefit	Any out-of-work benefit (Unemployment, Family/Child or Housing)
Any HH-level Benefit	Any household-level benefit (Family/Child or Housing)
In-Work Benefits	Income Support, including Working Tax Credits
Out-of-Work Unempl. Benefits	Unemployment-related benefits, National Insurance Credits, Universal Credit, Job Seeker's Allowance
Family/Child Benefits	Family-related and child benefits, including Child Tax Credits
Housing Benefits	Housing benefits, including Council tax reductions and rent rebate
Sickness Benefits	Sickness or disability benefits, including Personal Independence Payment and Employment and Support Allowance

type of benefit, regardless of her employment status, and value 0 otherwise. The second dummy, 'Any OW Benefit', is an indicator for whether the individual claims any of the following: out-of-work, family/child or housing benefit. This should comprise all benefits to which eligibility for A8 nationals was restricted in the period up until 30th April 2011, i.e. the treatment period. Hence, this is used as main outcome of interest when the effect of the transitional limitations is assessed in terms of benefit take-up. The third and last variable, 'Any HH-level Benefit' is equal to 1 if any of the benefits at the household level are claimed, namely family/child or housing benefits, and is equal to 0 otherwise.

The variables describing the individuals' labour supply identify their economic status, the hours worked, their earnings and their likelihood of working full-time or of having a second job. Economic status is divided into three categories, as defined under the ILO classification: in employment (which includes both employees and self-employed workers), unemployment and inactivity. Hours worked are determined on the basis of usual hours worked, only for people in employment. Full-time employment and having a second job are identified by two dummy variables, again only for people in employment. Finally, gross hourly pay, which is only available for workers that are not self-employed, constitutes the information about wage.

1.3.4 Harmonisation of Educational Attainment Variables

The information concerning the educational level of migrants in the data is rather problematic. Up until January 2011, in fact, the LFS provides for all non-UK qualifications to be recoded as 'other' and this makes it troublesome to allocate the correct qualification level to individuals who have completed their educational career abroad. Hence, following Campbell (2013), I adopt an alternative strategy to determine the qualification attained by the individuals in the sample. This is achieved by exploiting the variable 'age when completed full-time education' and comparing it to the corresponding level of educational attainment in the country of origin. In order to maintain a good degree of accuracy and to ensure some harmonisation among the different educational systems across European countries, I refer to the International Standard Classification of Education (ISCED). While this practice suffers from potential misclassification, due to recall bias of respondents and especially in the case of individuals who have repeated years in school, it allows to fully exploit the information about the age when education was terminated and frame it into the relevant educational system.

Other authors have previously used information about the age of education completion (Dustmann et al., 2010; Drinkwater and Robinson, 2013). They generally classify educational attainment as high (left full-time education at 21 or older), intermediate (left between 17 and 20) and low (left at 16 or younger). However, none of these studies takes into account that different countries may have incomparable educational systems and that the age at which full-time education is left may correspond to different levels achieved. For instance, leaving school at age 19 (i.e. 13 years of education) in Spain may translate in a vocational tertiary level (ISCED 5B), while at the same age a German student may reach a post-secondary level (ISCED 3).[29] Thus, such design may lead to misclassification of the individuals' educational attainment and this is likely to be persistent within each country of origin group. Hence, the correlation of the bias to the group individuals belong to may generate endogeneity concerns. By choosing to follow the strategy adopted by Campbell (2013), I believe I am able to minimise the likelihood of such issue taking place. In order to do so, I refer to the 1980 primary school entry ages from the World Bank's World Development Indicators

[29] In both countries the primary school entry age is 6 years old.

and the tables in the 2009 PISA Technical Report (OECD, 2012) to compute the average age at which each ISCED level is attained in each European country.[30] I follow a conservative approach and assign the lowest ISCED achievement in the cases where two or more levels can be attained at the same age.

1.3.5 Descriptive Statistics

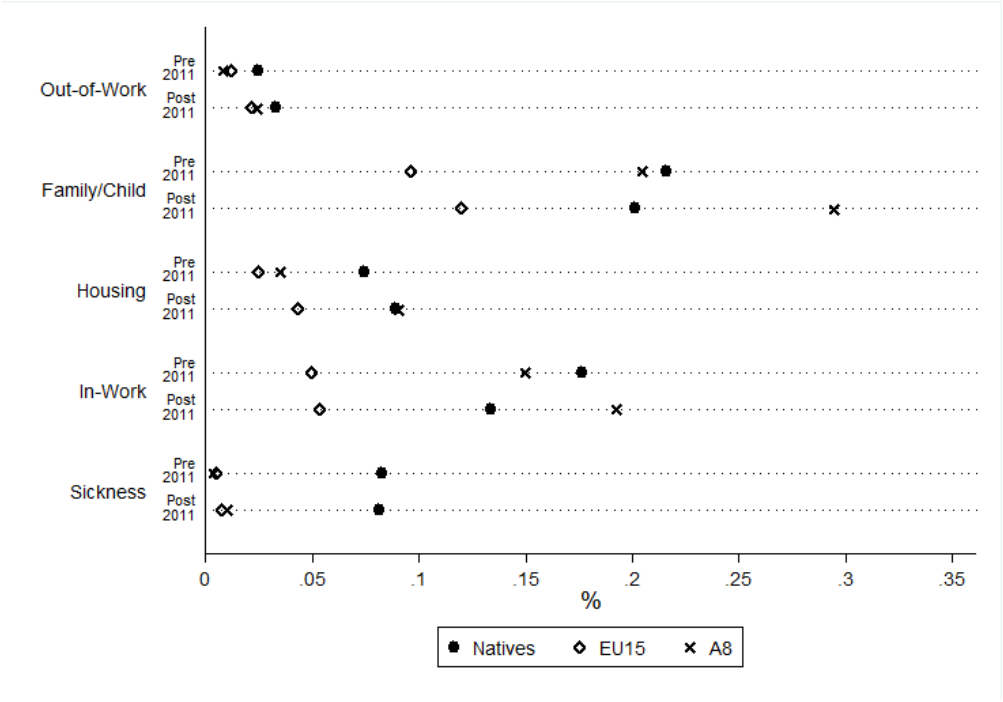
Tables A.2.1 and A.2.2 report the (unconditional) means of variables used in the analysis for three groups of individuals: UK-born, EU15 immigrants and A8 immigrants. Here, figures pertaining to the UK-born are shown with the primary aim of having a benchmark for comparison with the resident native population. All individuals in the sample are restricted to be aged 18-65, to be interviewed in the period 2006q3 - 2014q1 and not to have missing information in their key variables. The two groups EU15 and A8, only encompass individuals who have arrived to the UK on 2005 or after.

Foreign-born individuals are approximately 30 years old at the time of the interview and have been living in the UK for 2 to 4 years, with A8 immigrants having stayed in the country for longer than the EU15-born (Table A.2.1). Moreover, A8 nationals are more likely to be married and have more children. With respect to the UK-born individuals in the sample, immigrants are on average much younger (natives are 43 years old on average), less likely to be married and have less children (except the case of the A8 nationals interviewed after April 2011). In terms of education, natives are strikingly more likely to have (lower) secondary level qualifications, while non-British individuals are generally more highly educated: 43% of A8 immigrants have achieved a lower tertiary qualification, while more than two thirds of EU15 individuals have a first degree or higher.

Finally, more than one every two EU15-born lives in a household with at least an individual coming from a different country of origin than hers, while this occurs for roughly a third of the A8-born immigrants and only in 5% of the cases for the natives. This variable is included in the regressions because it should pick up the effect of living in a multicultural environment and coming across more information. This may be especially important with respect to the procedures needed

[30] The World Bank tables on the official entrance age to primary education are available at: http://data.worldbank.org/indicator/SE.PRM.AGES (last accessed 04/01/2017).

Figure 1.2: Percentage of Benefit Claim by Group and Period



to claim benefits, particularly for non-English speakers, and to the chances of finding a job. In fact, the coefficients associated to this variable tend to be statistically significant in all specifications.

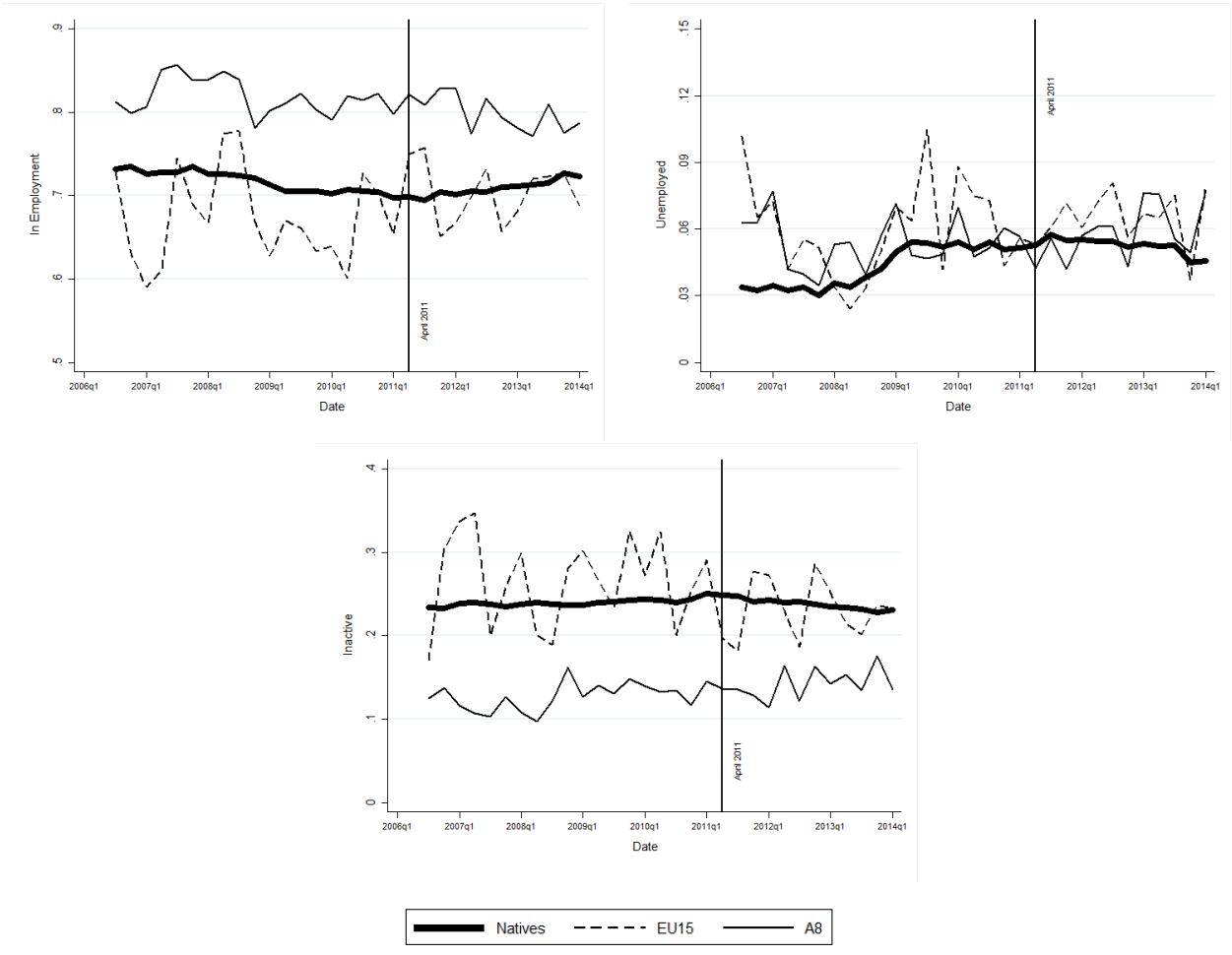
As described above the two groups of immigrants differ in terms of few other observable characteristics, including their achieved educational level. In turn, they are quite dissimilar from the sample of natives. These differences may partly originate from the sample selection criteria employed, in particular the fact that only recent immigrants are included in the final sample. However, such selection should not constitute a problem in terms of the study that is carried out here for two reasons. First, the core analysis is done by comparing A8 to EU15 nationals, who are all immigrants and are all selected with the same criteria. Second, all observable characteristics, including gender, family composition and education, are included among the controls and are, therefore, taken into consideration.

The distribution of some characteristics also changes to a slight extent over time: among the A8 immigrants interviewed after April 2011 there is a larger share of females and of married people and individuals tend to have a higher number of children. On the other hand, differences in educational

achievement between the two periods are negligible. This suggests the absence of a trend in the skill composition of these individuals that could hypothetically affect their likelihood of claiming benefits or their participation to the labour market.

Information on the indicators concerning the claim of benefits are summarised in Table A.2.2 (upper panel) and Figure 1.2. Here, two things can be easily noticed. First, on average natives claim significantly more benefits than the foreign-born, for most types of benefits. The pattern is reversed only when natives are compared to A8 immigrants in the period after April 2011, i.e. when A8 nationals are finally able to claim like other EEA nationals: there, for some types of benefits, especially family and child benefits, A8 immigrants appear to claim more than the UK-born. It

Figure 1.3: Employment by Group and Year

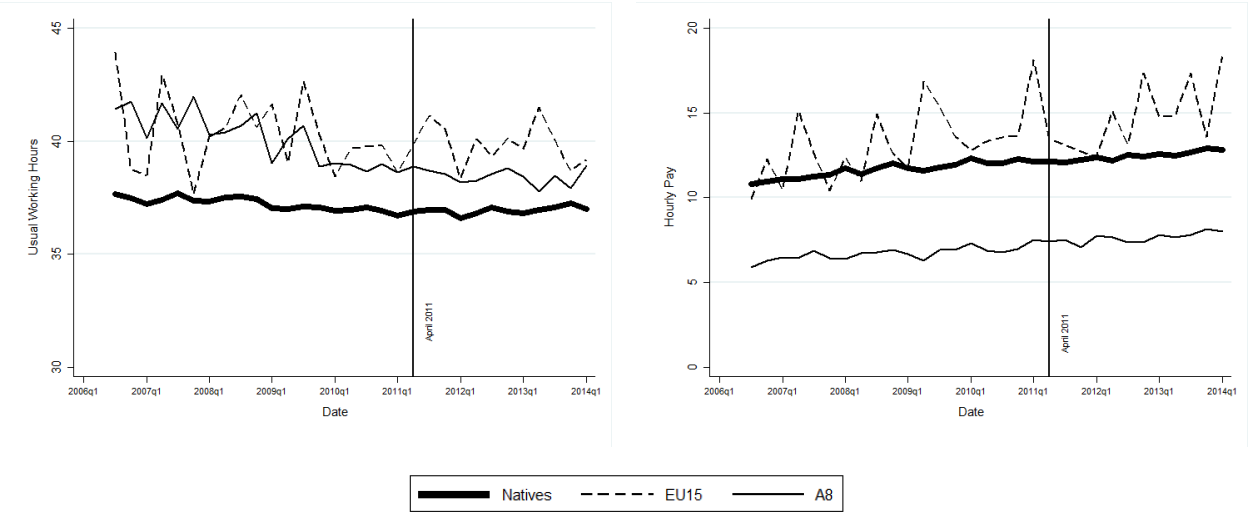


must be noted, however, that this is coherent with the patterns found in the number of children per individual (see Table A.2.1): before 2011 natives have the highest claiming rate but also the highest number of children among the three groups, while after 2011 A8 nationals reach higher fertility levels and their share of family and child benefits claimants grows accordingly. Second, contrary to popular belief, an extremely low percentage of individuals, and even more so of immigrants, in the sample claim out-of-work unemployment benefits (around 3% and 1.5%, respectively). The same is true also in the case of sickness benefits, where less than 0.5% of immigrants claims this type of benefit (compared to around 8% of natives).

When comparing A8 immigrants before and after the relaxation of the restrictions to welfare access, the differences in the unconditional means are always found to be positive and statistically significant: for instance, after April 2011 A8 nationals claim almost 12% more of any type of benefit. When benefits are broken up by type, the highest increase in the claiming rate is in family and child (9%) and housing (5%) benefits.

As far as the labour supply is concerned, averages by period are presented in Table A.2.2 (lower panel) and Figures 1.3 and 1.4. A8 immigrants constitute the group that has the highest employment rate (over 80%) and the lowest inactivity rate (13%), while EU15 nationals tend to

Figure 1.4: Labour Supply by Group and Year



behave similarly to the native population, where around 70% are in work.[31] The number of the unemployed, on average, is constant across groups and is set in between 5% and 6%.

A8 nationals also work longer hours: their average usual hours worked are up to 6 hours more than natives and their EU15 counterparts in the first years examined (Table A.2.2). A8-born are also more likely to be in a full-time job. Nevertheless, they receive the lowest wage, namely around a third less than the UK- and the EU15-born (see Figure 1.4).

1.4 The Effect on Benefit Claims

In this section I present the main results concerning the effect of the restrictions to welfare access on the claim of benefits. I first evaluate the effect on the aggregated indices previously discussed. Next, I break down the analysis on each type of benefit separately. Then, I discuss a number of robustness checks and placebo tests in support of the main evidence.

1.4.1 Main Results

The first step consists of estimating the probability of claiming benefits for the individuals who are potentially affected by the temporary limitations in the eligibility to welfare support. In order to do so, I restrict the sample to all individuals in the sample who have been in the UK for less than two years (see Table 1.1). The reason behind this lies in the fact that, under the stricter regime (May 2004 - April 2011), A8 immigrants had to be continuously in work for at least 12 months before being able to access out-of-work, family/child and housing benefits or tax credits like other EEA nationals. Hence, A8-born workers that had just arrived to the UK would have been the ones actually subject to the limitations. As the year of arrival to the UK is the only piece of information available in the data, I cannot compute precisely the length of time that each individual has spent in the UK. Given this, I select all individuals for whom the difference between year of interview and year of arrival is strictly less than two. Hence, the time elapsed since the time of arrival is, *de*

[31] Figures are consistent with Campbell (2013), who uses ONS data to compute that the employment rates for A8 and EU15 immigrants and natives are, respectively, 81.1%, 72.4% and 72.8%.

facto, restricted to be from a minimum of 6 months to a maximum of 23 months.[32]

Table 1.3 reports the regression results from the estimation of Equation 1.1, where the aggregate indices of benefit claim grouped by type, as described in subsection 1.3.3, are used as outcomes. Specifically, column I concerns the claim of any benefit regardless of the type or the employment status of the individual. This includes also benefits that were available for A8 immigrants before and after April 2011 (i.e. in-work and sickness benefits). Column II refers to the claim of any benefit among the following: out-of-work, family/child or housing. This indicator is the one that fully encompasses the benefits that were temporarily inaccessible to A8 immigrants in the treatment period (2004-2011) and should be regarded as the main outcome of interest. Finally, the outcome in column III is defined as whether the individual claims any benefit or tax credit at the household level, namely family/child and/or housing benefits.

The coefficients associated to the $A8$ dummy are all positive and significant, meaning that in the absence of any restriction, A8 immigrants are on average more likely to claim benefits by around 6 percentage points with respect to their EU15 counterparts. Conversely, the expected average change in benefit claim from before to after April 2011 is not only statistically null but also very close to zero in terms of magnitude.

The estimated effect of being under the restricted regime ($A8 * PreApr2011$) is negative and significantly different from zero in all columns. This corresponds to a decrease in the probability of claiming benefits by around 6 percentage points. Stated differently, when restrictions are relaxed (namely, after April 2011) A8 immigrants are found to take up more benefits by 6 percentage points. Given that the average share of claimants among the non-treated goes from 5.7 to 4.4, this means that A8 immigrants have around a 120% higher probability of claiming benefits when restriction to welfare access are removed (column II). The effect decreases slightly (to 110%) when all types of benefits are included in the definition of the dependent variable, i.e. column I, due to the counterbalancing effect of in-work benefits (see Table 1.4 and related discussion below). However, when the restrictive policy is in operation, the average difference between the two groups

[32]This is because 6 months is the minimum time that an individual needs to be residing in the UK before being interviewed in the LFS, while 23 months would be the case where the immigrant who arrived on January of the year $t-1$ is interviewed in December of the year t.

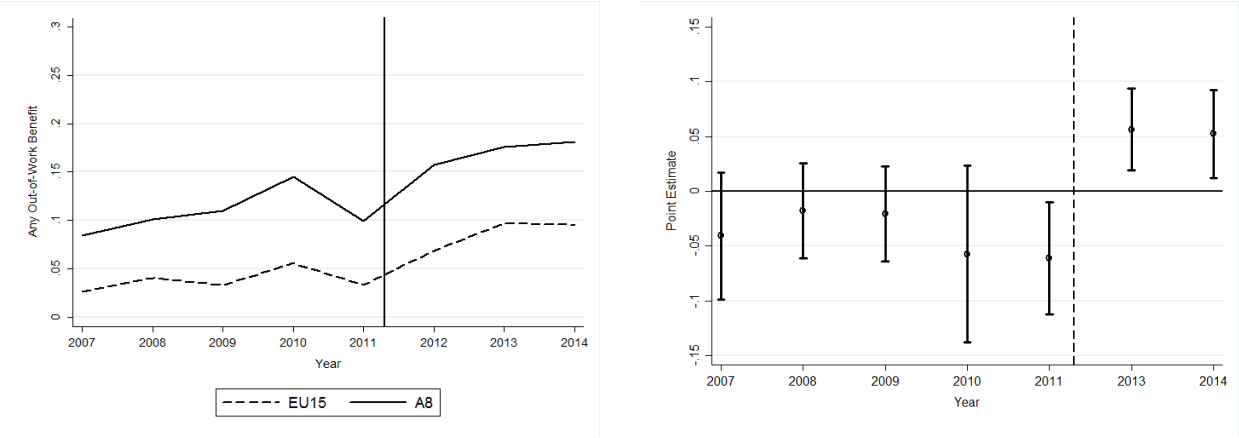
Table 1.3: Claim of Benefits

Dep. Variable	(I) OLS Any Benefit	(II) OLS Any Out-of-Work Benefit	(III) OLS Any HH-level Benefit
A8	0.083***	0.063**	0.064**
	(0.023)	(0.023)	(0.023)
PreApr2011	0.004	0.005	0.003
	(0.010)	(0.010)	(0.015)
A8*PreApr2011	-0.063**	-0.063**	-0.055**
	(0.023)	(0.023)	(0.024)
Female	0.053***	0.058***	0.057***
	(0.012)	(0.011)	(0.012)
Age	0.014***	0.012***	0.011***
	(0.002)	(0.001)	(0.002)
Age Squared	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
Married	0.047**	0.053***	0.051**
	(0.017)	(0.017)	(0.018)
1 Child	0.214***	0.213***	0.211***
	(0.025)	(0.023)	(0.023)
2 Children	0.206***	0.196***	0.201***
	(0.033)	(0.029)	(0.027)
3+ Children	0.203***	0.201***	0.190***
	(0.053)	(0.051)	(0.051)
1 Yr in UK	0.059***	0.047***	0.051***
	(0.009)	(0.008)	(0.008)
Secondary Edu (or Lower)	0.037***	0.037***	0.031***
	(0.012)	(0.010)	(0.009)
Mixed-Origin HH	-0.018**	-0.020**	-0.018*
	(0.008)	(0.009)	(0.010)
Lag of URate	1.560***	1.167***	1.014***
	(0.205)	(0.251)	(0.249)
Lag of URate Squared	-7.879***	-5.997***	-5.618***
	(1.600)	(1.386)	(1.663)
Lag of GDP Growth	0.001	0.004	0.002
	(0.005)	(0.003)	(0.004)
Constant	-0.218***	-0.183***	-0.177***
	(0.028)	(0.016)	(0.021)
Observations	4,918	4,918	4,918
R-squared	0.203	0.210	0.214
Other Controls	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs
P-value ($\beta_1 + \beta_3 = 0$)	0.253	0.993	0.504

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Reference categories: No Children, Less than a Year in UK.

of immigrants is not statistically different from zero.[33] These results suggest that restricting access to benefits may work in general, because it appears to decrease the overall probability of take-up. Nevertheless, when the difference between the affected group (A8 nationals) and their EU15 counterparts is observed, this implies that such restrictions do not make the treated group less likely to claim compared to the unaffected one. This, however, is not surprising given the fact that EU15-born are generally found to be the most virtuous group of immigrants (Clark and Drinkwater, 2008; Campbell, 2013). Such considerations are complemented by the graphs depicted in Figure 1.5. Here, the graph on the left illustrates yearly trends in the average claim of any out-of-work benefit by EU15 and A8 immigrants. The graph on the right shows the point estimate of the coefficient of the interaction between the indicator for belonging to the treated group (A8) and a series of year dummies.[34] It is easily noted that the two groups tend to behave similarly in the years in which the restrictions are in place. Conversely, when these are relaxed the probability of benefit take-up for A8 immigrants increases significantly, namely by 5.6 and 5.2 p.p. for the years 2013 and 2014,

Figure 1.5: Estimated Effect of the Restrictions by Year: Any Out-of-Work Benefit



Note: The graph on the left shows the predicted values of the claim of any out-of-work benefit by group and year, conditional on macroeconomic characteristics. The graph on the right depicts the estimated effect of the restrictions to welfare access by year. 90% confidence intervals are shown and standard errors are clustered at the country of origin level. I do not reject the null hypothesis of all point estimates in the 'pre' period being equal (p-value 0.227).

[33] This is calculated as the sum of β_1 and β_3 coefficients (see Equation 1.1) for each column of Table 1.3. I do not reject the null hypothesis of $\beta_1 + \beta_3$ being equal to zero in all columns (see Table 1.3).

[34] In order to align time spans to April 2011, year dummies are arranged such that each year refers to the last two quarters of the previous year and the first two quarters of the actual year. Hence, for instance, the dummy for 2007 takes value 1 in the last two quarters of 2006 and the first two quarters of 2007. Quarters q2 and q3 of 2011 are excluded.

respectively (the year 2012 is the reference year).

Brewer et al. (2013) suggest that the use of feasible GLS can ensure substantial gains in power in the context of difference-in-difference and therefore recommend the use of this method of estimation combined with cluster-robust inference. Hence, I also estimate the same model as in Equation 1.1 using feasible GLS and find identical results (Table A.2.3, columns I-III).

When directing the attention to the covariates, I find that, as expected, females, married individuals, those who have dependent children and the less educated are more likely to claim benefits, as well as those who have arrived in the UK in the previous year (compared to those arrived in the same year as the interview). I also observe that the propensity to claim decreases if the individual lives in a household where members are of different origin. Moreover, benefit claims respond positively (and non-linearly) to the lag of the unemployment rate in the Local Area where these individuals live, implying that claims are affected by the economic conditions of the area following a pattern that increases less than proportionally. *Per contra*, the lag of the GDP growth at the national level does not seem to have any influence. This suggests that this latter variable, which is intended to control for the strength of the Great Financial Crisis that hit since 2008, is not associated to overall variations in benefit claims.

When I break the analysis by type of benefit (Table 1.4), I observe that immigrants that are subject to the restrictions claim less out-of-work (mainly Job Seeker's Allowance) benefits by 2 p.p., less family-related benefits by almost 4 p.p. and and less housing support by about 2.5 p.p., although only the latter appears to be statistically significant. In other words, the effects that can be drawn from coefficients in Table 1.4 can be interpreted as follows. Similarly to the case of the aggregate indicators discussed above, I find that during the restricted regime A8 immigrants claim benefits at a comparable rate with respect to EU15-born individuals, while they tend to increase their take-up when they gain full eligibility. Hence, after the expiration of the temporary limitations A8 immigrants claim significantly more housing benefits and this corresponds to a 145% increase with respect to their EU15-born counterparts in the same period. The point estimates pertaining to out-of-work and family benefits also suggest an increase in the take-up of these benefits by 174% and 98%, respectively, but in these two latter cases coefficients are not statistically significant.

Table 1.4: Claim of Benefits by Type

Dep. Variable	(I) OLS Out-of-work Empl. Bnfts	(II) OLS Family Bnfts	(III) OLS Housing Bnfts	(IV) OLS In-Work Empl. Bnfts	(V) OLS Sickness Bnfts
A8	0.008	0.052**	0.024**	0.047***	-0.000
	(0.010)	(0.021)	(0.011)	(0.014)	(0.003)
PreApr2011	0.000	0.002	-0.007*	-0.020*	0.001
	(0.007)	(0.014)	(0.004)	(0.010)	(0.001)
A8*PreApr2011	-0.020	-0.038	-0.025**	-0.003	-0.003
	(0.012)	(0.023)	(0.012)	(0.016)	(0.003)
Observations	4,918	4,918	4,918	4,918	4,918
R-squared	0.025	0.231	0.030	0.109	0.012
Other Controls	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs
P-value ($\beta_1 + \beta_3 = 0$)	0.003	0.323	0.780	0.001	0.253

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

The lack of statistical significance of the coefficient associated to family-related benefits may be due to the fact that more than two thirds of European immigrants in the sample have no children in the first years since their arrival to the UK.[35] On the other hand, out-of-work benefits are claimed only by a small fraction of the sample (less than 1%). Also, there is no effect on the claim of in-work benefits, i.e. primarily Income Support for low-income workers, and on sickness benefits. In fact, the coefficient associated to the treatment effect in both cases is essentially zero and not statistically significant. This is consistent with the eligibility rules for the A8 immigrants, in the sense that prior to April 2011 they were already qualified to claim in-work and sickess benefits and, hence, a significant change was not predicted to occur.[36] Analogously to the aggregated indices of benefit claims, I estimate the probability of claiming benefits by type with feasible GLS (Table A.2.3, columns IV-VII) and find consistent results: the magnitude of the coefficients associated to the interaction term is unchanged and they become statistically significant, except in the case of in-

[35]Given that family-related benefits include some transfers which are provided conditional on the presence of children (namely, child benefits), I also restrict the sample to include only individuals who have at least one child. This yields a reduction in the number of observations to around a third. The interaction term remains not significantly different from zero and the point estimate implies a contraction in the claim of this type of benefits due to the restrictions to almost 7 p.p. However, when I run the specification with country of origin and year fixed effects as in Table A.2.5 (see next subsection), I obtain a coefficient of -0.010 which is significant at the 10% level.

[36]Moreover, sickness benefits are claimed a very small number of individuals in the sample (less than 0.5%). For this reason, I do not present estimations concerning sickness benefits in the rest of the analysis, as the effect associated to this outcome is of little statistical importance.

work benefits which, as discussed above, is expected to yield a null effect.

Additionally, I estimate Equation 1.1 on the whole sample of immigrants from EU15 and A8 countries that arrived after 2004, i.e. including those who have spent more than two years in the UK (see Table 1.1). Here, I expect the effect of the restrictions to be smaller as it should be attenuated by the fact that now the sample also includes individuals that have been in the UK for longer than two years. These people might, in fact, have already spent in the country enough time in order to have met the minimum requirement of the 12 months in employment and, hence, be eligible to claim benefits on the same grounds as EU15 nationals. Results are presented in Table A.2.4. The effect of the restrictions is, indeed, lower with respect to the figures in Table 1.3. Nevertheless, this is still statistically significant and corresponds to a decrease in the probability of claiming benefits by 4 percentage points (column II). In other words, the relaxation of the restrictions yields an increase in the propensity to claim benefits by 28% for A8 immigrants when they are compared to their EU15-born counterparts in the same period. Moreover, as predicted, the likelihood of claiming benefits for individuals in the A8 group is still higher compared to that of EU15 immigrants but its magnitude is considerably reduced: A8-born individuals are on average 45% per cent more likely to claim any out-of-work benefits, while when only very recent immigrants are considered the likelihood goes up to 122% (Table 1.3, column II). This would suggest that, while immigrants from the A8 countries are relatively more in need of welfare support compared to their counterparts from the EU15 countries, as they spend more time in the host country the behaviour of the two groups becomes more similar.

1.4.2 Robustness Checks

In addition to the use of different estimators discussed in the previous subsection, I run several robustness checks and placebo tests to verify the robustness of the analysis presented so far and the solidity of the interpretation of the main results.

To begin with, I run a slightly different specification with respect to Equation 1.1, where I substitute the dummies for belonging to an A8 country and for being interviewed before April 2011 with, respectively, country of origin and year dummies (Table A.2.5). Results are analogous to the

ones presented in the main analysis: the coefficients associated to the interaction term are always negative and they even improve in terms of statistical significance.

Additionally, I carry out some placebo tests to ensure that the main results do not arise from random chance rather than from a causal relationship. As discussed in subsection 1.4.1, the use of in-work benefits as dependent variable is already to be seen as a placebo test, since this category of benefits was accessible for A8 immigrants even during the period of limited eligibility to welfare support. Coherently with this, I find that the coefficient associated to the restrictions on the claim of in-work benefits is not only not significant, but also its magnitude is close to zero (see Table 1.4). The same applies to sickness benefits, for which the estimated effect is, in fact, null. However, in this last case, the absence of an effect is certainly influenced also by the fact that only a negligible part of the population in the sample (less than 0.5%) claims illness- or disability-related benefits.

Moreover, I run some other placebo tests by focusing on the span prior to the equalisation of A8 immigrants to other EU15 (that is, the period before April 2011) and by using several false cut-offs, namely one every six months from April 2010 going backwards to April 2008. Results in Table A.2.6 confirm the absence of any systematic treatment effect.

Furthermore, one may argue that, given the relatively large number of immigrants from Poland in the A8 group, the effect on the take-up of benefits may be potentially driven by some unobserved characteristics that only Polish immigrants might have. Thus, I run all regressions with two different sub-samples. In the first one I exclude all immigrants that were born in Poland (Table A.2.7), while in the latter I exclude all immigrants that were born in countries other than Poland from the A8 group (Table A.2.8). In both cases, results are in line with the main analysis. Also, when Poland is excluded from the sample the estimated effects appear to be slightly larger in magnitude, which would suggest that the restrictions to welfare access bite proportionally more on immigrants other than those coming from Poland. This comes at no surprise if one takes into account that the Polish community has been among the largest in the UK since the post-war period, hence, it is plausible that at their arrival in the UK Polish-born new immigrants may have found a well-developed informal network on which to rely in place of (or along with) the official welfare assistance.

Finally, I perform an additional check by using a group of countries similar to the A8 as treat-

ment group (Table A.2.9). I select a group of other European countries that are arguably comparable to the A8 group in their socio-economical features: Albania, Bosnia-Herzegovina, Croatia, Moldova, Serbia and Montenegro, Turkey, Ukraine, Kosovo. Among these countries, many of them are awaiting to enter the European Union at the time of the analysed period.[37] When I employ this sample of countries in place of the original treatment group (A8 countries) I find no consistent and significant treatment effect on the probability of claiming benefits. This result is expected, given that the countries in this sample have not encountered any change in restrictions over the period considered.

1.5 The Effect on the Labour Supply

In the previous section I have given evidence of the fact that relaxing the restrictions to welfare access yields a considerable and significant reduction in the claim of out-of-work and HH-level benefits for A8 nationals. Specifically, I find that extending the access to these types of benefits for the first twelve months to immigrants that have just arrived in the country increases their probability of take-up by around 6 p.p., on average. The question that follows is, then, whether there is a response to this effect in terms of labour supply. In other words, when immigrants no longer face limitations to welfare support do they work less in view of the relatively increased financial resources?

In this section, I investigate whether the extension of the eligibility to out-of-work and HH-level benefits is complemented by a decrease in the labour supply, both on the extensive and on the intensive margins.

1.5.1 Employment Status

I begin with evaluating the impact of the limitations on the probability for immigrants to be in a certain employment status, according to the standard ILO definitions of employment, unemploy-

[37] Mastrobuoni and Pinotti (2015) use a similar approach. Immigrants coming from A2 countries (Bulgaria and Romania) are not in the sample as they were subject to different transitional restrictions over the period January 2007 - December 2013. Croatia entered the European Union on July 2013 but Croatian immigrants had restrictions similar to those applied to A2 nationals (Kennedy, 2015). In any case, there are no Croatian-born interviewed in between July 2013 and the end of the period considered.

Table 1.5: Employment Status

Dep. Variable	(I) OLS In Employment	(II) OLS Unemployed	(III) OLS Inactive
A8	0.101***	-0.009	-0.092***
	(0.023)	(0.007)	(0.018)
PreApr2011	-0.011	-0.014**	0.025*
	(0.014)	(0.006)	(0.014)
A8*PreApr2011	0.044***	0.002	-0.045***
	(0.014)	(0.008)	(0.015)
Observations	21,005	21,005	21,005
R-squared	0.139	0.013	0.147
Other Controls	Yes	Yes	Yes
Sample	Whole	Whole	Whole
P-value ($\beta_1 + \beta_3 = 0$)	0.000	0.211	0.000

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

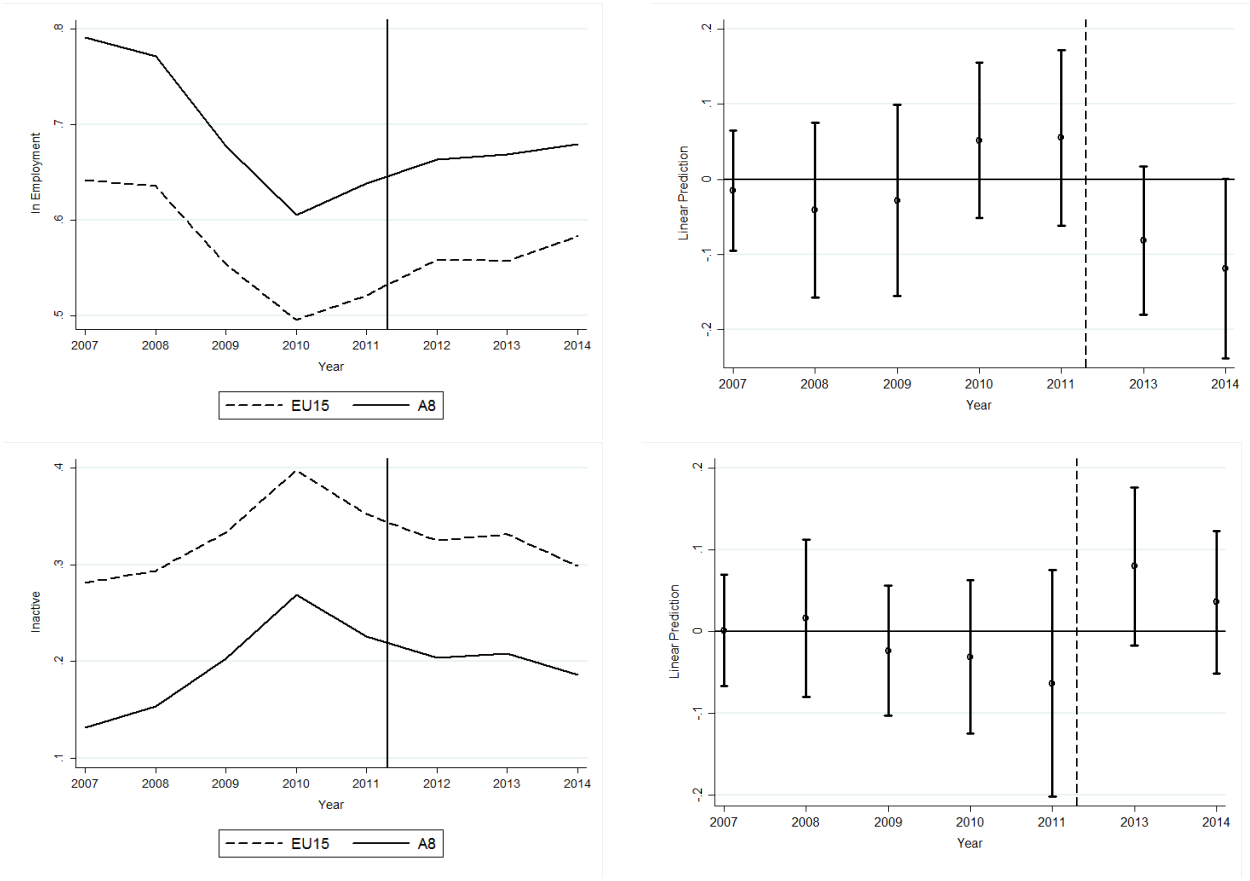
ment and inactivity.[38] Results are presented in Table 1.5 and are based on the whole sample of immigrants who have arrived to the UK after 2004.

The probability of being either employed or self-employed is more than 4 percentage points higher due to the restrictions to access to some types of welfare support (column I). These are exactly counterbalanced by an identical reduction in the probability of being inactive, while the effect on the propensity of being unemployed is null (columns III and II, respectively). That is to say, the ending of the transitional restrictions to welfare access yields both a drop in the probability of being employed and an increase in that of being inactive for the A8 immigrants. This is because the acquired eligibility to transfers reduces the financial gain from working compared to not working (Brewer et al., 2010). In terms of percentages, these two effects are quantifiable in A8-born immigrants being less likely to be in employment by 6% and more prone to be inactive by 19% compared to their EU15-born counterparts.

This finding is coherent with the hypothesis of an increased labour supply due to the reduced access to social benefits during the transitional restrictions in the years 2004 - 2011 for individuals whose financial constraint is binding: the rise in the probability of being employed does not come

[38] Here, workers in employment include all employees and self-employed individuals.

Figure 1.6: Estimated Effect of the Restrictions by Year: Employment Status



Note: The graphs on the left show the predicted values of being in employment (above) and inactive (below) by group and year. The graphs on the right depict the estimated effect of the restrictions to welfare access by year. 90% confidence intervals are shown and standard errors are clustered at the country of origin level. I do not reject the null hypothesis of all point estimates in the 'pre' period being equal (p-values 0.300 and 0.763, respectively).

as a consequence of a decline in the number of those in unemployment, which is an involuntary status. Rather, this is fully outweighed by a contraction of the inactivity rate. By adding the β_1 and β_3 coefficients from Equation 1.1, I also observe that A8 immigrants are almost 15 percentage points more (less) likely to be in employment (inactive) compared to EU15 nationals while subject to the restrictions.[39] These figures are in line with the documented extremely high employment rate of A8 immigrants, especially in the first post-Accession years (Campbell, 2013). Figure 1.6 illustrates graphically the estimated effect of the restrictions to welfare access on the probability to be employed (panel above) and to be inactive (panel below) by year.

[39]I reject the hypothesis that the combined effect ($\beta_1 + \beta_3$) on unemployment is statistically different from zero.

Table A.2.10 in the Appendix reveals the results relative to the sub-sample of those who have stayed in the country for less than two years and for at least two years (odd and even columns, respectively). The claim discussed above is confirmed by the coefficients herein displayed. In particular, the magnitude of the effect on employment and on inactivity in the case of the newly arrived immigrants is 50% larger than that of the whole sample. This is a reasonably expected outcome for the sub-sample of the foreign-born who are mostly affected by the policy. Yet, for those who have stayed in the country for at least two years and, therefore, should have already met the 12-month requirement, the expiration of the restrictive regime still has a small but significant impact by about 2 percentage points. This suggests the existence of something similar to a 'chilling effect' (Borjas, 2002), in the sense that immigrants who find themselves restricted in their eligibility to welfare have to work more but even when they can finally access benefits many of them choose to keep their job. One may then argue that such selective policy is effective not only in terms of enhancing the employment rate of those affected, but it also has an indirect, though smaller, impact on the workers who have met the eligibility requirements. Similarly to what is reported in Table 1.5, $\beta_1 + \beta_3$ are found to be statistically different from zero when being in employment and being inactive are used as outcomes. Hence, the newly arrived A8-born still appear to be around 15 p.p. more likely to be in employment and less likely to be inactive in the period following April 2011 compared to EU15 immigrants, i.e. when the two groups are subject to identical eligibility rules. When evaluating the sub-sample of those who have lived in the UK for at least two years, such gaps remain substantial and amount to little less than 13 p.p. On the other hand, in all cases, there is no statistical difference in the propensity to be unemployed between the two groups.

1.5.2 The Intensity of Employment and Earnings

Having found a higher probability of being in employment, I then focus on the sub-sample of individuals who work and analyse the effect of the limitations to welfare support on the intensive margin of the labour supply. More specifically, I examine the impact on the number of hours usually worked, on the probability of working full-time and on the probability of having a second job. Last, I investigate whether there is any effect on earnings. Results are displayed in Table 1.6.

Table 1.6: Labour Supply

Dep. Variable	(I) OLS Usual Hrs Worked	(II) OLS Full-Time Job	(III) OLS Second Job	(IV) OLS Gross Hr Pay
A8	-0.616	0.026*	0.004	-6.890***
	(0.573)	(0.013)	(0.004)	(0.925)
PreApr2011	0.003	0.002	0.012***	-1.300**
	(0.420)	(0.012)	(0.003)	(0.584)
A8*PreApr2011	0.860*	0.020	-0.005	0.955
	(0.459)	(0.013)	(0.004)	(0.574)
Observations	16,084	16,350	16,331	12,085
R-squared	0.140	0.115	0.008	0.140
Other Controls	Yes	Yes	Yes	Yes
Sample	Whole	Whole	Whole	Whole
P-value ($\beta_1 + \beta_3 = 0$)	0.559	0.000	0.831	0.000

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

In the first column, I estimate that the restrictions to welfare access increase the number of usual hours worked by 0.9, i.e. by being eligible to some types of benefits since having arrived in the UK makes A8 immigrants work less hours by 3% relative to other EU15 workers. These figures are consistent with the effect on the probability of being employed discussed in the previous subsection. Yet, such a small effect is not surprising, given the fact that, plausibly, most workers might be under fixed-hour contracts and might not freely choose the number of hours they work in a week, especially in the case of employees. The choices that workers are possibly more likely to make independently, instead, concern the decision of working full-time or of taking a second job. Hence, I check whether these probabilities are significantly affected by being under the strict regime (Table 1.6, columns II and III). I find that when limitations are in place, the probability of having a full-time job rises by 2 p.p. (although the coefficient is not statistically significant), while I observe no impact on the take-up of second jobs. Finally, despite the increase in the probability of being in work and in the number of hours worked, I find no significant impact on gross hourly pay (column IV). As in the case of the employment status, I also break down the sample by length of stay and look at the employed immigrants who have been in the UK for less than two years and for at least two years, separately, but I find no significant effect in any of the specifications.[40]

[40]Results omitted for brevity.

1.6 Heterogeneous Effects: Responses by Gender and Education

Understanding whether the restrictions to welfare access affect differently men and women is of great relevance for two reasons. First, because women are traditionally more exposed to risks in their labour market opportunities and if they are subject to reduced eligibility to state-provided assistance this might translate into a deterioration of their well-being. The second reason pertains to intra-household allocation of resources. If, in fact, one assumes that women are the second earner, or the less-earning spouse, within the household, the fact that they may or may not be eligible to welfare assistance does have repercussions on the household finances directly and on the women's choice to work. If they decide to be in the labour market, the additional earnings produced will stack on top of the males' earnings and this may become a problem if the extra earnings push the household total income above the eligibility threshold for some types of benefits (Atkinson and Micklewright, 1991).[41] Hence, in this case women have a strong incentive not to work. What is more, these consequences are due to differ across socio-economic status. Specifically, the above mechanism is likely to occur for high-income households.[42] In the case of low-income households, however, state-provided benefits might alleviate some of the pressure related to financial constraints but the mitigation might be only partial and therefore women may be still in need of earning a salary even when they receive welfare assistance (McCaffery, 2007).

Hence, in order to appreciate more in depth the dynamics concerning the link between welfare restrictions and labour supply of immigrants, I split the sample by gender and by educational achievement.

1.6.1 The Impact across Genders

Table A.2.11 displays results from Equation 1.1 when the outcome is the take-up of benefits and the sample is divided by gender. As coefficients suggest, the effect of the restrictions on the probability

[41] In the broader context of taxation, McCaffery (2007) refers to a higher marginal rate of taxation for women than for men. This can have detrimental effects on female employment as the labour supply of women is more elastic than that of men (Alesina et al., 2011).

[42] Alesina et al. (2011) argue that gender-based taxation would allow a convergence in the elasticities of labour supply between man and woman so that the allocation of home duties within the household and the labour market opportunities across genders would eventually equalise.

of claiming is almost entirely driven by females (even columns), while the same coefficients tend to zero in the case of males (odd columns). Such pattern is persistent regardless of the indicator for benefit claim used. This result implies that the temporary limitations to welfare access predominantly affect the use of public assistance for women. In other words, the expiration of the restrictions in 2011 has brought about an increase in the take-up of benefits by women by almost 10 percentage points.

As expected, the reaction in the extensive margin of the labour supply is also to be attributed to women. In fact, due to the temporary restrictions which yield a tightening in their financial constraint, women are found to be 6 p.p. more likely to be in employment and almost 7 p.p. less likely to be inactive (Table A.2.12). That is, when the restrictions are relaxed and eligibility to benefits is granted to all immigrants regardless of their country of origin, this makes A8-born women less inclined to work by 6 p.p. and induces them to choose to go into inactivity. Conversely, the magnitude of the effect for males is much lower (by two thirds) and is not statistically significant.

The implications for the labour supply on the intensive margin, *per contra*, offer a different interpretation. Results are presented in Table A.2.13 and they clearly show the absence of any effect of the temporary restrictions on the hours worked or on the propensities to be in full-time work or to have a second job for females. Instead, the stricter regime appears to significantly affect the number of hours worked by men, yielding an increase by 1.3 hours. Moreover, there is a significant effect on hourly pay and this is, again, only for male workers.

Such figures suggest that limiting access to benefits determines a fall in the probability to claim for women especially. In turn, to compensate for the foregone income coming from state-provided aid, women become more likely to work and less likely to be inactive. On the other hand, men tend to be already in employment and, hence, their labour supply is only partially affected through a significant increase in the number of hours worked. Similarly, men workers who also belong the sub-group (the A8-born) that suffers the highest wage penalties, see a significant increase in their hourly pay when subject to the restrictions.

1.6.2 The Role of Education

Drinkwater and Robinson (2013) say lower educational levels are associated to a higher probability of claiming benefits by immigrants, although they estimate a relatively small effect of education in the case of A8 immigrants. Indeed, I do find a negative and significant effect of the policy restrictions on the sub-sample of the low-educated (Table A.2.14), while the highly educated immigrants do not seem to change their likelihood to claim benefits.[43] Specifically, the probability of taking-up benefits falls by almost 9 p.p. due to the restrictions for the less educated only, while those who hold (at least) a degree do not seem to be affected. Hence, this should indicate that a more restrictive regime in terms of welfare access has the strongest impact on the less educated (and less skilled) immigrants, who in principle should have more binding financial constraints and, therefore, be more in need of welfare assistance. Education is, in fact, correlated with earnings: the average weekly pay for full-time highly educated and low educated workers in the sample is GBP 387.55 and GBP 250.75, respectively.

Similarly, I observe that the temporary limitations drive immigrants who have lower levels of education to work longer hours, with an increase by 1.6 hours. Additionally, they are 5 p.p. more likely to have a full-time job (Table A.2.16). The coefficients associated to the interaction term in the case of the probability of taking a second job is also statistically significant at the 10% level but the magnitude of the coefficient is essentially null. The hypothesis of an effect prevailing through the immigrants' financial constraint is supported also by the last piece of evidence (Table A.2.16, columns VII-VIII): when analysing hourly pay, I find that the limitations to welfare access bring about an increase in the wage of the low educated immigrants only.

Finally, the likelihood of being in employment and of being inactive is affected by the transitory limitations to welfare access only in the case of highly educated immigrants (Table A.2.15). This might be explained by the fact that in less educated (hence, low-income) households financial constraints are binding and all adult members have no choice but to work. Conversely, highly educated (high-income) households might afford to allow the second earner, that is typically the woman, to stay out of the labour force (McCaffery, 2007). Hence, once the restrictive regime

[43] 'High' education refers to ISCED levels 5 and 6 (tertiary education) and 'Low' education indicates any level below that.

expires, highly educated women become less likely to be in employment by 5 p.p. and more likely to be inactive, while the absence of any effect on less educated women might be due to the fact that they cannot afford to leave the labour market. Such arguments are also confirmed by the lack of significance on the probability to be unemployed, which is an involuntary status. These findings are at odds with what is proposed by Meghir and Phillips (2010) on British data. The authors find that participation elasticities of highly-educated individuals is virtually null, while low-educated men display some degree of responsiveness to tax and benefit incentives. Also, their results confirm a high sensitiveness in terms of participation for (low-income) women with young children and lone mothers (Brewer et al., 2006; Francesconi and Van Der Klaauw, 2007). However, while their conclusions are drawn on a sample that is representative of the general population, my analysis is focused on a group of foreign-born individuals who, differently from the natives, are only eligible to state transfers and benefits if they have a Right to Reside, i.e. are economically active, are able to support themselves, or (if unemployed) have a genuine chance of finding a job (Kennedy, 2011).

1.7 Discussion

The scope of this paper is to provide an insight on the consequences of the imposition of restrictions to welfare support access in terms of benefit claims and of labour supply. In order to do so, I use a difference-in-difference setting by exploiting a change in policy that took place on April 2011 in the UK, when immigrants from the so-called A8 countries, which entered the European Union in 2004, after a transitional period of limitations in their rights to access welfare, were finally equalised to other citizens of the European Economic Area. Specifically, in the period up to April 2011, A8 nationals who moved to the UK had access to some types of public assistance only after they had been in work for the first 12 months since their arrival.

First, I investigate the effects of being under stricter regulations on the probability of claiming benefits for the group of immigrants that is directly affected by the change in policy (namely, those who have lived in the UK for less than two years). I find that this decreases claims by 6 percentage points on average. However, since A8 immigrants are *per se* relatively more likely to claim benefits than those coming from a EU15 country, there is no difference, on average, between the two groups

in the presence of the stricter regime. This implies that the A8-born are around 120% more likely to claim benefits than other EEA nationals when subject to the same eligibility rules. Nevertheless, I also find that these differences tend to narrow down and the two groups become more similar as they spend more time in the host country. Moreover, by looking at each type of benefit separately, I am able to estimate that the effect on claims is largely concentrated on housing-related benefits, while little impact is found on family-related or unemployment benefits.

Second, having established that limitations to welfare access successfully determine a decrease in the claim of certain benefits, I analyse whether there is a response in terms of the labour supply of immigrants. On the extensive margin, I find that under the restricted regime the probability of being in employment is 4 percentage points higher and this is sharply counterbalanced by an equal reduction in the likelihood of being inactive, while the share of the unemployed is not affected. Moreover, I find that, among the employed, restrictions to welfare access yield an increase in the number of hours worked by almost one hour, while no effect is found on the likelihood of working full-time, of having a second job or on earnings.

Furthermore, when I split the sample by gender and education, I observe that the restrictions significantly affect the propensity to claim for women and this translates into a higher participation rate in the labour market for the same sub-group. On the other hand, the limitations to welfare access appear to affect the take-up of benefits for the less educated sub-group, yielding a response through the intensity of their labour supply.

The results found in this analysis yield a number of considerations. From the first part of the investigation, it is clear that limiting welfare access may reduce the take-up of benefits dramatically. However, such policy is only effective to a certain extent, as it does not make the treated group less likely to claim benefits with respect to the unaffected one.

In the second half of the paper, a labour supply response undeniably emerges: those who are subject to the restrictive regime do exhibit a higher propensity to work, and this is especially true for the newly arrived immigrants, who are directly affected by the first 12-month limitations to welfare access. Likewise, they are found to work longer hours. In view of such results, it may then be argued that those immigrants who are not entitled to access some types of welfare support may

be more keen on working more in order to compensate for the foregone receipt of assistance.

As a matter of fact, it appears that the transitional limitations tend to disproportionally restrain those who are possibly more in need (i.e. those who are more financially constrained): not only the policy affects the claim of benefits of women and of less educated individuals in a particularly strong way, but it also determines a higher propensity to work (and a lower likelihood of being inactive) for a group of immigrants who already stand out for their extremely high employment rate, compared both to other foreign-born and to natives. Moreover, an effect on the wage is found on the less educated only, who are possibly the sub-group of immigrants that are more at risk of being in a disadvantaged condition and that have to make up for the absence of any state support. On the other hand, the positive effect on the probability to be in work for the highly educated (mostly women) only can be explained by the fact that when the restrictions are relaxed the less educated simply cannot afford to leave the labour market and have to continue working.

Finally, given the concerns that have arisen and have been fiercely debated on in the past years - peaking (but not ceasing) with the EU referendum on June 2016, a comparison against the UK natives is worth a mention. With respect to a similar sample of natives, A8 immigrants appear to be much less reliant on welfare. Furthermore, as mentioned above, UK nationals have remarkably lower employment rates and higher inactivity rates than A8 immigrants, who also work longer hours and receive lower pay on average. Hence, these figures suggest that, as argued by Drinkwater and Robinson (2013), the concerns of media and the public opinion about these recently arrived immigrants wanting to seek welfare support in the UK may have been unfounded, at least when their behaviour is evaluated against that of the resident population of natives.

To my knowledge, this is the first attempt to empirically evaluate the effects of the transitional restrictions that were applied to immigrants from the A8 countries after the 2004 Accession. In view of the results herein presented, and of past and future related research, it may be of use for the policy maker to prudently assess all direct and indirect fallouts coming from the application of such restrictions to a group of individuals and to conscientiously evaluate the (potential) possibility to apply similar schemes to other categories or sub-populations in the future.

Appendix A

A.1 Appendix: Benefits in the UK

This section is aimed at briefly describing the main types of benefits and welfare support available in the UK for natives and for citizens of other countries.[44]

Types of Available Benefits

The UK benefit system provides for countless categories of benefits and contributions.[45] Eligibility for benefits is based on a number of features of the 'benefit unit', i.e. essentially the nuclear family (single person or couple living together with or without dependent children). The benefit unit differs from the 'household', whereas a household may contain more than one benefit units. For simplicity, throughout the analysis I refer to a benefit unit as a household (HH). As mentioned above, eligibility for benefits depends on a number of circumstances within a household, such as income, savings, outgoings (e.g. rent and childcare payments), existing benefits and council tax bill. This, along with the definition of benefit unit, make eligibility of individuals in the sample virtually impossible to be fully identifiable with the available the data.

Cappellari and Jenkins (2008) make a distinction between Social Assistance Benefits, or 'income maintenance' (cash benefits paid to bring incomes up to some minimum income level) and Social Insurance Benefits, or 'income replacement' (payments made in response to the occurrence of particular risky events such as sickness or unemployment and for which an appropriate record of social insurance contributions exists). Among the most common Social Assistance Benefits, there are Income Support (IS), income-based Job Seeker's Allowance (JSA) and in-work benefits such as the Working Tax Credit. These are all aimed at financially support low-income households and their recipiency depends on employment status. In addition, there are also Housing Benefit (HB) and Council Tax Benefit (CTB), which are designed to specifically help low-income households with

[44] While a number of cases provide for a different treatment, this rather simplified summary is only intended to give a glimpse of the general rules that may apply and is solely aimed at the purposes of this analysis. See www.gov.uk for a more detailed description of the existing rules.

[45] At least up until the adoption of the Universal Credit, which started in some pilot areas at the end of 2013 and is expected to be fully implemented by the end of 2017. This is meant to replace a number of welfare contributions, such as Income Support, income-based Job Seeker's Allowance (JSA) and Employment and Support Allowance (ESA), Housing Benefit, Child Tax Credit and Working Tax Credit.

housing-related costs. For households with dependent children (under 16 years of age or under 20 years of age if in approved education or training), also Child Benefit and Child Tax Credit are available. Child Benefit consists of a weekly allowance for each child, as long as the household income does not exceed a certain income. Child Tax Credit is an additional transfer that can be claimed for each child that lives in the household.[46]

Eligibility to Welfare Services of Immigrants in the UK

The rules on eligibility for benefits for non-British citizens are extremely complex and depend on a wide range of factors, which include nationality, immigration status (and any conditions attached to it), the circumstances under which the person arrived in the UK, whether they are considered to be 'habitually resident', their employment status, and whether they arrived to the UK alone or with other family members (Kennedy, 2015). In what follows I will briefly summarise the main and broader rules under which eligibility to benefits for people other than British citizens is defined.

Access to most welfare benefits and the social security system in the UK is a prerogative of all people holding the Right to Reside (RtR), which derives from holding a Right of Abode (RoA), an Indefinite Leave to Remain (ILR) or a Permanent Residence (PR) card. For benefits that are granted at the household level (e.g. child and housing benefits), the claim can be made by any member of the household, as long as they are entitled to apply for them. No requirements are generally put on the other members, who may, therefore, not hold a RoA, an ILR or PR.

All British citizens and Commonwealth citizens (under some circumstances) have the Right to Reside and are granted access to benefits and tax credits with it, as they hold a Right of Abode (RoA), i.e. they hold an unrestricted right to live in the United Kingdom.[47] Similarly, refugees are granted the right to claim benefits and tax credits on the same basis as UK nationals, while asylum seekers (i.e. those who are awaiting to be declared as refugees) are only eligible for the (less generous) so-called 'asylum support', which may translate into accommodation and financial

[46] See Browne and Hood (2012) and Hood and Oakley (2014) for a survey of the benefit system in the UK.

[47] People born after 1st January 1983 have the RoA only if they are British citizens, while Commonwealth nationals who are not also British citizens and who were born before that date may hold the RoA only if they meet certain conditions. Citizens of Pakistan and of South Africa are not considered as belonging to the Commonwealth for immigration purposes. Irish nationals, although they are not unconditionally granted the right to live in the UK, have a *de facto* RoA as a consequence of the Common Travel Area regulations.

support.

Immigration from countries outside the EEA (and Switzerland) are regulated by a Points Based System (*Tiers*). People coming from these countries must hold an Indefinite Leave to Remain in order to be entitled to apply for most welfare services. The ILR is generally acquired after five or ten years of continuous and lawful residence in the UK. The first case applies to all people who have lived in the UK with a visa that was issued for working purposes, the latter encompasses a number of residual categories. A threshold of twenty years (fourteen, up until July 2012) is required for people who have continuously lived in the UK lawfully or unlawfully.

Citizens of countries that belong to the European Economic Area (EEA) and Switzerland can access welfare support only if they have the Right to Reside (RtR), i.e. are economically active or able to support themselves.[48] Following a European Directive, starting on April 2006, the RtR is also granted for the first three months to economically inactive people but access to benefits is not given to those who gained it only on the basis of this new three-month rule. Access to benefits is, therefore, ensured to all EEA citizens who, after the first three months in the UK, are workers, self-employed or students (provided they can support themselves) and their families. If unemployed, EEA citizens may also acquire the Right to Reside if they can show that they have a 'genuine chance of being engaged', are actively looking for a job and are habitually resident in the country. After a continuous period of residence in the UK for five years, EEA citizens gain a Permanent Right of Residence status and can access benefits and tax credits like UK nationals.

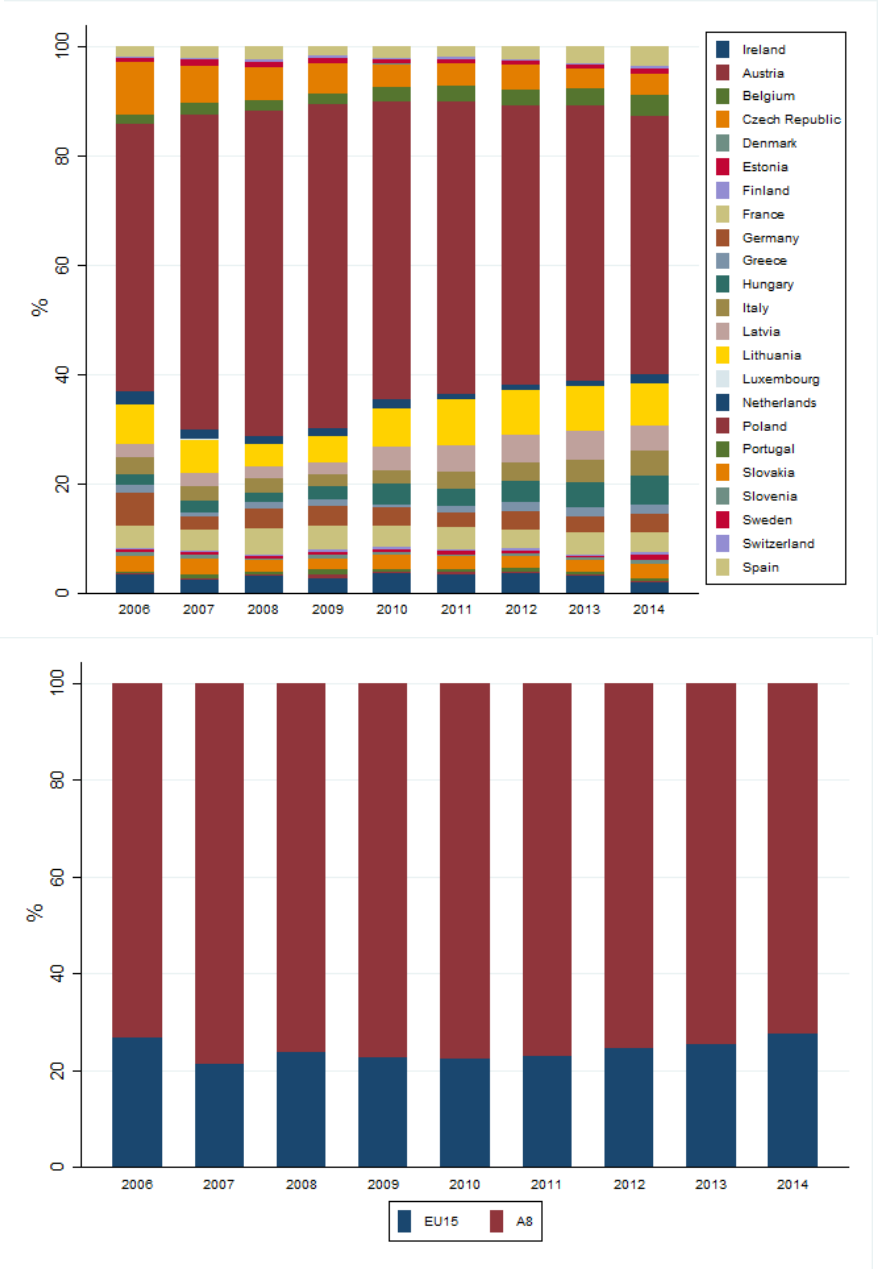
Following the EU enlargement in 2004, most European countries put restrictions to access to workers from the new member states (usually through the need of a work permit) for up to 7 years because of concerns regarding the effects of a potentially large influx of immigrants on their labour markets and their welfare systems. Only the UK, Ireland, and Sweden opened their labour markets to workers from Eastern Europe. In fact, the 2004 EU enlargement was accompanied by a major migration shock at the European level. Elsner (2013) estimates that, in between 2004 and 2007, Sweden, Ireland and the UK received 1.2 million workers and that the shock was substantial also

[48] The term 'Right to Reside', in the context of the EEA may generate some equivocation: the RtR differs from the free movement rights that all EEA citizens can exercise in the sense that, while all EEA citizens can freely move from one country to the other within the EEA, only certain categories may have some rights attached to their residence in the host country. As Kennedy (2011) suggests, it may be more convenient to think of RtR as 'rights of residence'.

on the side of the sending countries: in the same period, even if Poland had the highest number of emigrants in absolute terms, 9% of all Lithuanian workers and 6% of all Latvian workers moved to work to Ireland or to the UK. In the UK, some mild restrictions have been temporarily applied to citizens of some EEA countries that joined the European Union in the last decade. In particular, people coming from the so-called A8 countries, which joined the EU in 2004, had restricted access to welfare services up until April 2011, while citizens of Romania and Bulgaria (A2 countries) had additional restrictions that had been in place since these countries joined the EU in 2007 and continued until December 2013.

A.2 Appendix: Figures and Tables

Figure A.2.1: Proportion of Immigrants by Group and Year



Note: The graphs show the proportion of immigrants in the sample by country of birth and year (panel above) and by group (A8 or EU15) and year (panel below).

Table A.2.1: Differences in Means: Main Characteristics

		Natives	EU15	A8	Δ(Natives - EU15)	Δ(Natives - A8)	Δ(EU15 - A8)	Δ(A8 After - A8 Before)
Individual Characteristics								
Age	- *Before Apr2011*	43.085	30.610	30.235	12.475***	12.850***	0.375	
					(0.276)	(0.151)	(0.200)	
	- *After Apr2011*	43.485	31.839	32.612	11.646***	10.873***	-0.773***	2.377***
					(0.267)	(0.153)	(0.200)	(0.137)
Sex of respondent	- *Before Apr2011*	0.524	0.511	0.518	0.013	0.006	-0.007	
					(0.010)	(0.006)	(0.012)	
	- *After Apr2011*	0.524	0.538	0.557	-0.014	-0.033***	-0.019	0.039***
					(0.010)	(0.006)	(0.011)	(0.008)
Married	- *Before Apr2011*	0.532	0.286	0.391	0.246***	0.141***	-0.105***	
					(0.010)	(0.006)	(0.011)	
	- *After Apr2011*	0.509	0.316	0.432	0.194***	0.078***	-0.116***	0.041***
					(0.010)	(0.006)	(0.011)	(0.008)
No. of Dependent Children	- *Before Apr2011*	0.707	0.503	0.666	0.204***	0.040***	-0.164***	
					(0.021)	(0.012)	(0.022)	
	- *After Apr2011*	0.693	0.594	0.865	0.099***	-0.172***	-0.271***	0.198***
					(0.020)	(0.012)	(0.022)	(0.015)
Years in UK	- *Before Apr2011*		2.031	2.499			-0.468***	
							(0.035)	
	- *After Apr2011*		3.509	4.861			-1.352***	2.362***
							(0.051)	(0.030)
Primary Edu	- *Before Apr2011*	0.011	0.024	0.038	-0.012***	-0.026***	-0.014**	
					(0.002)	(0.001)	(0.004)	
	- *After Apr2011*	0.011	0.019	0.033	-0.007***	-0.022***	-0.015***	-0.004
					(0.002)	(0.001)	(0.004)	(0.003)
Lower Secondary Edu	- *Before Apr2011*	0.606	0.103	0.105	0.503***	0.500***	-0.003	
					(0.010)	(0.005)	(0.007)	
	- *After Apr2011*	0.572	0.105	0.093	0.467***	0.479***	0.012	-0.012**
					(0.010)	(0.006)	(0.007)	(0.005)
Upper Secondary Edu	- *Before Apr2011*	0.113	0.090	0.070	0.024***	0.043***	0.020**	
					(0.006)	(0.004)	(0.006)	
	- *After Apr2011*	0.129	0.083	0.073	0.045***	0.056***	0.011	0.002
					(0.007)	(0.004)	(0.006)	(0.004)
Lower Tertiary Edu	- *Before Apr2011*	0.052	0.108	0.430	-0.055***	-0.378***	-0.323***	
					(0.005)	(0.003)	(0.011)	
	- *After Apr2011*	0.061	0.102	0.431	-0.041***	-0.370***	-0.329***	0.000
					(0.005)	(0.003)	(0.010)	(0.008)
First Degree Edu	- *Before Apr2011*	0.066	0.108	0.097	-0.042***	-0.031***	0.010	
					(0.005)	(0.003)	(0.007)	
	- *After Apr2011*	0.077	0.134	0.108	-0.057***	-0.030***	0.026***	0.011*
					(0.005)	(0.003)	(0.007)	(0.005)
Further Edu	- *Before Apr2011*	0.152	0.569	0.259	-0.417***	-0.108***	0.310***	
					(0.007)	(0.004)	(0.011)	
	- *After Apr2011*	0.150	0.557	0.263	-0.407***	-0.112***	0.294***	0.003
					(0.007)	(0.004)	(0.010)	(0.007)
Mixed-Origin HH	- *Before Apr2011*	0.052	0.532	0.254	-0.480***	-0.202***	0.278***	
					(0.005)	(0.003)	(0.011)	
	- *After Apr2011*	0.057	0.563	0.411	-0.506***	-0.353***	0.153***	0.156***
					(0.005)	(0.003)	(0.011)	(0.007)
Observations	- *Before Apr2011*	866320	0	0	858395	863930	10315	
	- *After Apr2011*	492114	0	0	484062	489476	10690	15977

Table A.2.2: Differences in Means: Outcomes

		Natives	EU15	A8	Δ(Natives - EU15)	Δ(Natives - A8)	Δ(EU15 - A8)	Δ(A8 After - A8 Before)
Benefit Claim								
Any Benefit	- *Before Apr2011*	0.343	0.124	0.250	0.219***	0.093***	-0.126***	
					(0.010)	(0.005)	(0.010)	
	- *After Apr2011*	0.329	0.149	0.362	0.180***	-0.033***	-0.213***	0.112***
					(0.009)	(0.005)	(0.010)	(0.007)
Any Out-of-Work Benefit	- *Before Apr2011*	0.275	0.115	0.217	0.160***	0.058***	-0.102***	
					(0.009)	(0.005)	(0.009)	
	- *After Apr2011*	0.270	0.141	0.326	0.128***	-0.057***	-0.185***	0.109***
					(0.009)	(0.005)	(0.010)	(0.007)
Any HH-Level Benefit	- *Before Apr2011*	0.259	0.110	0.213	0.150***	0.046***	-0.103***	
					(0.009)	(0.005)	(0.009)	
	- *After Apr2011*	0.251	0.133	0.317	0.119***	-0.066***	-0.185***	0.104***
					(0.008)	(0.005)	(0.010)	(0.007)
Out-of-Work Empl. Bnft	- *Before Apr2011*	0.024	0.012	0.008	0.013***	0.016***	0.004	
					(0.003)	(0.002)	(0.002)	
	- *After Apr2011*	0.033	0.021	0.024	0.012***	0.009***	-0.003	0.016***
					(0.003)	(0.002)	(0.003)	(0.002)
Family/Child Bnft	- *Before Apr2011*	0.216	0.096	0.204	0.120***	0.012*	-0.108***	
					(0.008)	(0.005)	(0.009)	
	- *After Apr2011*	0.201	0.119	0.295	0.082***	-0.093***	-0.175***	0.090***
					(0.008)	(0.005)	(0.010)	(0.007)
Housing Bnft	- *Before Apr2011*	0.074	0.025	0.035	0.050***	0.040***	-0.010*	
					(0.005)	(0.003)	(0.004)	
	- *After Apr2011*	0.089	0.043	0.090	0.046***	-0.001	-0.047***	0.055***
					(0.006)	(0.003)	(0.006)	(0.004)
In-Work Empl. Bnft	- *Before Apr2011*	0.176	0.049	0.150	0.127***	0.027***	-0.100***	
					(0.008)	(0.004)	(0.008)	
	- *After Apr2011*	0.134	0.053	0.192	0.081***	-0.058***	-0.139***	0.043***
					(0.007)	(0.004)	(0.008)	(0.006)
Sickness Bnft	- *Before Apr2011*	0.083	0.005	0.004	0.078***	0.079***	0.001	
					(0.006)	(0.003)	(0.001)	
	- *After Apr2011*	0.081	0.007	0.010	0.074***	0.072***	-0.002	0.006***
					(0.005)	(0.003)	(0.002)	(0.001)
Economic Activity and Labour Supply								
In Employment	- *Before Apr2011*	0.718	0.670	0.818	0.048***	-0.100***	-0.148***	
					(0.009)	(0.005)	(0.010)	
	- *After Apr2011*	0.709	0.703	0.799	0.006	-0.090***	-0.096***	-0.019**
					(0.009)	(0.005)	(0.009)	(0.006)
Unemployed	- *Before Apr2011*	0.043	0.059	0.053	-0.016***	-0.010***	0.006	
					(0.004)	(0.002)	(0.005)	
	- *After Apr2011*	0.053	0.064	0.059	-0.012**	-0.006*	0.006	0.006
					(0.004)	(0.003)	(0.005)	(0.004)
Inactive	- *Before Apr2011*	0.240	0.271	0.129	-0.032***	0.111***	0.142***	
					(0.009)	(0.005)	(0.008)	
	- *After Apr2011*	0.238	0.233	0.142	0.005	0.096***	0.091***	0.013*
					(0.008)	(0.005)	(0.008)	(0.005)
Usual Hrs Worked	- *Before Apr2011*	26.560	26.749	32.584	-0.189	-6.024***	-5.835***	
					(0.419)	(0.230)	(0.445)	
	- *After Apr2011*	25.995	27.822	30.605	-1.826***	-4.610***	-2.783***	-1.979***
					(0.400)	(0.230)	(0.431)	(0.291)
Has a 2nd Job	- *Before Apr2011*	0.028	0.018	0.019	0.010**	0.009***	-0.001	
					(0.003)	(0.002)	(0.003)	
	- *After Apr2011*	0.028	0.014	0.017	0.014***	0.011***	-0.004	-0.002
					(0.003)	(0.002)	(0.003)	(0.002)
Full-Time Work	- *Before Apr2011*	0.724	0.825	0.859	-0.101***	-0.135***	-0.034***	
					(0.010)	(0.005)	(0.009)	
	- *After Apr2011*	0.712	0.804	0.817	-0.092***	-0.105***	-0.013	-0.042***
					(0.010)	(0.005)	(0.009)	(0.006)
Gross Hr Pay in Main Job	- *Before Apr2011*	7.500	7.963	5.227	-0.464	2.272***	2.736***	
					(0.318)	(0.177)	(0.168)	
	- *After Apr2011*	7.891	9.512	5.679	-1.621***	2.212***	3.832***	0.452***
					(0.285)	(0.167)	(0.254)	(0.083)
Observations	- *Before Apr2011*	866320	0	0	858395	863930	10315	
	- *After Apr2011*	492114	0	0	484062	489476	10690	15977

Table A.2.3: Claim of Benefits: Feasible GLS

Dep. Variable	(I) Feasible GLS Any Benefit	(II) Feasible GLS Any Out-of-Work Benefit	(III) Feasible GLS Any HH-level Benefit	(IV) Feasible GLS Out-of-Work Empl. Benefit	(V) Feasible GLS Family Benefit	(VI) Feasible GLS Housing Benefit	(VII) Feasible GLS In-Work Benefit
A8	0.083***	0.063***	0.064***	0.008	0.053**	0.024**	0.047***
	(0.022)	(0.023)	(0.022)	(0.010)	(0.021)	(0.011)	(0.015)
PreApr2011	0.004	0.005	0.004	0.000	0.003	-0.007*	-0.019*
	(0.010)	(0.010)	(0.015)	(0.007)	(0.014)	(0.004)	(0.010)
A8*PreApr2011	-0.063***	-0.064***	-0.055**	-0.020*	-0.039*	-0.025**	-0.003
	(0.023)	(0.022)	(0.023)	(0.012)	(0.023)	(0.011)	(0.015)
Observations	4,918	4,918	4,918	4,918	4,918	4,918	4,918
R-squared	4,744	4,744	4,744	4,744	4,744	4,744	4,744
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs
P-value ($\beta_1 + \beta_3 = 0$)	0.252	0.978	0.507	0.001	0.319	0.746	0.000

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.4: Claim of Benefits: Whole Sample

. Dep. Variable	(I) OLS Any Benefit	(II) OLS Any Out-of-Work Benefit	(III) OLS Any HH-level Benefit	(IV) OLS Out-of-Work Empl. Benefit	(V) OLS Family Benefit	(VI) OLS Housing Benefit
A8	0.091***	0.064***	0.066***	-0.002	0.058***	0.019
	(0.021)	(0.018)	(0.017)	(0.006)	(0.013)	(0.011)
PreApr2011	0.033**	0.033**	0.036***	-0.008	0.033***	-0.001
	(0.012)	(0.012)	(0.011)	(0.005)	(0.011)	(0.006)
A8*PreApr2011	-0.043**	-0.039**	-0.038**	-0.005	-0.025	-0.026***
	(0.018)	(0.018)	(0.016)	(0.008)	(0.016)	(0.008)
Observations	21,005	21,005	21,005	21,005	21,005	21,005
R-squared	0.337	0.348	0.355	0.012	0.386	0.060
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Whole	Whole	Whole	Whole	Whole	Whole
P-value ($\beta_1 + \beta_3 = 0$)	0.043	0.226	0.155	0.119	0.071	0.325

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.5: Claim of Benefits: Fixed Effects

Dep. Variable	(I) OLS Any Benefit	(II) OLS Any Out-of-Work Benefit	(III) OLS Any HH-level Benefit	(IV) OLS Out-of-Work Empl. Benefit	(V) OLS Family Benefit	(VI) OLS Housing Benefit
A8*PreApr2011	-0.100***	-0.091***	-0.081***	-0.026*	-0.065**	-0.032**
	(0.027)	(0.027)	(0.028)	(0.014)	(0.027)	(0.015)
Observations	4,705	4,705	4,705	4,705	4,705	4,705
R-squared	0.301	0.292	0.290	0.050	0.300	0.055
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country of Birth Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.6: Claim of Benefits: Placebos

Dep. Variable	(I) Probit Any Benefit	(II) Probit Any Out-of-Work Benefit	(III) Probit Any HH-level Benefit
A8*PreApr2008	-0.001	0.010	0.005
	(0.021)	(0.019)	(0.016)
A8*PreOct2008	0.020	0.020	0.013
	(0.018)	(0.017)	(0.014)
A8*PreApr2009	0.040**	0.031*	0.020
	(0.017)	(0.015)	(0.015)
A8*PreOct2009	0.028	0.024	0.008
	(0.025)	(0.023)	(0.021)
A8*PreApr2010	0.041	0.026	0.005
	(0.028)	(0.027)	(0.015)
A8*PreOct2010	-0.005	-0.011	-0.043
	(0.033)	(0.030)	(0.025)
Observations	3,412	3,412	3,412
Other Controls	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth. Prior to April 2011 only.

Table A.2.7: Claim of Benefits: Poland Excluded from A8 Group

Dep. Variable	(I) OLS Any Benefit	(II) OLS Any Out-of-Work Benefit	(III) OLS Any HH-level Benefit	(IV) OLS Out-of-Work Empl. Benefit	(V) OLS Family Benefit	(VI) OLS Housing Benefit
A8	0.103***	0.089***	0.089***	0.020	0.072***	0.037*
	(0.027)	(0.026)	(0.026)	(0.015)	(0.025)	(0.018)
PreApr2011	0.003	0.006	0.003	0.002	0.000	-0.005
	(0.011)	(0.011)	(0.016)	(0.007)	(0.014)	(0.004)
A8*PreApr2011	-0.114***	-0.107***	-0.097***	-0.034*	-0.078***	-0.040**
	(0.016)	(0.021)	(0.022)	(0.017)	(0.026)	(0.018)
Observations	2,895	2,895	2,895	2,895	2,895	2,895
R-squared	0.179	0.182	0.183	0.038	0.205	0.042
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs
P-value ($\beta_1 + \beta_3 = 0$)	0.549	0.296	0.621	0.012	0.757	0.370

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth. Poland excluded.

Table A.2.8: Claim of Benefits: Only Poland in A8 Group

Dep. Variable	(I) OLS Any Benefit	(II) OLS Any Out-of-Work Benefit	(III) OLS Any HH-level Benefit	(IV) OLS Out-of-Work Empl. Benefit	(V) OLS Family Benefit	(VI) OLS Housing Benefit
A8	0.071***	0.045**	0.047**	-0.006	0.040**	0.009**
	(0.019)	(0.018)	(0.018)	(0.006)	(0.017)	(0.003)
PreApr2011	0.006	0.006	0.004	-0.000	0.003	-0.008*
	(0.011)	(0.011)	(0.016)	(0.007)	(0.015)	(0.004)
A8*PreApr2011	-0.034***	-0.034***	-0.027*	-0.006	-0.015	-0.011***
	(0.010)	(0.010)	(0.014)	(0.006)	(0.013)	(0.003)
Observations	3,802	3,802	3,802	3,802	3,802	3,802
R-squared	0.205	0.210	0.219	0.014	0.234	0.023
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs
P-value ($\beta_1 + \beta_3 = 0$)	0.040	0.484	0.207	0.004	0.121	0.428

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth. A8 countries but Poland excluded.

Table A.2.9: Claim of Benefits: Other Countries

Dep. Variable	(I) OLS Any Benefit	(II) OLS Any Out-of-Work Benefit	(III) OLS Any HH-level Benefit	(IV) OLS Out-of-Work Empl. Benefit	(V) OLS Family Benefit	(VI) OLS Housing Benefit
Other Europe	-0.046	-0.034	-0.021	-0.031***	-0.039	-0.024
	(0.029)	(0.026)	(0.025)	(0.007)	(0.029)	(0.025)
PreApr2011	0.027**	0.025**	0.028**	-0.008	0.025**	-0.008
	(0.012)	(0.012)	(0.011)	(0.005)	(0.010)	(0.006)
Other Europe*PreApr2011	0.057	0.032	-0.029	0.068*	0.012	-0.025
	(0.045)	(0.028)	(0.022)	(0.038)	(0.014)	(0.021)
Observations	5,112	5,112	5,112	5,112	5,112	5,112
R-squared	0.275	0.281	0.296	0.015	0.334	0.072
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Whole	Whole	Whole	Whole	Whole	Whole

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth. Control group is EU15-born; treatment group is made of natives of 'potential EU members' (n = 695), i.e. Albania, Bosnia-Herzegovina, Croatia, Moldova, Serbia and Montenegro, Turkey, Ukraine, Kosovo.

Table A.2.10: Employment Status: By Length of Stay

Dep. Variable	(I) OLS In Employment	(II) OLS In Employment	(III) OLS Unemployed	(IV) OLS Unemployed	(V) OLS Inactive	(VI) OLS Inactive
A8	0.088**	0.108***	0.007	-0.013**	-0.094***	-0.095***
	(0.042)	(0.017)	(0.016)	(0.005)	(0.031)	(0.014)
PreApr2011	-0.047	0.014	-0.005	-0.018***	0.051*	0.004
	(0.033)	(0.009)	(0.010)	(0.005)	(0.030)	(0.011)
A8*PreApr2011	0.063*	0.019*	-0.013	0.006	-0.050	-0.025**
	(0.036)	(0.010)	(0.016)	(0.008)	(0.032)	(0.012)
Observations	4,918	16,087	4,918	16,087	4,918	16,087
R-squared	0.133	0.140	0.019	0.009	0.140	0.150
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	>=2 yrs	<2 yrs	>=2 yrs	<2 yrs	>=2 yrs
P-value ($\beta_1 + \beta_3 = 0$)	0.000	0.000	0.505	0.329	0.000	0.000

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.11: Claim of Benefits: By Gender

Dep. Variable	(I) OLS Any Benefit	(II) OLS Any Benefit	(III) OLS Any Out-of-Work Benefit	(IV) OLS Any Out-of-Work Benefit	(V) OLS Any HH-level Benefit	(VI) OLS Any HH-level Benefit
A8	0.057**	0.103***	0.020	0.095***	0.016	0.100***
	(0.027)	(0.032)	(0.022)	(0.033)	(0.023)	(0.031)
PreApr2011	-0.015	0.018	-0.018*	0.020	-0.022**	0.020
	(0.009)	(0.020)	(0.009)	(0.020)	(0.009)	(0.025)
A8*PreApr2011	-0.030	-0.086***	-0.013	-0.099***	-0.002	-0.092**
	(0.026)	(0.029)	(0.017)	(0.033)	(0.018)	(0.033)
Observations	2,346	2,572	2,346	2,572	2,346	2,572
R-squared	0.137	0.235	0.127	0.246	0.125	0.256
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs
Gender	Males	Females	Males	Females	Males	Females

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.12: Employment Status: By Gender

Dep. Variable	(I) OLS In Employm.	(II) OLS In Employm.	(III) OLS Unemployed	(IV) OLS Unemployed	(V) OLS Inactive	(VI) OLS Inactive
A8	0.120***	0.084***	-0.012	-0.005	-0.108***	-0.079***
	(0.029)	(0.021)	(0.009)	(0.008)	(0.023)	(0.018)
PreApr2011	0.001	-0.020	-0.011	-0.018*	0.010	0.038
	(0.017)	(0.021)	(0.008)	(0.009)	(0.016)	(0.023)
A8*PreApr2011	0.024	0.060**	-0.002	0.006	-0.022	-0.065**
	(0.016)	(0.022)	(0.011)	(0.010)	(0.017)	(0.023)
Observations	9,775	11,230	9,775	11,230	9,775	11,230
R-squared	0.132	0.143	0.020	0.011	0.163	0.148
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Whole	Whole	Whole	Whole	Whole	Whole
Gender	Males	Females	Males	Females	Males	Females

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.13: Labour Supply: By Gender

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dep. Variable	Usual Hrs Worked	Usual Hrs Worked	Full-Time Job	Full-Time Job	Second Job	Second Job	Gross Hr Pay	Gross Hr Pay
A8	-1.020	-0.245	0.032**	0.015	0.000	0.007	-8.984***	-4.796***
	(0.831)	(0.483)	(0.015)	(0.019)	(0.005)	(0.007)	(1.240)	(0.811)
PreApr2011	-0.503	0.497	0.007	-0.005	0.002	0.023***	-2.132**	-0.675
	(0.647)	(0.421)	(0.016)	(0.020)	(0.005)	(0.005)	(0.778)	(0.721)
A8*PreApr2011	1.260*	0.502	0.007	0.036	-0.003	-0.006	1.850**	0.351
	(0.677)	(0.527)	(0.017)	(0.022)	(0.006)	(0.006)	(0.841)	(0.673)
Observations	8,298	7,786	8,447	7,903	8,439	7,892	6,049	6,036
R-squared	0.030	0.105	0.033	0.096	0.006	0.007	0.158	0.115
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Whole	Whole	Whole	Whole	Whole	Whole	Whole	Whole
Gender	Males	Females	Males	Females	Males	Females	Males	Females

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: age, age squared, marital status, no. of children, years in the UK, education, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.14: Claim of Benefits: By Educational Level

	(I)	(II)	(III)	(IV)	(V)	(VI)
	OLS	OLS	OLS	OLS	OLS	OLS
Dep. Variable	Any Benefit	Any Benefit	Any Out-of-Work Benefit	Any Out-of-Work Benefit	Any HH-level Benefit	Any HH-level Benefit
A8	0.052*	0.082**	0.034	0.063*	0.036	0.063*
	(0.025)	(0.037)	(0.025)	(0.034)	(0.026)	(0.034)
PreApr2011	0.001	0.004	0.002	0.003	0.004	-0.008
	(0.011)	(0.022)	(0.010)	(0.023)	(0.012)	(0.029)
A8*PreApr2011	0.004	-0.096***	-0.007	-0.088***	-0.007	-0.069**
	(0.027)	(0.026)	(0.021)	(0.029)	(0.022)	(0.032)
Observations	2,332	2,586	2,332	2,586	2,332	2,586
R-squared	0.213	0.202	0.220	0.207	0.233	0.207
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs	<2 yrs
Education	High	Low	High	Low	High	Low

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.15: Employment Status: By Educational Level

	(I)	(II)	(III)	(IV)	(V)	(VI)
	OLS	OLS	OLS	OLS	OLS	OLS
Dep. Variable	In Employm.	In Employm.	Unemployed	Unemployed	Inactive	Inactive
A8	0.103***	0.100***	-0.009	-0.021	-0.094***	-0.079***
	(0.032)	(0.025)	(0.009)	(0.013)	(0.027)	(0.024)
PreApr2011	-0.023	0.024	-0.005	-0.029**	0.028	0.005
	(0.021)	(0.017)	(0.007)	(0.013)	(0.019)	(0.017)
A8*PreApr2011	0.052**	0.009	0.010	0.006	-0.062***	-0.015
	(0.019)	(0.018)	(0.009)	(0.015)	(0.021)	(0.017)
Observations	9,243	11,762	9,243	11,762	9,243	11,762
R-squared	0.161	0.139	0.010	0.015	0.178	0.144
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Whole	Whole	Whole	Whole	Whole	Whole
Education	High	Low	High	Low	High	Low

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Table A.2.16: Labour Supply: By Educational Level

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dep. Variable	Usual Hrs Worked	Usual Hrs Worked	Full-Time Job	Full-Time Job	Second Job	Second Job	Gross Hr Pay	Gross Hr Pay
A8	-1.403**	0.726	0.007	0.057***	0.004	-0.001	-8.982***	-3.097***
	(0.646)	(0.702)	(0.018)	(0.012)	(0.006)	(0.006)	(0.797)	(0.934)
PreApr2011	0.545	-0.866	0.018	-0.029	0.015***	0.009*	-1.333	-0.937**
	(0.503)	(0.762)	(0.020)	(0.017)	(0.004)	(0.005)	(0.848)	(0.357)
A8*PreApr2011	0.588	1.547*	0.002	0.052**	0.002	-0.008*	0.886	0.762*
	(0.493)	(0.776)	(0.021)	(0.019)	(0.007)	(0.004)	(0.809)	(0.393)
Observations	7,071	9,013	7,182	9,168	7,173	9,158	5,470	6,615
R-squared	0.141	0.145	0.109	0.124	0.007	0.010	0.140	0.104
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Whole	Whole	Whole	Whole	Whole	Whole	Whole	Whole
Education	High	Low	High	Low	High	Low	High	Low

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by country of origin) in parentheses. Other controls include: gender, age, age squared, marital status, no. of children, years in the UK, mixed-origin HH, lag of unempl. rate (linear and squared), lag of GDP growth.

Chapter 2

Geographical Mobility of Labour Market Entrants: Evidence from the UK

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2.1 Introduction

Regional mobility, or labour mobility, is an extremely crucial aspect for economies. It can serve as a balancing mechanism for local labour markets when they are in disequilibrium, by allowing workers to move from one area to the other in search of a job match (Machin et al., 2012). For this reason, mobility has drawn the attention of researchers for a long time and especially in very recent times.

However, most of the literature on regional mobility and labour market outcomes looks at the labour force as a whole, while the case of labour market entrants and their behaviour in the few years after their transition out of full-time education has not been investigated much. The interest in this particular category arises from the fact that at this time of life individuals make decisions based on a set of preferences and priorities which diverges substantially from those of their adult counterparts. This, of course, gives rise to different implications. Additionally, any choice made at this specific stage is likely to affect later outcomes (Scherer, 2005; Bachmann et al., 2010; Hoare and Corver, 2010). Hence, the reasons and the implications associated with such decisions are worth investigating.

In a general microeconomic framework, the choice of moving is affected by the difference between the expected utility of earnings away and at home, in addition to a number of non-economic features (Wagner, 1990; Hatton, 1995). The economic outcomes depend on the individual employment history and on local labour market and regional conditions such as unemployment rates, mean wages, GDP per capita and housing prices (McCormick, 1997; Hatton and Tani, 2005). The non-monetary factors concern individual-specific preferences and household characteristics, including the individual propensity to move (Belot and Ermisch, 2009), marriage and parenthood (Mitchell, 2008; Løken et al., 2013) and other amenities, such as those associated with climate (Kodrzicki, 2001).

Young individuals are generally found to be much more mobile than older people. As a matter of fact, the family and housing constraints to which adult workers are generally subject to, do not apply to labour market entrants. At this stage of life, in fact, they are unlikely to be married or to have children and they typically do not own a house but are renters. Hence, having fewer

constraints to account for, they can more easily meet the costs of moving (Mitchell, 2008). Also, unlike adult workers, they do not have any significant employment history (Böheim and Taylor, 2002). Their choices of moving must, then, be necessarily driven by some other factors, which I examine in my paper.

Here, I look at individuals who just exited full-time education and I analyse their mobility patterns with respect of their place of origin using data from the United Kingdom.

Given the lack of a proper measure for distance in the data, I build a continuous variable that quantifies the distance of each individual from their place of origin. As illustrated in the Appendix, the variable I build offers better information with respect to the solutions employed so far. Böheim and Taylor (2002), for instance, who perform an analysis of residential and job mobility in the UK, are only able to identify whether respondents who move to another address do so within a certain district, across districts but within a region or across regions, without accounting for adjacency or proximity of districts and regions. The continuous variable I use in this paper allows to disentangle this ambiguity.

I select local labour market and regional factors along with some individual and parental characteristics as the crucial determinants of mobility for labour market entrants, while excluding housing and family formation aspects from being a stringent constraint in such a context.

Above all, educational attainment is expected to play a major role since, *ceteris paribus*, it is directly and strongly related to the individual's employability opportunities as it may serve as signal, especially in the absence of any job history. Because of data availability and methodological issues, most recent studies either refer to mobility of graduates (Lindberg, 2009; Ghinetti and Moriconi, 2010; Krabel and Flöther, 2012) or that of non-qualified individuals (Kaplan, 2009; Kennan and Walker, 2011; Machin et al., 2012). In this paper I choose to investigate determinants and implications for both sub-groups. In doing so, I apply family fixed effects and instrumental variable approaches in order to mitigate the endogeneity that may arise both from individual and 'environmental' unobservable characteristics.

I find that having a degree is significantly and positively associated to higher mobility. Correcting for endogeneity in the relationship between education and mobility suggests that OLS

coefficients are biased upwards. This is due to unobservable characteristics that are predominantly related to the environment from which individuals come from and that increase both their probability to pursue education and their propensity to move. Hence, I estimate that the true impact of educational attainment on mobility of young adults is, in fact, positive and statistically significant but lower in magnitude than what is implied by OLS.

Moreover, individual past mobility experience is associated to higher mobility, possibly because it accounts for the weakening of ties with the place of origin, along with increased independence. This is the case also for some family and local labour market characteristics.

This paper supports the existing findings on the importance of education for the enhancement of labour mobility, with a particular focus on labour market entrants. It also contributes to the broader literature on the returns to education, as mobility can be considered to be a form of return to education. Finally, on a methodological note, it provides a new method to measure distance continuously in the absence of a direct measure of geographical relocation of individuals.

The remainder of this chapter is structured as follows. In the next section, I give a brief picture of the existing literature on the determinants of geographical mobility. In Section 3 I describe the data and define how the sample is selected. In Section 4, I outline the empirical strategy and I present the results for each of the methods employed, including some robustness checks. Section 5 concludes.

2.2 The Determinants of Geographical Mobility

The mobility behaviour of labour market entrants is typically affected by reasons that can be roughly classified into three broad categories: individual, family and regional characteristics, some of which are time-invariant while others may change over time. In this Section I briefly mention the literature that is related to each of these topics.

2.2.1 Individual Characteristics

The factor that, regardless of the country and the period analysed, is widely recognised in the literature as one of the main predictors of mobility is age. In particular, young people are most mobile when they are in their early twenties. This time also coincides with the occurrence of some crucial steps in a person's life, such as leaving the parental house and finding a job. Champion et al. (1998) find that, although people aged 16-29 only constitute 20% of the population in England, they are the sub-group to which almost half of total moves within the country pertains to. Moreover, these are generally frequent and long-distance moves. There are two main explanations to this phenomenon. First, young people typically have a higher net present value of migration than that of older people because they can amortise moving costs over a longer period of time (Hatton, 1995).[1] Second, they have fewer constraints in terms of family formation and assets. At this very young age, in fact, it is unlikely for them to have children or be house-owners, hence the costs of moving are sensibly low compared to those of older adults, for whom location decisions must always account for the maximisation of the utility at the household level (Mitchell, 2008).[2]

Gender differences are not particularly significant. However, on average women move at a younger age with respect to men both because they tend to marry older men and because they often are the ones who follow their bread-winner male partners in their migration decisions, i.e. women are 'tied movers' (Champion et al., 1998; Løken et al., 2013).

Educational attainment is also a crucial predictor of mobility, not only because individuals move to pursue education.[3] In principle, geographical mobility might be thought of as an indicator of the width of each individual's labour market. Hence, it may be that highly educated individuals move farther away from their place of origin because they can access a wider range of jobs and

[1] Aisa et al. (2013) discuss a model of optimal age of migration and argue that this is lower for those who choose to invest more in education because their expected returns from migration are higher than those of the less educated; conversely, the less-educated tend to move later as their returns associated to migration will be lower.

[2] Mitchell (2008) finds that married couples have lower mobility rates compared to single people (and single parents). Likewise, the presence of children, especially if in school age, reduces the probability of moving.

[3] Champion et al. (1998, p. 98) argue that in England "one of the major migration streams which moves several hundred thousand migrants each autumn is that of students into higher education". Belfield and Morris (1999) estimate that around 54% of British students move to another region in order to pursue higher education, while a third does not move region at all. Similarly, Hillmert (2004), analysing regional mobility of young adults in West Germany, finds that youths in West Germany aged 15-21 move mostly for training or education, while for those in the age range 21-34 mobility is predominantly employment-related.

better exploit the returns from schooling, while the less skilled would be confined to a narrower labour market, i.e. not move or move only short distances (McCormick, 1997). Conversely, it may be the case that those who have invested more in education, in view of their more valuable human capital, are able to find a job more easily in the place they live in (McHenry, 2013), while their less educated counterparts struggle and have no other option but to look for better opportunities away.

In the past few decades a positive correlation between mobility and education has been found (Hillmert, 2004; Hoare and Corver, 2010).[4] On the one hand, there exist some endogenous, often unobservable, personal and family attitudes (ambition, motivation, expectations, etc.) that may encourage individuals to achieve higher levels of education and, at the same time, to move more or farther away. On the other hand, it may be that skill-specific labour markets are unevenly scattered in terms of geographical distribution: while the demand for unskilled or manual workers is by and large uniformly distributed, metropolitan areas typically generate and attract better educated workers, who, in turn, have higher opportunity costs for not moving because of their higher expected returns to education (McCormick, 1997).[5] A few analyses account for causal relationships between mobility and education. Machin et al. (2012) instrument education with changes in the minimum school leaving age in Norway and find that there is an unequivocal causal effect of education on mobility which amounts to a 15% increase in mobility rates for every additional year of schooling. McHenry (2013) also analyses variations in educational attainment using compulsory schooling laws in the US. Contrary to Machin et al. (2012), he finds a negative impact of education on migration for individuals who have approximately ten years of schooling. He attributes this to the fact that at low levels, additional schooling enhances local network ties which allow individuals to find a job more easily and therefore increase the opportunity cost of migration. Malamud and Wozniak (2012) exploit the draft-avoidance college enrollments during the Vietnam war as suggested by Card and Lemieux (2001) and estimate that the differences in mobility rates for graduates and non-graduates are almost entirely to be attributed to the causal effect of having a degree or not. According to the

[4] A number of analyses carried out in earlier periods, on the contrary, do not provide such unequivocal evidence (Quigley and Weinberg, 1977; Wagner, 1990).

[5] With this respect, however, Rees et al. (1996) with the UK 1991 Census data find some evidence of a significant redistribution of the population from large cities to medium/small towns and from urban centres to the outskirts. Yet, they argue that people aged 16-29 do show a generalised tendency to move into urbanised areas.

authors, this may operate directly - namely, the fact that college education may provide additional cognitive skills that foster one's ability to make long-distance moves - or indirectly, because it provides access to a more geographically integrated labour market.

Moreover, the field of study may also influence the degree of mobility because of the intrinsic characteristics of some jobs and of the employability opportunities (Belfield and Morris, 1999; Buonanno and Pozzoli, 2009; Krabel and Flöther, 2012), while academic performance is found to increase the likelihood of moving (Hoare and Corver, 2010), possibly by picking up some sort of ability effect.

Personal inclinations and social capital ties with the place of origin do matter in one's choice of moving. Krabel and Flöther (2012) argue that personal preferences and the willingness to move are a crucial factor in the migration process. They find that the likelihood of moving from the university region for German graduates is higher if the individual has moved in the past, where prior mobility is a proxy for the individual propensity to move. Similarly, Kodrzicki (2001) estimates that US graduates are 17% and 54% more likely to be mobile later in life if they moved state some time before high-school age and in between high-school and college, respectively. Bound et al. (2004) also find that graduates in the US have very high mobility rates by comparing the stock of graduate workers and the flows of college degree by state. In a novel work, Kennan (2015) models migration choices before and after college. He challenges the results by Bound et al. (2004) and argues that, while reductions in tuition fees determined by state subsidies do in fact stimulate the flow of graduates in a state, costs of migration in the US are such that most people will choose to stay in their college location after leaving full-time education.

Belot and Ermisch (2009) claim that people with thicker local social networks are less likely to move, possibly because on one hand, the intrinsic value of family and friendship ties is jeopardised by the high costs of maintaining them over long distances; on the other hand, people with a lot of close friends are more likely to hear about jobs nearby rather than at some other locations. Conversely, those who move generally have weaker social networks and this encourages further movements. More recently, Bauernschuster et al. (2014) show that the greater mobility of highly-educated and risk-loving individuals is explained by the fact that these individuals are systematically less

responsive to the cultural costs of migration with respect to their less educated counterparts, while they are indifferent to the direct costs of moving (i.e. travel costs and information costs).

2.2.2 The Environment: Family Features and Regional Conditions

The environment in which an individual is raised is of crucial importance and the characteristics of the parental household and of the region of origin need, therefore, to be accounted for.

The existing literature has found strong evidence of a persistence in inter-generational socioeconomic status, especially in terms of education and economic outcome. As a consequence, individuals coming from wealthier backgrounds are generally more educated and can afford moving away, while their poorer counterparts choose to live in proximity to their parents in order to enjoy their support and be better protected against labour market shocks (Card, 2001; Kaplan, 2009, 2012) and job insecurity (Cobb-Clark, 2008; Becker et al., 2010).

As far as the composition of the parental household and its merely demographic aspects are concerned, Cobb-Clark (2008) finds that the probability young Australians live with their parents decreases in the number of siblings and if parents are divorced. Similarly, Løken et al. (2013) argue that Norwegian young adults are less likely to live near their place of origin when they can count on a higher number of siblings or are at a later birth order, as they have less family responsibilities. On the contrary, Konrad et al. (2002) find that German older siblings move more than the younger ones, possibly because they can shift the burden of care-giving to their younger siblings through a first-mover advantage. The same reasoning applies to adult children with siblings, who move more than only-children (Rainer and Siedler, 2009).

When dealing with young adults seeking for a job for the first time, local labour market and regional properties of both the areas of origin and of (potential) destination are, in principle, of great relevance. Each area is, in fact, characterised by three sets of features: attracting or *pull* factors, repelling or *push* factors and characteristics to which people are indifferent to. It is true that these sets are differently defined across people, given individual-specific preferences and characteristics, but some factors seem to generally affect homogeneous sub-groups of people in a similar way (Lee, 1966). Using US data, Wozniak (2010) finds that, regardless of the individual's level of education

attained, location choices are driven not only by characteristics of the state of birth alone, but also by labour market conditions in other (nonbirth) states.

In the case of labour market entrants, for instance, the degree of urbanisation might have an attracting power because of the creation of agglomeration economies in metropolitan areas (Rees et al., 1996). Here, the gravitational pull is twofold: not only those people coming from elsewhere are attracted by the higher concentration of jobs, especially high-skilled ones, and by better facilities, but also those who were raised in that area are less keen on moving. This is particularly true for highly skilled individuals, also because inner city areas are very costly in terms of housing and therefore low-income households are induced to move to suburban areas (Champion et al., 1998; Mitchell, 2008). Similarly, regions characterised by high average wages tend to be more appealing, while high unemployment rates generally push residents away. Wozniak (2010) investigates whether (average and education-specific) local labour market conditions affect mobility decisions of young adults in their late twenties, distinguishing between graduates and less educated individuals. She finds that US states with high labour demand and/or lower unemployment rates tend to attract disproportionately more highly educated workers. Similarly, Kennan and Walker (2011), who model migration decisions of young adults as a job search problem, come to the conclusion that these respond quite strongly to spatial differences in wages. Furthermore, they argue that a major role in shaping the relationship between expected income and migration choices is played by match effects, which translates in the fact that workers who get a bad draw in their current location tend to leave while those who earn more tend to stay.

2.3 Data

In this section I briefly describe the data sources and how the sample is selected. Then, I describe the variables used in the analysis. The construction of the distance variable, which constitutes the outcome in the main analysis, is illustrated in detail in Appendix B.1.

2.3.1 Selection of the Sample

All variables are drawn from the British Household Panel Survey (BHPS), which is a very rich and detailed survey that includes information on all aspects of people's lives. It covers the years 1991-2008 (18 waves) and includes a representative sample of the population of the United Kingdom. All people aged 16 or above living in the eligible households are interviewed. The claimant count statistics come from the official UK labour market statistic database, while information on universities and their location is drawn from the UK Register of Learning Providers.[6]

The geographical unit used in this analysis is the Local Authority District (LAD).[7] According to this methodology, the UK is divided into 406 LADs across 19 regions. By disaggregating the data at such a level, I am able to improve the precision of my analysis and account for intra-regional differences which would otherwise be undetected. Also, by using larger geographical units there would clearly be fewer observed movements between units themselves (Champion et al., 1998).

Starting from the full BHPS dataset, I isolate all individuals aged 15 to 35 years and for whom the first observation is at 25 years old or below. Then, I keep all individuals who experience a transition out of full-time education and into employment, unemployment or inactivity.[8] Given that some people record multiple transitions by going in and out of education with some interruptions, I do not consider as undergoing transition those who suspend their studies for one year while living with their parents (i.e. those who take a sabbatical year). As for the rest, I only take into account the transition corresponding to the attainment of their highest academic qualification. This way, I should be able to, at least partially, get rid of casual and temporary employment that young people often take in order to earn some money during their studies and before finding a 'proper' job. Finally, I select all individuals who I observe with at least a sibling and for which information in the key variables is non-missing.

Hence, I am left with an unbalanced panel of almost 10,000 observations in 18 waves. At the time of transition (t_0), the sample consists of 1,169 individuals who were enrolled in full-time

[6] For further details, see www.nomisweb.co.uk and www.hesa.ac.uk, respectively.

[7] Speaking of geographical mobility, the most appropriate unit would certainly be the Travel to Work Area (TTWA), which is available in the BHPS. However, I choose to use the LAD because this is the smallest geographical level that allows me to match all the information that is drawn from the various sources.

[8] Inactivity is specifically intended as 'family care', while workers in maternity leave are listed among the employed. I exclude individuals who are in long term sickness or disabled.

Table 2.1: Sample Size by Years from Transition

t	0	1	2	3	4	5	6	7	8	9	10
n	1169	1162	1110	1014	910	749	679	565	469	384	315
f	859	857	797	728	665	563	517	435	377	311	266
k	257	254	247	239	234	206	202	188	177	165	151
%	100.00	99.40	94.95	86.74	77.84	64.07	58.08	48.33	40.12	32.85	26.95

Note: t is the number of years since transition, n the number of individuals, f the number of families and k the number of Local Authority Districts of origin.

education in the previous period and are now either in the labour market or inactive. I, then, follow these individuals over time. The sample size decreases with time since transition as individuals are dropped from the survey for a number of reasons which I cannot entirely identify: five periods after transition (t_5), I can only observe 64% of the initial sample, while at t_{10} the share drops to 27% (Table 2.1). Therefore, I choose to restrict my analysis to the first few years after transition - namely, up until t_5 - in order to keep a decent sample size and limit the potential bias deriving from attrition.[9]

2.3.2 Descriptive analysis

At the time of transition, half of the sample is 21 years old or younger (Table 2.2).[10] Very few are married or have children, confirming the fact that family formation aspects are not particularly relevant at this stage.[11] The distribution of educational qualifications is roughly balanced, with 28% having graduated, almost a third having achieved A level qualifications or equivalent and the rest (42%) holding O level qualifications or lower. Most people in the sample, after leaving full-time education, go into employment (86%, of which almost 90% have a permanent contract and work full-time). One tenth is unemployed, while a small percentage (less than 3%) is listed as inactive.

The selected young adults have two siblings, on average, and the vast majority (73%) has

[9] While attrition may be a problem if movers are less likely to remain in the sample, "[t]he BHPS attempts to follow all movers who remain in Britain and, although attrition among migrants is higher than among non-migrants, Buck (2000) reports that almost 75% of movers between waves 1 and 2 were traced." (Böheim and Taylor, 2002, p. 372)

[10] Kiernan (1991) finds that, only a decade earlier, 90% of young British adults had gone from full-time education to their first experience in the labour market when aged 19.

[11] Since the sample is almost entirely made of whites, I do not include ethnicity among the socio-demographic indicators.

Table 2.2: Descriptive Statistics at the Time of Transition (t_0)

Variable	Obs	Mean	Std. Dev.	Min	Max
Female	1162	0.518	0.500	0	1
Age	1162	21.356	3.515	16	42
Married	1162	0.039	0.193	0	1
Children	1162	0.073	0.260	0	1
Current Qualification					
- Degree +	1162	0.278	0.448	0	1
- A levels	1162	0.298	0.457	0	1
- O Levels or Lower	1162	0.424	0.494	0	1
Status					
- In Employment	1148	0.864	0.343	0	1
- Unemployed	1148	0.110	0.313	0	1
- Family Care	1148	0.026	0.160	0	1
Previous Mobility	1162	0.367	0.482	0	1
Birth Position	1162	2.200	0.922	1	10
Number of Siblings	1162	2.115	1.360	1	11
Any Older Sibling with Degree	598	0.149	0.356	0	1
Any Older Sibling in Uni/with Degree	732	0.250	0.433	0	1
Any Sibling with Degree	861	0.159	0.366	0	1
Any Sibling in Uni/with Degree	1162	0.291	0.454	0	1
Any Sibling Out of Parental HH	1031	0.864	0.343	0	1
Father's Education	968	0.506	0.500	0	1
Mother's Education	991	0.415	0.493	0	1
Mother Has Job	1161	0.292	0.455	0	1
Books in Parental HH	1162	0.487	0.500	0	1
Two-Parent HH	1156	0.727	0.446	0	1
Mother's Attitude: Equal	878	0.445	0.497	0	1
Mother's Attitude: Earnings	878	0.893	0.309	0	1
Mother's Attitude: Job	878	0.640	0.480	0	1
Income in Parental HH	884	66997.9	48224.6	9941.5	729619.9
LAD of Origin					
- Urbanised (pop >10,000) at t-1	1084	0.743	0.437	0	1
- Claimant Count (prop of resident pop) at t-1	1120	101.844	45.507	22.2	246.2
- Number of Universities in LAD	1126	1.803	1.917	0	12

Note: information on LAD of origin is missing for those whose place of origin could not be recovered; the claimant count is calculated as a percentage of the national average.

lived with both parents. Around half come from families where one of the parents has achieved some qualifications, while less than a third have a working mother. Moreover, around half of the individuals in the sample have been exposed to the presence of books in the household where they grew up.[12] As in Booth and Kee (2009), this indicator is meant to pick up some unobservable

[12]The original question in the BHPS questionnaire reads: 'Thinking about the time from when you were a baby until the age of ten, which of the following statements best describes your childhood home: lots of books; quite a few books; or not many books'. This variable is recoded as 1 for respondents who state 'Lots of books' and 0 otherwise. Available in wave 13 only.

Table 2.3: Residence at the Time of Transition (t_0)

	Non-graduates	Graduates	Total
Living in Parental HH	77.50%	32.79%	65.71%
Moved within LAD	13.93%	18.62%	15.17%
Moved to another LAD	8.56%	48.58%	19.12%

features of the parental household, and specifically, the parents' sensibility towards education. Even if only for a sub-sample, I am also able to look into the parents' (namely, the mother's) attitude towards roles within the family. The two dummies 'Mother's Attitude: Equal' and 'Mother's Attitude: Job' report whether the mother of the young adult has progressive views in terms of whether husband and wife should contribute equally to the household income and whether the family suffers if the mother works.[13] With this respect, roughly half of the individuals for which this information is available come from relatively conservative households.

As far as the living arrangements are concerned, at the time of transition more than one in three individuals has already moved at least once, with or without their parents. Moreover, 34% are already living out of their parental household, of which more than half lives in a different district (Table 2.3). Of those who move out of their parental house for the first time, nearly 70% move in between three years before and three years after transiting out of education. When considering only university graduates, almost half of them moves away from their parents one to three years before finishing their studies (Figure 2.1, left panel), which is probably due to the common practice for British students to choose a university relatively far from home (Champion et al., 1998). Yet, a share of graduates returns home for some time after finishing studying, while those who do not get a degree tend to leave home later but permanently.[14] At the time of transition few non-graduates have moved out of the parental household, while around half of the graduates lives away. While non-graduates reach their independence at a fairly stable rate year after year, a considerable amount of

[13]The original questions in the BHPS questionnaire read, respectively: 'Do you personally agree or disagree: both the husband and wife should contribute to the household income' and 'Do you personally agree or disagree: all in all, family life suffers when the woman has a full time job'. The first variable is recoded to 1 if the mother has disagreed and 0 otherwise, the second variable takes value 1 if the mother has agreed and 0 otherwise. The response of the mother is evaluated at the time prior to the young adult's transition out-of-education, i.e. when they were living at the same address.

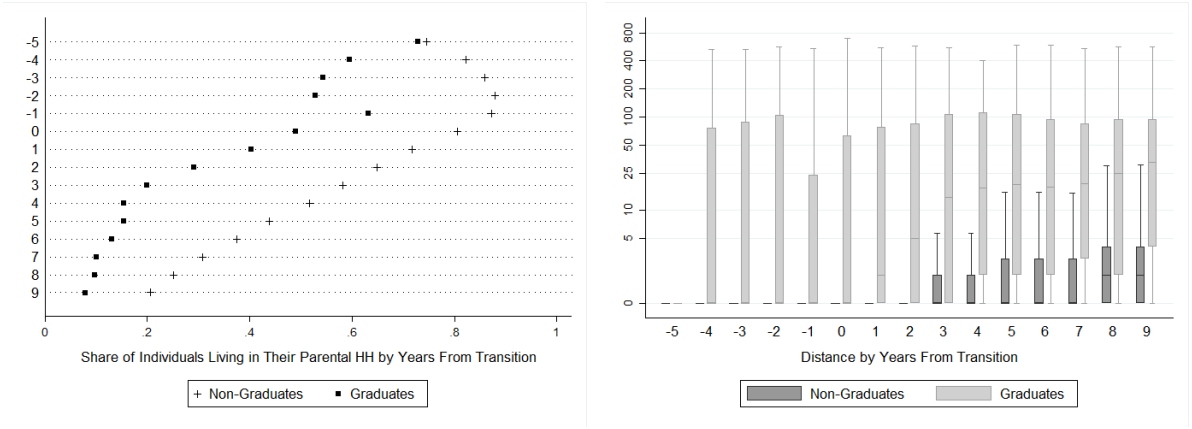
[14]Belfield and Morris (1999) find that around a third of UK students who moved region to study eventually return to their home region and look for their first job there. See also Jones (1987).

graduates moves out in between four and three years before transition (i.e. at the time of university enrolment). Some graduates move back home after university for one or two years (time t_0 and t_1) but at the third year after transition almost 70% have reached independence. Moreover, on average graduates move much farther away with respect to non-graduates, with those achieving a higher degree moving the farthest away from their place of origin (Figure 2.1, right panel).

With respect to the location of origin and of destination, the London area, followed by Greater Manchester, is the most attractive destination, while Scotland, the North of England and Northern Ireland have very low rates of inward and outward mobility (Tables B.2.1 and B.2.2). This evidence is consistent with the hypothesis that metropolitan areas are typically magnetic location. At the same time, the number of stayers in Scotland, Wales and Northern Ireland is particularly high, as previously found by Belfield and Morris (1999) and Hoare and Corver (2010), possibly because of higher costs of movement and greater diversities in their administrative systems compared to the regions of England.[15]

Despite the noticeable differences in mobility rates across regions, the average share of movers

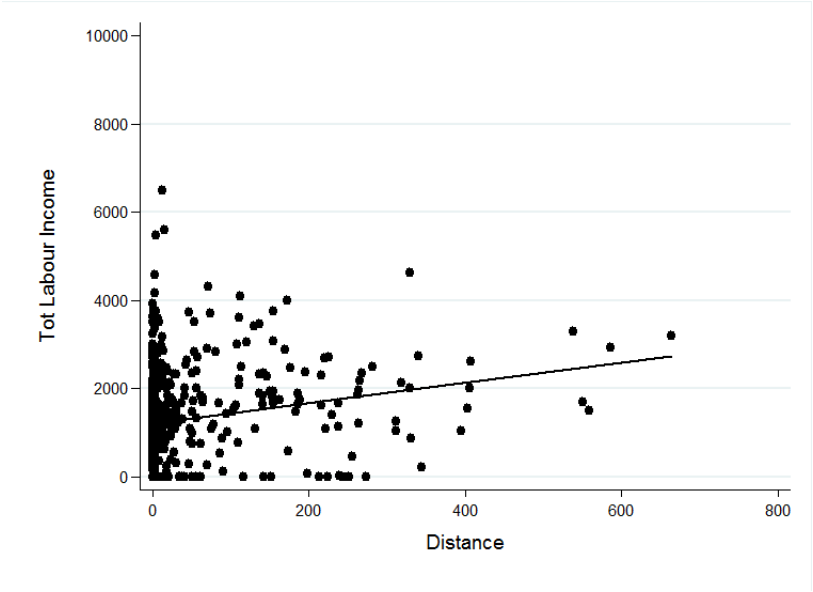
Figure 2.1: Mobility by Years from Transition



Graduates are those who are eventually observed achieving at least a first degree, non-graduates are never observed achieving a degree. The years from transition are such that the 0 label, negative values and positive values correspond to the year of, the years before and the years after transition, respectively. Left figure: the share of individuals living in the parental household is on the x-axis, where 1 = all live with their parents and 0 = all moved out. Right figure: distance is on the y axis, rescaled on a base 10 logarithm. Outliers excluded.

[15]Such extreme values may also depend on the much greater geographical extension of Wales, Scotland and Northern Ireland with respect to all other regions: the wider the region, the less the number of movers, because all short- and medium-distance moves are not detected.

Figure 2.2: Total Labour Income by Mobility at the Fifth Year from Transition



(both within and across regions) at the time of transition is low, while it reaches roughly 75% by the fifth year after transition. This is in line with what Kodrzicki (2001) finds with US data on graduates, where much of the migration occurs within the first five years after graduation. Given this, I am keen on taking individuals not just on the very year in which they experience transition, but also some time later, i.e. up to five years later, in order to allow for some adjustments but still maintain a reasonable sample size. The process of moving out from their family may, in fact, stand for these individuals being able to afford living on their own and therefore being more likely to have a permanent job. This, again, would eliminate some of the causal and temporary employment, which I am not interested in.

Finally, I compare mobility to the individual's labour income. If mobility is intended to approximate the labour market opportunities of labour market entrants, larger distances should translate in better opportunities and, conversely, in higher earnings.[16] Figure 2.2 shows that there is, in fact, a positive correlation between mobility, measured as distance in kilometres from the place of origin, to the individual's total labour income in the month prior to the interview. This is evaluated at the fifth year from transition into the labour market but similar results are obtained for all pooled

[16] Appendix B.1 provides a description of the challenges I come across when I define a move and how distance is measured.

and single cross-section sub-samples.

2.4 Empirical Approach

In this Section I illustrate the empirical model and the results I obtain. I begin with the baseline model, where I analyse the link between the distance from the place of origin and some individual-, family- and area-level characteristics. Then, I discuss the endogeneity of the educational attainment. I deal with this issue by using family fixed effects and instrumental variables.

2.4.1 The Baseline Model

In order to determine to what extent each set of determinants contributes to the mobility of young people entering the labour market, I estimate the following baseline model with OLS:

$$distance_{ijkt} = \alpha + \beta_1 edu_{ijkt} + \beta_2 X_{ijkt} + \beta_3 F_{jkt} + \beta_4 R_{kt} + \lambda_k + t + \varepsilon_{ijkt}, \tag{2.1}$$

where $distance_{ijkt}$ is the distance (in kms) of individual i from family of origin j, which resides in LAD k at time t. The main variable of interest is edu_{ijkt}, which distinguishes between having at least a first degree or not. I also control for individual (X_{ijkt}) and parental household (F_{jkt}) characteristics and for regional features of the LAD of origin (R_{kt}), as well as regional and time dummies. Because of the possibility for variables within LADs to be similar to one another, as a prudent practice I cluster standard errors at the LAD of origin level.[17] I do not include factors associated with the region of destinations because of practical reasons: while I can easily identify the LAD of destination for those who move, it is impossible to determine a potential destination for the stayers. Nevertheless, the sets of factors associated with the place of origin has a clearly heavier weight in the migration process because individuals have a better knowledge on the actual situation of that specific area, while information on the area of prospective destination is generally incomplete or inexact (Lee, 1966).

[17] Similar results are also obtained when I cluster by family of origin.

I estimate Equation 2.1 with OLS for different samples. The results reported in Table 2.4 are obtained pooling the first six years from the year of transition onwards ($t_0 - t_5$) for each individual. Similar results are also reached for each cross-section (Table B.2.3), but because of the small sample size in the cross-sectional estimations, my preferred specification is the one obtained with the pooled results.[18]

Table 2.4 shows the estimated coefficients from Equation 2.1. In each column I gradually add sets of controls - namely individual, family and area characteristics in columns II, III and IV, respectively. Column V includes some controls pertaining to the family of origin. However, since the inclusion of these controls does not change the main estimated coefficients and yields a large drop in the sample, my preferred specification remains the one in column IV.

Education appears to have a meaningful and significant effect on mobility: having a degree increases the distance from the place of origin by around 30 kilometres. The coefficients of the gender indicator suggest that females move less than their male counterparts, although this is only statistically significant at the 10% level. Also, having moved before the transition out of full-time education seems to be a fairly important factor, with a magnitude that is even larger than that of the *degree* variable. This may be partially picking up both the individual propensity to move, which would be revealed by prior mobility, and the weakening (or non-existence) of social ties with the place where the individual's parents currently live. Moreover, being exposed to the presence of many books in the parental household as a child is positively and significantly associated to mobility, possibly through a positive attitude towards education and 'broad-mindedness' within the household (Booth and Kee, 2009; Valbuena, 2011). Other family characteristics, such as the education of the mother or the size of the parental household, seem not to be particularly relevant to the individual's choice of moving. When I control for the mother's attitude towards family roles (column V), I observe that coefficients are positive, hence young adults are more likely to move if they come from more progressive households, although no claims can be made about their significance. The same occurs, although with a negative sign, for the total income in the parental household. Finally, regional characteristics seem to have a weaker relevance. In particular, mobility

[18] In order to rule out the possibility that the results are only valid for individuals who have siblings, I also estimate the same model on an enlarged sample (n = 6,854) which includes only-children and find identical results.

Table 2.4: Estimates over $t_0 - t_5$: OLS

	(I)	(II)	(III)	(IV)	(V)
	OLS	OLS	OLS	OLS	OLS
Dep. Variables	Distance	Distance	Distance	Distance	Distance
Degree	52.748***	31.731***	30.425***	30.668***	34.895***
	(6.059)	(6.832)	(6.772)	(6.773)	(7.211)
Female		-6.002	-6.970*	-7.475*	-3.352
		(3.745)	(3.845)	(3.892)	(3.644)
Age		2.607*	1.930	1.900	1.211
		(1.488)	(1.496)	(1.489)	(1.904)
Age Squared		-0.109	-0.083	-0.086	-0.073
		(0.073)	(0.073)	(0.073)	(0.100)
Previous Mobility		39.681***	38.554***	38.757***	38.386***
		(5.527)	(5.407)	(5.425)	(6.163)
1 Yr Since Transition		1.784	2.155	2.087	3.780
		(1.966)	(1.974)	(1.951)	(2.304)
2 Yrs Since Transition		-0.775	-0.060	-0.042	1.428
		(2.803)	(2.846)	(2.810)	(3.174)
3 Yrs Since Transition		1.633	2.374	2.455	3.903
		(3.559)	(3.640)	(3.595)	(4.001)
4 Yrs Since Transition		0.434	1.278	1.542	6.649
		(4.189)	(4.293)	(4.283)	(4.649)
5 Yrs Since Transition		4.835	5.890	6.232	12.624**
		(5.032)	(5.061)	(5.081)	(5.494)
Birth Order		-1.102	-0.015	0.008	1.244
		(1.998)	(2.257)	(2.265)	(2.548)
Two-parent HH		5.381	4.338	4.868	4.343
		(5.025)	(4.877)	(4.882)	(4.735)
Number of Siblings			-1.379	-1.415	0.001
			(1.583)	(1.611)	(1.751)
Mother's Edu			0.914	0.833	1.691
			(4.591)	(4.611)	(4.721)
Mother Has Job			2.302	2.549	3.222
			(5.475)	(5.477)	(5.532)
Books in Parental HH			12.767***	13.147***	13.838***
			(3.618)	(3.611)	(3.752)
(Ln) Income in Parental HH					-6.440
					(3.942)
Mother's Attitudes: Equal					3.246
					(4.516)
Mother's Attitudes: Job					6.840*
					(3.923)
(Lag) Urbanisation				7.044*	3.612
				(3.741)	(4.221)
Universities				-2.398*	-4.639***
				(1.425)	(1.385)
(Lag) Claimant Count				0.023	0.067
				(0.055)	(0.062)
Constant	13.864**	-10.815	-12.778	-14.211	51.399
	(6.469)	(9.568)	(10.371)	(12.077)	(45.322)
Observations	5,055	5,055	5,055	5,055	3,997
R-squared	0.122	0.175	0.182	0.185	0.201
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by LAD of origin) in parentheses. Year and region of origin dummies included.

appears to be affected (positively) only by whether the district of origin is listed as urbanised at the previous period. This may be due to the fact that urbanised LADs in the sample are characterised by higher levels of unemployment rate: the claimant count in urbanised LADs is 101% of the UK average, compared to 79% for the non-urbanised LADs. The concentration of educational institutions in the place of origin is associated to a negative coefficient, while the indicator for the claimant count in the LAD of origin (relative to the national average), does not display any significant relationship.

Additionally, I run a complementary investigation by having edu_{ijkt} in Equation 2.1 broken down into the following educational attainments: achieving a first degree or higher, A levels or equivalent and O levels or lower. From the estimates shown in Table B.2.4 it appears that the threshold above which education has a meaningful and significant association to mobility clearly consists in achieving a degree (columns I-IV).

2.4.2 Dealing with Endogeneity

Issues arise as those who have achieved higher levels of education *and* move farther away from the place of origin might do so because of unobservable individual or family characteristics which are omitted from the model such as individual ability or ambition or, more generally, 'environmental' push factors that may develop among members of the household of origin.

The literature on returns from education has used various ways to deal with the endogeneity associated to educational attainment. Some have used individual characteristics, e.g. quarter of birth or lottery draft as instruments for education (Angrist and Krueger, 1991, 1992). Other early analyses have focused on approaches based on family-related variables. Butcher and Case (1994) use sibling number and sex composition by gender to understand educational attainment. Levin and Plug (1999) carry out a series of IV estimations using quarter of birth, social status, sibling composition and parental education and employment, concluding that the latter measures perform better as instruments for schooling attainment. More recently, Dai and Heckman (2013) argue that a child's cognitive skills are influenced, directly or indirectly, not only by early parenting but also by the presence of older siblings. Further analyses use differences between twins to eliminate

the endogeneity bias (Bonjour et al., 2003). Other works rely on changes in compulsory education laws, e.g. Harmon and Walker (1995) and Oreopoulos (2006) for the UK.[19] The latter two analyses exploit changes in the UK minimum school-leaving age from 14 to 15 and from 15 to 16 that were enforced in 1947 and in 1973, respectively.

During the period of observation in my data there has not been any major change in the schooling system, which makes this approach unfeasible. At a higher education level, some changes occurred in 1998 and 2006, when university tuition fees were introduced (capped at GBP 1,000) and raised (to GBP 3,000), respectively, but this as well does not seem to be a suitable approach as previous research has found no evidence of these changes on participation rates (Crawford, 2012). Dearden et al. (2011) argue that such lack of evidence, in the case of the 1998 change, is attributable to the fact that a maintenance grant system was introduced at the same time, which offset the effects of the fees.[20]

Hence, I opt for family fixed effects and instrumental variables in order to deal with this problem.

Family Fixed Effects

First, I apply family fixed effects in order to rule out any family-related time-invariant push factors that may potentially affect educational attainment and individual mobility. Additionally, any time-invariant residual effect associated to the characteristics of the area of origin is wiped out with this approach by construction. Hence, I estimate a model such that:

$$distance_{ijt} = \alpha + \beta_1 edu_{ijt} + \beta_2 X_{ijt} + \delta_j + t + \epsilon_{ijt}. \tag{2.2}$$

Here, the analysis pertains to all labour market entrants who have at least one sibling in the sample (on average, individuals in the sample have two siblings) and I pool all observations up to the fifth year after transition out of full-time education.[21] Results are shown in Table 2.5.

[19] Other notable works are Acemoglu and Angrist (2000), Lochner and Moretti (2004) and Malamud and Wozniak (2012) for the US and Machin et al. (2012) for Norway.

[20] The authors find that a GBP 1,000 increase in fees yields a decrease in university participation by 3.9 p.p., while an equal increase in grants leads to a 2.6 p.p. increase in participation. These figures can be interpreted as average elasticities of -0.14 and 0.18 for fees and grants, respectively.

[21] The sample is slightly larger than the one used with OLS because I am no longer constrained by missing

Table 2.5: Estimates over $t_0 - t_5$: Family FE and IV

	(I) OLS	(II) Family FE	(III) IV Family FE
Dep. Variables	Distance	Distance	Distance
Degree	31.494***	12.38**	16.14
	(3.294)	(4.926)	(12.21)
Female	-7.598***	-1.072	-1.035
	(2.157)	(2.828)	(2.852)
Age	2.868***	-1.111	-1.418
	(0.911)	(1.425)	(1.794)
Age Squared	-0.125***	0.124**	0.127**
	(0.041)	(0.058)	(0.059)
Previous Mobility	38.930***	32.13***	31.20***
	(2.725)	(4.902)	(5.478)
1 Yr Since Transition	-0.052	2.026	2.207
	(3.471)	(2.592)	(2.642)
2 Yrs Since Transition	-2.512	0.836	1.214
	(3.508)	(3.152)	(3.318)
3 Yrs Since Transition	0.757	4.666	5.242
	(3.793)	(3.884)	(4.210)
4 Yrs Since Transition	-0.730	3.951	4.722
	(3.915)	(4.576)	(5.065)
5 Yrs Since Transition	2.658	7.113	8.070
	(4.548)	(5.515)	(6.026)
Birth Order	-2.508**	-1.732	-1.734
	(1.190)	(2.949)	(2.953)
Two-Parent HH	6.450**	4.244	4.314
	(2.512)	(13.27)	(13.27)
Constant	-6.253		
	(6.751)		
			IV 1st stage
Dep. Variables			Degree
Any Sib w/Degree			-0.505***
			(0.027)
Observations	5,121	5,120	5,120
R-squared	0.170	0.052	0.051
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$
Number of families		825	825
(Heterosk.-Robust) F Stat			337.06

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Year dummies included.

When I introduce family fixed effects, the coefficient associated to the educational attainment variable decrease as expected but remain relevant and significant. The coefficient of the *degree* variable now suggests that graduates move on average 12 kilometres farther away from their place of origin with respect to non-graduates. This leads to believe that the OLS estimates may be upward

information on some family-related characteristics.

biased because of the existence of unobservable family characteristics that may make young adults more likely to pursue education and to move at the same time.

Also, past movements maintain a positive and significant impact on current mobility, which suggests that the variable associated with prior mobility is effectively picking up an individual attitude rather than some sort of family-driven inclination, at least for the most part. Therefore, individual features seem to maintain a substantial importance once all potential 'environmental' elements are taken into account. Furthermore, the negative association between mobility and gender or order of birth that arises with OLS disappears with this new specification.

As suggested by OLS estimates, the estimated coefficients in the family FE model where education is broken down in different levels show that a first degree is the educational attainment that substantially affects mobility of young adults (Table B.2.4, column V).

Instrumental Variables

As discussed above, implementing family fixed effects allows to rule out only observable and unobservable 'environmental' factors, while it does not control for individual unobserved characteristics such as ability. Hence, I adopt an instrumental variable approach combined with family FE, with which I try to handle the aforementioned issue. This consists of using the educational attainment of the siblings as instrument for the individual's education.

The idea behind this approach is that educational attainment might be correlated to one's siblings achieving a degree for reasons that are not dependent on family-related characteristics. The existing literature supports the existence of the quantity-quality trade-off as postulated by Becker and Lewis (1973), according to which parents decide the optimal number of children in advance and how much to invest in their human capital, and the hypothesis that siblings are unlikely to receive equal shares of resources destined to education by their parents.[22] Hence, a negative correlation between the education of the siblings is expected. On the other hand, it might be that individuals who have at least a sibling achieving a degree should be more keen on doing the same themselves as a result of (potential) inter-siblings education externalities, which may yield positive demonstration

[22]Empirical findings have shown that investment in education decreases in family size and birth order, especially for females (Black et al., 2005; Booth and Kee, 2009; de Haan, 2010; Silles, 2010).

and push effects, especially within families that are more prone to education. Consequently, this would determine a positive correlation between the schooling attainment of siblings.

Thus, the combination with family FE allows me to difference out any family-specific trait that might be affecting all children within the family (e.g. parental attitude towards education) and to employ the education of the siblings as instrument for the education of the young adult herself. In what follows, I discuss the reasons that would ensure the validity of the instrument and I try to rule out all possible channels that may hinder this particular method.

First, the instrument would not be a valid one if it is related to individual ability. This would be the case if, for instance, two siblings shared a common set of 'good genes' or if they were brought up by parents that are particularly conscientious in enhancing the talents of their offspring. However, since all family characteristics are controlled for, I can confidently rule out such possibility. Also, the educational attainment of the siblings should not be correlated to other unobservable features such as independence or motivation. I try to rule out this channel by controlling for whether the individual has moved prior to finishing full-time education, under the assumption that those who have experienced changes in environment in their teenage or early adulthood years might be more resourceful and independent. Again, if all siblings have gone through the same type of changes, this should be picked up by the family fixed effects and consequently it should not create any concern regarding the exogeneity of the instrument.

On the other hand, the educational achievement of a sibling should not affect directly the individual's choice of moving, unless through the moving of the sibling herself. To rule out this channel of causation, in the robustness checks I also control for whether the individual has at least a sibling not living in the parental household.

Moreover, the combined use of IV and family FE ensures the rejection of any potential correlation between the instrument and all time-invariant family or regional characteristics. These include a wide range of socio-economic features of the household of origin which have been associated to the educational attainment of the children, such as family size (Butcher and Case, 1994), parent's education and job status (Ermisch and Francesconi, 2001), household income and marital status of the parents (Blundell et al., 1997; Gregg and Machin, 2000).

Thus, in addition to family fixed effects, I rely on a two-stage model which includes a first step, where:

$$edu_{ijt} = \theta_0 + \theta_1 sibs\_edu_{ijt} + \theta_2 X_{ijt} + \delta_j + t + \upsilon_{ijt}. \tag{2.3}$$

Here, $sibs\_edu_{ijkt}$ is a dummy variable that takes value equal to 1 if the individual has at least a sibling currently with a degree (*Any Sib w/Degree*), conditional on the sibling being at least 21 years old.[23] This variable is constructed in the following way. I first match siblings on the basis of their parents' identifier, in order to obtain a family identifier (the same employed for the family fixed effects). Then, I follow siblings over time and verify their educational attainment, even if they no longer live in the same household.

Results are shown in column III of Table 2.5. The second stage estimates are reported in the upper panel, while the first stage is reported in the lower panel. The instrument has a negative and significant effect on the endogenous variable and suggest that, *ceteris paribus*, young adults who have a graduate sibling are roughly 50 percent less likely to get a degree. Also, an F statistic above the rule-of-thumb threshold of 10 proposed by Staiger and Stock (1997) suggests that having a highly educated sibling is a fairly strong predictor of the individual's educational attainment. In view of the various potential channels discussed above, it appears that once all unobserved heterogeneity at the family level is controlled for, the negative effect associated to the quantity-quality hypothesis dominates over any type of inter-sibling positive externality. Hence, the IV can be interpreted as a local average treatment effect where the group that is affected by the instrument are those individuals who, possibly in view of their higher ability or ambition, would achieve a degree even in the absence of an educated sibling, i.e. having more resources available and regardless of family preferences and other 'environmental' factors.

The second stage results are shown in the upper panel of column III. Here, the coefficient of the dummy for having a degree is positive but not statistically different from zero. The absence of

[23] Ideally, I would use the *eldest* siblings' educational attainment as instrument because potential birth order and demonstration effects would be stronger. However, this would force me to exclude all first-borns, further reducing the sample by 44%. By using *any* siblings' education, I manage to limit the loss of observations to a 5% of only-children. The actual difference in the number of observations in the tables is larger because the information on the education of the siblings is sometimes incomplete, as later described.

statistical significance may be due to the lack of within-family variability. However, the magnitude of the coefficient is similar to the one in column II - and, as a matter of fact, this is true for all coefficients. This may lead to believe that the positive and significant coefficient found with family FE alone is in fact a good measure of the effect of having a degree on the distance from the place of origin for young labour market entrants.

As an additional analysis, I include a control for having at least a sibling who is not living in the parental household (Table B.2.5). This is aimed at reducing the possibility that results might be driven by the potential push effects of having mobile siblings - i.e. having a more educated sibling may induce the individual to move because her sibling, as a consequence of her own level of education, is more likely to be mobile herself. The indicator for having at least a sibling living outside of the parental household is constructed by comparing the total number of siblings each individual has to the information about the number of children living with her parents at the time of the interview.[24] The coefficient associated to this variable is positive and significant in the OLS specification but loses all statistical significance once family fixed effects are employed. Also, when controlling for this, the impact of education and pre-transition mobility on the distance from the place of origin remain perfectly coherent with the main specification discussed above. This suggests that using the siblings' educational attainment as instrument for the individual's schooling should not be undermined by the existence of an alternative channel of causation related to the mobility of members within the household.

In order to verify the robustness of the first stage, I perform some other checks. First, I use alternative indicators for the siblings' educational attainment (Table B.2.6). These dummies are constructed such that they take value 1 if the individual has at least one sibling aged 18 or over who is attending university or has a degree (Column I), has at least an older sibling aged 21 or over who has a degree (Column II) or has at least an older sibling aged 18 or over who is attending university or has a degree (Column III). In all three cases, the coefficient associated to the education of the sibling is always negative and significant.[25]

[24] In the BHPS, there is a variable with such information but it is only available for waves 11 and 16. As a result, the number of observations would have been rather scarce so I opted for a less straightforward, but more complete procedure.

[25] When the first variable is used as instrument, the second stage results (omitted here) are comparable to the main

The second check that I carry out is shown in Table B.2.7. Given that the achievement of a degree is conditional to having reached the minimum age of 21, I select various sub-samples of individuals at different ages and show that the coefficient associated to the instrument in the first stage is fairly robust also to these changes in sample selection.

I also split the sample by the number of siblings that the individual has, in order to verify that the effect of the siblings' attainment on the probability of achieving a degree persists regardless the size of the family (Table B.2.8). Hence, I can exclude that the negative effects found in the main analysis are driven by parental fertility-related compromises.

Finally, the dominance of the quantity-quality trade-off is confirmed when I split the sample by income of the parental household and by education of the mother (Tables B.2.9 and B.2.10, respectively).[26] For individuals coming from a more disadvantaged background (i.e. either a low-income family or a household where the mother has only gained low levels of education), the effect of having a highly educated sibling is stronger than the average effect, and it amounts to a 63-68% lower probability of achieving a degree. On the other hand, young adults coming from wealthier families have only 38-41% lower chances to graduate. These figures would be consistent with the quantity-quality trade-off as when the parents' financial constraints become less binding this trade-off is less likely to bite. Within this framework, one might argue that the education of the sibling is not uncorrelated to the individual's ability if those young adults that come from disadvantaged household, as they are destined less resources than those who come from less financially constrained families, have to exert relatively more effort (i.e. display higher levels of ability) in order to gain a degree, therefore leading to inconsistency of the IV estimator. If that was the case, however, the coefficient associated to the *degree* variable in the second stage would be biased upwards for the low-income/low-educated sub-sample because of a (positive) unobservable impact of ability. Nevertheless, when comparing the second stage estimated coefficients for the two sub-samples, these are very similar in magnitude and therefore this suggests that such hypothesis can be ruled out.

analysis. As the two latter variables are concerned, since they necessarily yield a sizeable reduction in the number of individuals I choose not to employ them in a IV-Family FE setting (see discussion above).

[26] Low and high income households are defined as below or above the threshold level of the sample median income of the family of origin (GBP 34,017.66), respectively.

2.5 Discussion

This paper investigates geographical mobility patterns of young adults as a proxy for their labour market opportunities and specifically examines their behaviour in respect of the education they acquire before transiting into the labour market.

The results suggest that mobility is likely to be strongly affected by the level of education attained. In particular, the threshold for having a positive and significant effect on moving away from the place of origin appears to be the achievement of a first degree. The OLS estimates indicate that graduates tend to move around 30 kilometres farther away with respect to their less educated counterparts. Nevertheless, OLS coefficients are likely to be biased because of unobservable characteristics that may pertain not only to individual innate features such as ability, but also to family or 'environmental' factors which may affect both the decision to pursue higher education and to move away from the area of origin. Hence, I tackle the endogeneity bias deriving from such unobservable individual and 'environmental' characteristics by using family fixed effects and by instrumenting the individual's educational attainment with that of her siblings. Even so, education maintains its considerable effect: when family FE are employed, having a degree is associated to 12 kilometres of extra distance from the place of origin, compared to a non-graduate. When fixed effects are combined to instrumental variables, there is a loss in precision but the point estimates remain quite similar to the ones obtained with family fixed effects alone.

An additional characteristic that seems to play an important role is past mobility, which may account for the individual's propensity to move, her independence and for having weaker ties with the place of origin. On the other hand, birth order and family composition do not appear to have any role in the choice of moving.

As far as family and regional characteristics are concerned, OLS estimates allow to inspect their contribution to mobility separately. Belonging to a household with an education-oriented attitude (namely, the presence of many books in the parental household) seems to push individuals farther away from their place of origin. The same happens to those who come from a relatively urbanised area, because these are associated to higher levels of unemployment, while, as expected, universities display a significant pulling power.

As geographical mobility may provide a measure of the width of the labour market that individuals face, it may be interpreted as an indicator for the labour market opportunities of young adults. From a policy point of view, the results of this analysis highlight the fact that improving education may yield better outcomes not only for individuals, who become more prone to move in search for a better job match, but also at the macroeconomic level, since the geographical relocation of workers allows to eliminate disequilibria in local labour markets and improve their overall conditions.

Appendix B

B.1 Appendix: Measuring Distance

The literature makes a clear distinction between the concept of residential mobility and that of internal or interregional migration, the latter being referred in particular to longer distance moves which are generally combined with a change in employment or socioeconomic status.[27] On the other hand, residential mobility is primarily related to changes in housing type. Consequently, moves within a certain radius or within specific administrative unit boundaries are often excluded by the computation of mobility because they still potentially allow commuting to the place of work and do not necessarily imply a major change in social group, i.e. the cost of moving within these areas is implicitly assumed to be null (Manning and Petrongolo, 2011). Hence, Wagner (1990), having access to continuous data, uses a cut-off at 50 kilometres, while others set it at specific territorial levels (Belfield and Morris, 1999; Kodrzicki, 2001; Böheim and Taylor, 2002; Krabel and Flöther, 2012; Løken et al., 2013).

Following Dennett (2010), I choose to overcome any distinctions of this sort for a number of reasons which can be attributed to: (i) a general decrease in the opportunity costs of moving over the years, thanks to the development of the transport system, (ii) the increased access to the internet and to communication technologies and (iii) the evolution of the labour market, which is nowadays mainly based on the service sector. Hence, for the purpose of this analysis, mobility is broadly intended as "a permanent or semi-permanent change of residence" (Lee, 1966, p. 49), regardless of the distance of the move and its voluntariness.

Moreover, a distinction between residential mobility and internal migration would require a cut-off point that would turn out to be completely arbitrary, and therefore, not objective by definition. In fact, the variety of definitions and methods across the literature, suggest that these are often influenced, if not driven, by the availability of data and are not purely based on theoretical principles (Boyle, 2009). In addition to this, the discontinuities that are created by such boundaries do not resemble the actual structure of labour markets, which do, in fact, overlap (Manning and Petrongolo, 2011).

[27] See, for instance, Cadwallader (1992).

In this particular analysis, the natural cut-off would consist in the boundaries of the UK Local Authority Districts, such that any moves within a LAD would be considered as residential, while individuals moving outside a LAD would be listed as internal migrants. Considering that in the UK roughly two thirds of moves take place within LADs (Böheim and Taylor, 2002), such an approach would completely disregard a significant share of this phenomenon.

When defining distance, I come across two types of issues. Firstly, I have to take into consideration the fact that some individuals, while still living in the parental household after transiting out of full-time education, may move to another place *with* their parents. Therefore, I account for these moves and define the household of origin as the one in which the individual is last observed living with her parents.[28]

Secondly, the information on residence changes offered by the BHPS dataset only allows to determine whether an individual is living in the same Local Authority District (LAD) as the one of origin, with no distinction between adjacent and distant LADs - except for being in the same region or not, and the distance of the last residential move in kilometres (the variable *distmov*).

Consider the discrete spatial system (Wilson, 2000) depicted in Figure B.2.1, as a simplifying example. This represents one country divided in two regions, which in turn are disaggregated into equally sized LADs. Consider LAD_0 to be the LAD of origin of two individuals (i and j), in which they reside at time t_0. Suppose that, in the next period (i.e. time t_1), individual i moves to LAD_A and individual j moves to LAD_B. Then, if mobility was defined simply by a dummy indicator for being in another LAD as the one of origin, clearly the two would be acknowledged as identical movers and the fact that j moved considerably farther away from LAD_0 would not be accounted for.[29] Nevertheless, using a discrete variable that distinguishes movements within LAD, across districts but within regions or across regions as in Böheim and Taylor (2002), would not ease the problem: not only LAD_A and LAD_B belong to the same region and would therefore be treated equally, but if, at time t_1, individual j were to move to LAD_C instead (i.e. in region 2), she would

[28] I also check whether the parents' household can still be considered as an attractive locus for adult children after they move out, as in principle individuals may have less incentives to return to their place of origin if their parents have moved to another place in the meanwhile. Nevertheless, only a negligible percentage of families move after their adult children leave the house.

[29] Despite its ambiguity, this is the most common approach in the literature.

be considered as a long-distance mover with respect to i, while, in fact, both LAD_A and LAD_C are adjacent to LAD_0. Similarly, if, at time t_1, i moved to LAD_C and j moved to LAD_B, then i would be considered to have moved farther away from the LAD of origin than j, whereas the opposite is true. Therefore, a continuous variable appears to be more suitable.

The BHPS variable *distmov*, which identifies the distance of the last residential move, would be sufficient if individuals were moving only once, but since many of them move repeatedly and my purpose is to define how far they move from their place of origin in each period, I cannot recover any valuable information on the spatial pattern of their moves. In fact, the information I can gather from the variable *distmov* is, in some cases, misleading. Consider Figure B.2.1 again and suppose individual i coming from LAD_0 and moving to LAD_A at time t_1, to LAD_B at time t_2 and back to LAD_A at time t_3. The distance measured by this variable would only be reliable when considering i's first move to LAD_A, while the outcome with respect to the following two movements would not be accounted for properly because it would acknowledge the distance from the last LAD of residence (i.e. LAD_A at time t_2 and LAD_B at time t_3) and not from the LAD of origin (LAD_0).

Therefore, I compute the distance in kilometres between each pair of LADs using the geographical coordinates of all districts across the UK and creating a variable that I call *distlad*.[30] The drawback of this method is that, by construction, I do not observe any positive values for moves within the same LAD. Hence, I create a new variable, *distance*, which I use throughout the whole analysis, where I combine the information obtained with *distlad* and *distmov*, such that *distance* is equal to *distlad* for any move across LADs and equal to *distmov* for any move within LAD.[31] Despite being reflecting estimated and actual distances, respectively, the two measures are almost perfectly correlated and share a very similar distribution.[32] Figure B.2.2 shows that when I compare the variable *distmov* and its equivalent derived from *distlad* (i.e. the variable *distlad_1*, defined as the distance from the last LAD of residence), observations align well on a 45-degree line.

With the new measure *distance*, I can then fully exploit all the information available given

[30] Geographical coordinates of postcodes are recovered from www.doogal.co.uk. The centre of each district is calculated by averaging the latitudes and longitudes of all postcodes belonging to the district. Centre latitude and longitude values of LADs in England, Wales and Scotland are elaborated by www.doogal.co.uk, values for LADs in Northern Ireland are calculated by the author.

[31] At the 90th percentile, *distmov* takes value 4.47.

[32] Correlation between the two measures, when both positive and non-missing, is 0.9969.

by *distlad* and *distmov*. The use of this new variable certainly improves the efficiency of distance measuring in this particular context. Nevertheless, it does have weaknesses: being the data collected once a year, I have no information on potential movements that may happen in between observations from one year to the other. Hence, in some cases multiple, undetected moves may take place within a same year and these cannot be accounted for. This introduces some measurement bias and an understatement of the frequency and the extent of mobility patterns that I cannot currently disentangle.

B.2 Appendix: Figures and Tables

Figure B.2.1: Discrete Spatial System

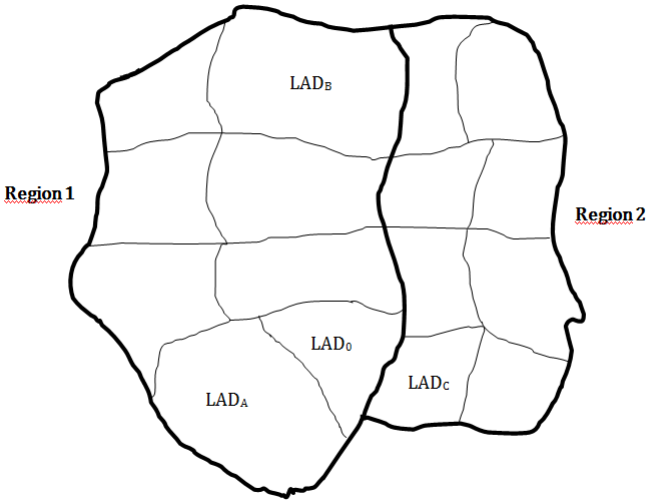


Figure B.2.2: Comparison Distance Measures

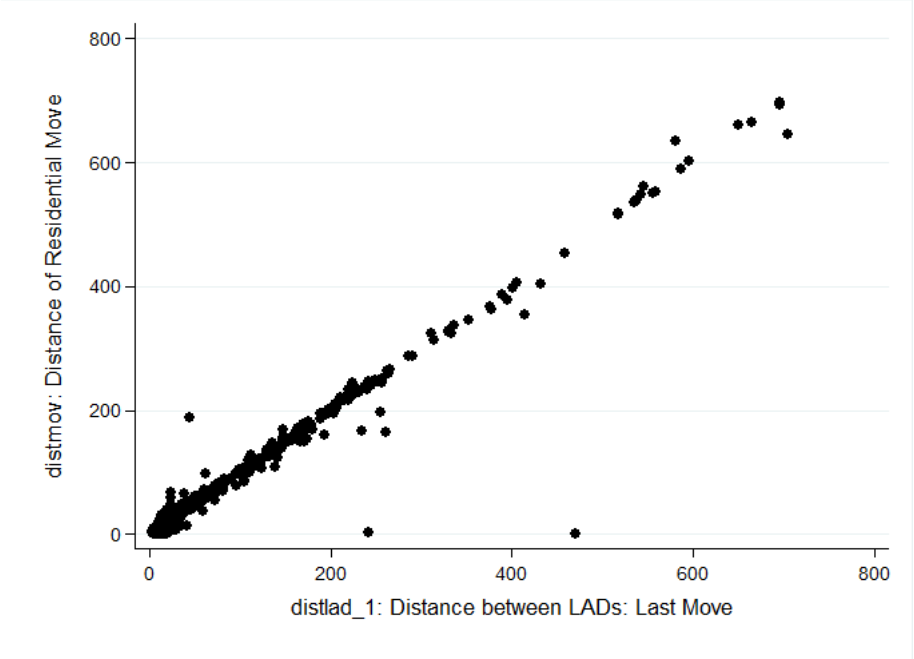


Table B.2.1: Share of Stayers and Movers by Region of Origin

Region of origin	at t_0			at t_5		
	Stayers	Movers within Region	Movers across Region	Stayers	Movers within Region	Movers across Region
Inner London	63.83	29.79	6.38	28.57	33.33	38.10
Outer London	75.81	6.45	17.74	37.21	18.60	44.19
R. of South East	65.06	20.82	14.13	29.37	51.05	19.58
South West	64.35	24.35	11.30	25.86	56.90	17.24
East Anglia	62.26	26.42	11.32	12.50	67.50	20.00
East Midlands	66.06	22.02	11.93	20.00	64.62	15.38
West Midlands Conurba	79.07	13.95	6.98	23.53	47.06	29.41
R. of West Midlands	66.22	20.27	13.51	45.45	39.39	15.15
Greater Manchester	75.00	17.50	7.50	22.73	59.09	18.18
Merseyside	54.84	32.26	12.90	9.09	54.55	36.36
R. of North West	68.18	13.64	18.18	10.34	65.52	24.14
South Yorkshire	77.78	14.81	7.41	16.67	55.56	27.78
West Yorkshire	65.71	20.00	14.29	21.74	60.87	17.39
R. of Yorks and Humbers	70.59	14.71	14.71	21.05	78.95	0.00
Tyne and Wear	83.33	6.67	10.00	31.25	56.25	12.50
R. of North	77.50	12.50	10.00	32.00	36.00	32.00
Wales	72.97	20.72	6.31	33.75	60.00	6.25
Scotland	68.70	26.72	4.58	20.20	74.75	5.05
Northern Ireland	86.25	13.75	0.00	44.44	55.56	0.00
Total	70.42	20.33	9.25	25.83	56.14	18.03

Table B.2.2: Share of Stayers and Movers by Region of Destination

Region of origin	at t_0			at t_5		
	Stayers	Movers within Region	Movers across Region	Stayers	Movers within Region	Movers across Region
Inner London	38.96	18.18	42.86	16.22	18.92	64.86
Outer London	68.12	5.80	26.09	37.21	18.60	44.19
R. of South East	68.09	21.79	10.12	29.17	50.69	20.14
South West	64.35	24.35	11.30	26.79	58.93	14.29
East Anglia	60.00	25.45	14.55	13.89	75.00	11.11
East Midlands	69.90	23.30	6.80	19.12	61.76	19.12
West Midlands Conurba	69.39	12.24	18.37	23.53	47.06	29.41
R. of West Midlands	75.38	23.08	1.54	44.12	38.24	17.65
Greater Manchester	63.83	14.89	21.28	19.23	50.00	30.77
Merseyside	56.67	33.33	10.00	12.50	75.00	12.50
R. of North West	78.95	15.79	5.26	12.50	79.17	8.33
South Yorkshire	77.78	14.81	7.41	17.65	58.82	23.53
West Yorkshire	62.16	18.92	18.92	23.81	66.67	9.52
R. of Yorks and Humbers	72.73	15.15	12.12	16.67	62.50	20.83
Tyne and Wear	75.76	6.06	18.18	31.25	56.25	12.50
R. of North	83.78	13.51	2.70	47.06	52.94	0.00
Wales	75.70	21.50	2.80	33.75	60.00	6.25
Scotland	71.71	27.89	0.40	20.62	76.29	3.09
Northern Ireland	86.25	13.75	0.00	44.44	55.56	0.00
Total	70.42	20.33	9.25	25.83	56.14	18.03

Table B.2.3: Estimates over $t_0 - t_5$: By Year

	(I) OLS	(II) OLS	(III) OLS	(IV) OLS	(V) OLS	(VI) OLS
Dep. Variables	Distance	Distance	Distance	Distance	Distance	Distance
Degree	40.231***	25.775***	27.474***	30.429***	29.718***	31.032**
	(8.300)	(8.740)	(7.981)	(9.688)	(9.725)	(12.614)
Observations	706	811	776	734	691	603
R-squared	0.250	0.221	0.220	0.238	0.221	0.169
Time Frame	t_0	t_1	t_2	t_3	t_4	t_5

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by LAD of origin) in parentheses. Including controls as in column IV, Table 2.4.

Table B.2.4: Estimates over $t_0 - t_5$: by Level of Qualification

	(I) OLS	(II) OLS	(III) OLS	(IV) OLS	(V) Family FE
Dep. Variables	Distance	Distance	Distance	Distance	Distance
Degree +	53.247***	29.699***	27.495***	27.496***	13.744**
	(5.948)	(6.641)	(6.584)	(6.630)	(5.972)
A Level	3.500	-1.285	-2.361	-2.656	-0.571
	(3.466)	(3.275)	(3.143)	(3.186)	(3.117)
Observations	5,055	5,055	5,055	5,055	5,047
R-squared	0.120	0.173	0.181	0.184	0.057
Individual Controls	No	Yes	Yes	Yes	Yes
Family Controls	No	No	Yes	Yes	Yes
Area Controls	No	No	No	Yes	Yes
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (clustered by LAD of origin) in parentheses. Year and region of origin dummies included.

Table B.2.5: Estimates over $t_0 - t_5$: Sibling Outside Parental HH

	(I) OLS	(II) Family FE	(III) IV Family FE
Dep. Variables	Distance	Distance	Distance
Degree	30.779***	12.73**	15.05
	(3.791)	(5.192)	(12.36)
Any Sib out of Parental HH	9.979***	-1.510	-1.533
	(2.792)	(6.137)	(6.143)
Previous Mobility	41.755***	35.16***	34.67***
	(3.209)	(5.589)	(6.017)
Dep. Variables			IV 1st stage Degree
Any Sib w/Degree			-0.512***
			(0.029)
Observations	4,051	4,696	4,696
R-squared	0.199	0.054	0.054
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$
(Heterosk.-Robust) F stat			314.8

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Year dummies included. OLS specification includes controls as in column II, Table 2.4. Family FE and IV family FE specifications include controls as in column II, Table 2.5.

Table B.2.6: First Stage: Alternative Indicators of Siblings' Attainment

	(I)	(II)	(III)
	Family FE	Family FE	Family FE
Dep. Variables	Degree	Degree	Degree
Any Sib in Uni or w/Degree	-0.746***		
	(0.018)		
Any Older Sib w/Degree		-0.396***	
		(0.063)	
Any Older Sib in Uni or w/Degree			-0.227***
			(0.060)
Observations	6,094	3,358	3,133
R-squared	0.621	0.421	0.390
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$
Number of families	921	608	572

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Year dummies included. Includes controls as in column II, Table 2.5.

Table B.2.7: First Stage: by Age

	(I)	(II)	(III)
	Family FE	Family FE	Family FE
Dep. Variables	Degree	Degree	Degree
Any Sib w/ Degree	-0.524***	-0.512***	-0.487***
	(0.029)	(0.043)	(0.120)
Observations	4,189	2,402	978
R-squared	0.394	0.349	0.317
Number of families	744	506	253
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$
Age	21+	24+	27+

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Year dummies included. Includes controls as in column II, Table 2.5.

Table B.2.8: First Stage: by Number of Siblings

	(I)	(II)	(III)
	Family FE	Family FE	Family FE
Dep. Variables	Degree	Degree	Degree
Any Sib w/Degree	-0.512***	-0.514***	-0.550***
	(0.038)	(0.047)	(0.086)
Observations	2,128	1,709	775
R-squared	0.440	0.389	0.486
Number of families	375	258	115
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$
No. of Siblings	1	2	3

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Year dummies included. Includes controls as in column II, Table 2.5.

Table B.2.9: Estimates over $t_0 - t_5$: by Income in Parental HH

	(I)	(II)	(III)
	IV Family FE	IV Family FE	IV Family FE
Dep. Variables	Distance	Distance	Distance
Degree	29.60**	29.57**	26.70
	(13.79)	(14.60)	(23.16)
	IV 1st stage	IV 1st stage	IV 1st stage
Dep. Variables	Degree	Degree	Degree
Any Sib w/Degree	-0.478***	-0.681***	-0.376***
	(0.031)	(0.041)	(0.040)
Observations	3,955	2,059	1,890
R-squared	0.048	0.072	0.047
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$
Number of families	615	335	279
(Heterosk.-robust) F stat	228.8	273.5	84.68
Income in Parental HH	All	Low	High

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Year dummies included. Includes controls as in column II, Table 2.5.

Table B.2.10: Estimates over $t_0 - t_5$: by Mother's Education

	(I)	(II)	(III)
	IV Family FE	IV Family FE	IV Family FE
Dep. Variables	Distance	Distance	Distance
Degree	15.52	15.68	15.87
	(12.63)	(13.42)	(21.38)
	IV 1st stage	IV 1st stage	IV 1st stage
Dep. Variables	Degree	Degree	Degree
Any Sib w/Degree	-0.495***	-0.625***	-0.413***
	(0.027)	(0.040)	(0.036)
Observations	4,553	2,621	1,932
R-squared	0.050	0.088	0.040
Time Frame	$t_0 - t_5$	$t_0 - t_5$	$t_0 - t_5$
Number of families	699	425	274
(Heterosk.-Robust) F stat	330.5	236.6	129.2
Mother's Edu	All	Low	High

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Year dummies included. Includes controls as in column II, Table 2.5.

Chapter 3

Job Turnover in Early Career and Fertility Choices

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3.1 Introduction

Fertility rates in many developed countries have been falling since the second half of the 1800s, with a sharp acceleration in decline after the *Baby Boom* of the 1960s (Guinnane, 2011; Clark and Cummins, 2014; Strulik and Vollmer, 2015). Ahn and Mira (2002) report that OECD countries in particular have seen a substantial drop in the period 1970-1995, with average fertility going from 2.45 to 1.63 children per woman. Strulik and Vollmer (2015) identify two separate groups of countries: those with a low-fertility regime (mainly Europe and North America), and those with high fertility rates. The first are converging to a predicted equilibrium fertility rate of 1.12, which is largely below the population replacement level; the latter group has also experienced a downward, but not uniform, trend, as these countries seem to be affected mostly by country-specific and time-variant phenomena.[1]

Among the explanations for this decline in fertility rates, together with the drop in child mortality, the extensive use of contraceptive methods and the reduction in the direct costs of having children, is an evolution in the opportunity costs of child-bearing (Guinnane, 2011). Women labour force participation rates have steadily increased in all countries (Hotz et al., 1997; Ahn and Mira, 2002; De La Rica and Iza, 2005; Guinnane, 2011) and, as suggested by theoretical models (Becker, 1960; Butz and Ward, 1979), such changes have resulted in an increment in the demand for children (positive income effect), but also a contemporaneous rise in the opportunity cost of child-bearing (negative substitution effect), especially given the increase in the level of educational attainment of the younger cohorts of women (Joshi et al., 1985).

Also, with the rising participation of women into the labour market, in many countries this has adjusted over time with the aim of allowing an easier match between working duties and family needs: new forms of employment contracts, such as part-time, temporary, etc., have been introduced. On the other hand, the recent empirical literature has found a strong and consistent association between these types of non-standard, and sometimes precarious, employment and fertility choices, particularly for highly-educated women. The dominating channel, in this case, appears to

[1] See also Adserà (2004) and Adserà (2011) for a discussion on the role of institutions and aggregate labour market conditions. Goldstein et al. (2013) evaluates the impact of the Great Recession of the late 2000s on fertility rates in Europe.

be the one concerning the reduced future career prospects and the lowered employability of women with small children (Del Bono et al., 2012; Huttunen and Kellokumpu, 2016).

The contribution of this paper to the existing literature is threefold. First, I join in the ongoing discussion on the long-term effects of experiencing high rates of job turnover during the crucial years of a worker's early career on various outcomes (see, e.g., Light and McGarry, 1998 and Burgess et al., 2003), focusing specifically on fertility choices of working women.

Second, I aim at evaluating the relative impact of undertaking job separations due to both voluntary and involuntary reasons. To the best of my knowledge, this is the first attempt that distinguishes between the two types of motives and tries to evaluate whether they have a different impact on the demand for children in the long run.

Third, I account for the possible presence of endogeneity, which may bias the estimated effect of job turnover on women's fertility choices. In fact, only a few analyses have dealt with this issue (Auer et al., 2013; Del Bono et al., 2015), but none has focused specifically on such long-term mechanisms. In this context, endogeneity issues may arise in a number of cases. It may be that women who plan to invest in child-bearing in the near future may be less attractive to employers because their productivity may be potentially reduced by the need of maternity leave and by family commitments; it may also be that women who have a strong preference for having children self-select into less demanding jobs, which in turn are generally associated with lower returns and higher instability (Booth et al., 2002; Del Bono et al., 2012); at the same time, women who have a comparative advantage in the labour market may choose to invest in their human capital or their career and, hence, postpone child-bearing (Francesconi, 2002). Conversely, it may be that women with a preference for children may seek job security and a stable career to reach adequate living standards (Easterlin, 1973).

The empirical analysis is run on a sample of British women who left education in the years 1959-1986. I estimate a Poisson model for count data with endogenous regressors, as suggested by Windmeijer and Santos Silva (1997), where the GMM estimation provides consistent estimates for the parameters of interest. These are associated to the count and the share of all voluntary and involuntary job changes that a woman has experienced during her first ten years in the labour

market.

In the baseline model I find a negative and significant association between job turnover and the number of children at the twentieth year of a woman's career, i.e. almost complete fertility. This correlation holds across different specifications, both for voluntary and involuntary turnover. However, when I try to rule out the potential endogeneity in the model with an instrumental variables approach, I find an even stronger, yet imprecisely estimated, negative effect of voluntary job turnover on the number of children born to a woman by her twentieth year in the labour market, while job losses seem to be yielding higher levels of fertility. The estimated coefficients imply that the bias that is generated by the endogeneity in the model is perhaps driven by women with stronger preferences for children self-selecting into more rewarding career paths, possibly in pursuance of better labour market conditions that can guarantee a more adequate child rearing. When I focus on a sub-sample of married women, the impact of job turnover seems to be characterised by a relatively more prominent substitution effect, while for older and less-educated cohorts the income effect appears to be more important in shaping the demand for children.

The remainder of this chapter is structured as follows. In the next section I briefly go through the existing relevant literature concerning the demand for children and job turnover. In section 3 I describe the sample selection process and the data. In section 4 I outline the empirical strategy and in the following section I present the results. Section 6 concludes.

3.2 Fertility and Employment Experience in the Literature

There is an extensive literature that tries to identify the medium- and long-term effect of job instability on a number of outcomes. Circumstances at the start of the career may imply a path dependence that causes long-lasting repercussions not only on the individual's occupational status and earnings (Topel and Ward, 1992; Light and McGarry, 1998; Booth et al., 2002; Burgess et al., 2003), but also on family formation choices (De La Rica and Iza, 2005) and health condition (Auer and Danzer, 2015). Job instability, however, is quite a broad definition that encompasses various forms of uncertainty and is often proxied by indicators for job mobility, holding a fixed-term contract, being dismissed or unemployed, etc.

With respect to consequences in terms of employment-related responses, most analyses find evidence of an immediate reduction in the earnings of workers due to the instability generated by job mobility, particularly when separations are involuntary.[2] This is due to, e.g. higher risks of remaining trapped in fixed-term employment or even becoming unemployed (Gebel, 2010), poorer working conditions (Scherer, 2009), lower investments in training by the employer (Booth et al., 2002; Albert et al., 2005). Nevertheless, if this job turnover takes place at the beginning of the worker's career and eventually allows the worker to find a permanent job, the costs associated to job mobility turn out to be only transitory and workers can catch up to their counterparts who did not experience job instability in the past (Booth et al., 2002).[3] García Pérez and Rebollo Sanz (2005) find instead that voluntary turnover is associated with positive wage gains with respect to job stayers but involuntary changes, which are often followed by an unemployment spell, lead to losses in terms of wages.

With the steep rise in the labour force participation of women after WWII, many authors have focused on the link between female labour supply and fertility decisions. In the theoretical framework, children are usually assumed to be normal goods (Becker, 1960), so that higher earnings are associated with a greater demand for children, and child-bearing decisions are taken as a result of a utility maximization problem for the parents. As the male is traditionally seen as the breadwinner in the household, any change in his income levels are positively associated with the demand for children, namely a pure income effect (Butz and Ward, 1979).

The case of the woman, however, is not so unambiguously determined. On the one hand, an increase in her wage levels determines a positive income effect because it yields a rise in the overall household income; on the other hand, it generates a negative substitution effect because of the increase in her opportunity cost of time, under the assumption that children are the wife's time-intensive users. In their piece of work, Butz and Ward (1979) find evidence in support of the substitution effect dominating over the income effect, given a change in female earnings.[4] More

[2]Huttunen and Kellokumpu (2016) estimate that job displacement yields a reduction in earnings by 22%.

[3]Booth et al. (2002) find that women manage to fully recover their earnings levels to those who started with a permanent contract, while the compensation is only partial for men. Similar evidence is found by Davia (2005), who argues that a certain amount of job mobility is beneficial to young workers at the start of their career in terms of wage gains. However, she claims that changing jobs too often may turn out to be detrimental, even in case of voluntary turnover.

[4]Although the availability of external child care services is not contemplated in their model, Butz and Ward

recently, Francesconi (2002) observes that a woman's preferences for children decreases in her level of schooling and in her earnings ability, i.e. "women with a comparative advantage in market work (or, alternatively, whose earnings profiles are the highest) are those with the lowest marginal utility of children; conversely, women with a strong preference for children are those with lower earnings profiles" (p. 374). Analogous conclusions are drawn by Caucutt et al. (2002): they find that, even in the absence of returns to experience in the labour market, high-productivity women delay fertility and have less children such that women in the highest wage quintile have two-thirds of their children after age 27, while women in the lowest wage quintile only 40%.[5]

Given its established negative association with earnings, then, job instability may affect the woman's demand for children both negatively (income effect) and positively through a reduction in the opportunity cost of time (substitution effect). In addition to this, Del Bono et al. (2015) identify two further channels. First, the loss in future earnings that a woman with small children may incur as a consequence of her potential unavailability to undertake intensive tasks or training (career effect). Second, the fact that employers may be less prone to hire women with small children (employability effect).[6]

The past decade has seen an increasing interest in the relationship between fertility outcomes and labour market status, since job instability is seen as one of the main causes of the recent downward trends in fertility rates.[7] Currie and Schwandt (2014) estimate that a one percentage point increase in the unemployment rate decreases fertility by six conceptions per 1,000 women in the short-run and by 14.2 in the long-run.

Moreover, several empirical studies look at the role of fixed-term contracts as a source of instability, especially since the spreading of the use of atypical contracts in the 1990s. Although

(1979) recognise that this would partially offset the effects of wage increases on the opportunity cost of child bearing in terms of foregone earnings. See also Ermisch (1989), Walker (1995), Joshi (1998), Ahn and Mira (2002) and Del Boca (2002).

[5]The model by Caucutt et al. (2002) belongs to the strand of the theoretical literature that recognises a degree of simultaneity of labour supply decisions with marriage and/or fertility choices. This also includes, e.g., Van Der Klaauw (1996), Keane and Wolpin (2002), Francesconi (2002), Sheran (2007).

[6]Huttunen and Kellokumpu (2016) also mention other indirect effects such as the increased risk of divorce and of health deterioration.

[7]Klemm (2012), using German data, shows that civil servants have a much higher propensity to have children, especially if highly educated, and this is to be attributed to the high levels of job security associated with that particular type of employment.

temporary contracts were conceived as a flexible device to foster employment, their association to greater instability on the labour market is perceived as an obstacle to family formation, as, *ceteris paribus*, any worker would prefer a permanent contract to a temporary one (Booth et al., 2002). De La Rica and Iza (2005) estimate the effect of being on a fixed-term contract on the probability of getting married and of giving birth on a sample of young Spanish workers. They find that men are markedly affected by working under temporary contracts in both their likelihood of getting married and of having a child, while women only seem to show the tendency to postpone child-bearing until they can work under a more protective permanent contract. Similarly, Auer and Danzer (2016) conclude that, although the probability of child-bearing for young women seems to be lowered by working under fixed-term contracts, women in older age groups eventually decide to have a child regardless their job status. Auer and Danzer (2015) investigate the relationship between entering the labour market on a fixed-term contract and both health conditions and the number of children in the medium-run for German young adults. Differently from De La Rica and Iza (2005), they find no significant correlations for men, while women do seem to postpone first birth compared to their counterparts who started off their career with a permanent contract.

Other recent empirical papers look at the effect of job displacement on fertility choices. Huttunen and Kellokumpu (2016) estimate that if a woman is displaced, her fertility is immediately reduced and this persists over time, leading to a reduced completed fertility. The effect is much stronger in the case of highly educated women. On the other hand, the authors find no significant effect of the job displacement of men on the couple's decision to have children. They argue that this result suggests that the income effect is not such a relevant element in the couple's fertility choices, while the woman's career concerns are a much more decisive aspect. Accordingly, Del Bono et al. (2012) show that the number of children is significantly reduced in the short- and medium-term following a woman's job loss, particularly in the case of women in white collar occupations. This supports the hypothesis that fertility is negatively affected by job displacement because of career considerations. However, Del Bono et al. (2012) do find evidence of a negative link between the male's job loss and fertility, indicating that income concerns may actually make a difference. In a different analysis, the authors also look at the consequences of job displacement more in depth

by distinguishing the effect of job separation *per se* from that of being unemployed as a fallout of displacement (Del Bono et al., 2015). They provide evidence for the relevance of career and employability concerns, indicated by the fact that, differently from job displacement, going into unemployment after a job loss does not seem to affect fertility choices in the short-run.[8]

3.3 Data Description

In this Section I illustrate the sources from which the data are drawn and how I select the sample. Then, I define the main variables. Finally, I describe the data.

3.3.1 Data Sources and Sample Selection

I run the analysis using data from the 18 waves of the British Household Panel Survey (BHPS), which is a very detailed and nationally representative survey of private households. The peculiarity of this survey is that it contains a great amount of retrospective information and this allows me to reconstruct the respondents' employment history since they have entered the labour market.

I define the sample starting from the main BHPS dataset. I first compute the date when individuals leave full-time education; if the date cannot be retrieved, or if the school leaving date is prior to 1959 or after 1986, I drop the individual from the sample. This latter restriction is driven by the fact that one of the instruments is only available for these years.[9] As I am interested in analysing the link between job experience and fertility, I exclude all males.

Then, for each woman left in the sample I match all the available retrospective information on educational attainment, marriage, fertility and employment history contained in the related datasets. The procedure with which the individual historical information are produced is described in detail in Appendix C.1. Women who never worked (Out of Labour Force) during the first ten years after leaving full-time education are excluded, as their behaviour may be driven by different mechanisms than those of working women, e.g. women that are particularly prone to child-bearing

[8] They consider the fertility outcome as the number of births within the next three and six years. In the case of Del Bono et al. (2012), the number of births is evaluated within three, six and nine years, while Huttunen and Kellokumpu (2016) examine the incidence of job displacement three to eleven years after.

[9] See Appendix C.1 for details.

may decide not to enter the labour market and become stay-at-home mothers, leading to different evaluations of the results.[10]

Hence, the final sample is made of 1,904 women who left education between 1959 and 1986 and for whom I have complete information on their job experience and on their fertility at the 20th year since they entered the labour market (see Table C.1.1).

The historical data both on the unemployment rate and the average weekly earnings, which are used as instrumental variables, come from different sources. All data for the years 1959-1975 are drawn from the British Labour Statistics, namely, the *Historical Abstracts 1886-1968* and the *Yearbooks* for the years 1969 to 1975. As for the years following 1975, the unemployment rate is computed using the UK Labour Force Survey, while the average earnings are drawn from the New Earnings Survey tables.[11]

3.3.2 Definition of Variables and Descriptive Statistics

As the aim of the analysis is to evaluate the impact of job turnover during early career on long-term fertility outcome, I adopt the following strategy.

First, following Light and McGarry (1998) and Booth et al. (2002), I measure job turnover as the number of job changes experienced by an individual. Differently from previous analyses, and as

Table 3.1: Reasons for Changing Job

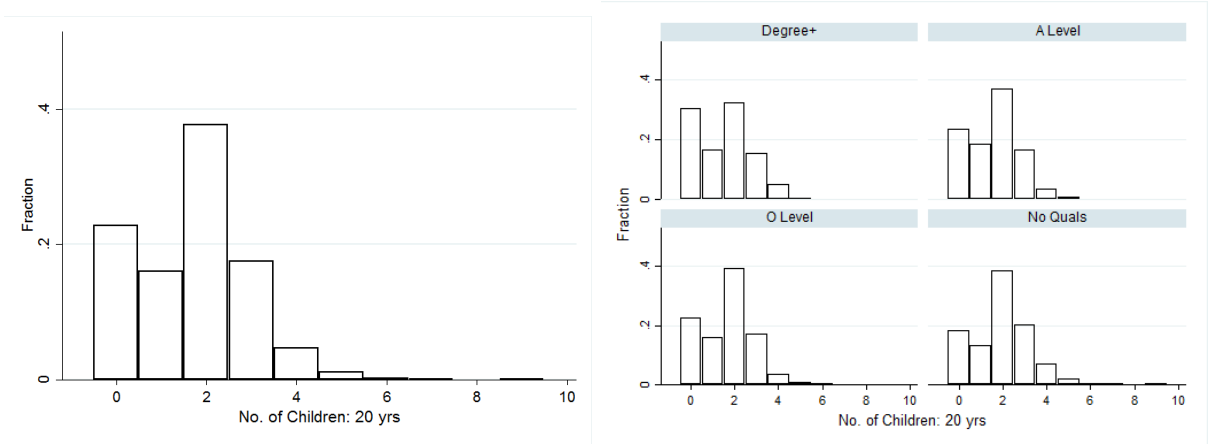
Voluntary	**37.29%**	**Involuntary**	**14.71%**	**Other**	**48.00%**
of which:		*of which:*		*of which:*	
- Better job	100.00%	- Redundancy	51.96%	- Retired	2.92%
		- Dismissed	5.63%	- Health reasons	7.50%
		- Temp job ended	42.41%	- To have baby	35.29%
				- Family care	15.87%
				- Other	38.42%

Note: 'Better job' includes: left for better job, left for different job, promoted. 'Other' includes: war service (0.42%), moved from area (41.42%), left for FT edu (18.83%), other unspecified reasons (39.33%). These sub-categories, however, are not available for all datasets or waves therefore I pool them together.

[10] Also, women who gave birth before leaving education are excluded from the sample in order to rule out potential effects of maternity on the educational attainment and, consequently, on the labour supply. In addition, a few observations are excluded because the instrumental variables are missing, due to the fact that the historical series are not available for the corresponding year-Industry (see notes to Figures C.1.3- C.1.5) in the Appendix.

[11] See Appendix C.1 for details on how the two series are constructed.

Figure 3.1: Number of Children at the 20th Year



a fallout of my contribution to the literature, I do not consider the total number of job changes but I choose to distinguish between voluntary, involuntary and other motives that lead to job separation. These three categories are defined on the basis of the self-reported reason why each job ended and are defined as displayed in Table 3.1: voluntary job changes encompass all jobs that ended because the respondent found a better or different job or was promoted; involuntary job changes refer to jobs that have ended because the worker was dismissed, made redundant, or because a temporary contract expired; if a job ended for any other reason, including 'to have a baby' or 'to look after children/other person', this is classified among the other job changes.[12] In my sample, 82.17% of voluntary changes are followed by another job spell, while this is the case for 46.51% of involuntary changes and for only 20.96% of other changes. Hence, as measures for job turnover I use the total count of the voluntary, the involuntary and the other job changes. Additionally, I employ the share of voluntary, involuntary and other job changes over the total number of job separations. This second measure is meant to work as a normalised index of the intensity of the amount of instability that each worker has experienced in a given time span.

Then, I define early career as the first ten years that a woman has been on the labour market (i.e. since she left full-time education). While the choice of this particular time span may be considered somewhat arbitrary, the literature offers some justification for it. In particular, Topel

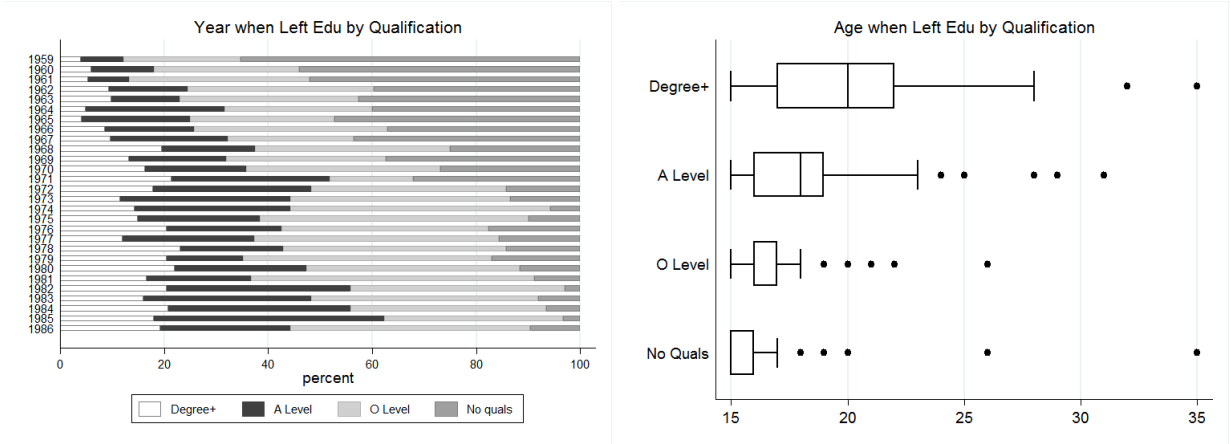
[12]García Pérez and Rebollo Sanz (2005) use a much less precise definition, distinguishing between voluntary and involuntary movers on the basis of the existence of a period of unemployment between two consecutive spells, under the assumption that involuntary job separations are followed by unemployment while voluntary job changes are not.

Table 3.2: Descriptive Statistics I

Variable	Obs	Mean	Std. Dev.	Min	Max
Individual characteristics					
Year when left edu	1904	1973.249	7.910	1959	1986
Age when left edu	1904	17.234	2.315	15	35
Qualification:					
- Degree+	1904	0.148	0.355	0	1
- A Level	1904	0.231	0.422	0	1
- O Level	1904	0.384	0.486	0	1
- No qualifications	1904	0.237	0.426	0	1
Job of mother:					
- Not working	1904	0.448	0.497	0	1
- Low-skilled job	1904	0.198	0.399	0	1
- High-skilled job	1904	0.354	0.478	0	1
Edu of mother:					
- No qualifications	1532	0.599	0.490	0	1
- Some qualifications	1532	0.211	0.408	0	1
- Higher edu	1532	0.191	0.393	0	1
Birthplace of mother:					
- England	1904	0.688	0.464	0	1
- Scotland	1904	0.122	0.327	0	1
- Wales	1904	0.074	0.261	0	1
- Northern Ireland	1904	0.029	0.169	0	1
- Eire	1904	0.021	0.143	0	1
- Outside UK	1904	0.067	0.250	0	1
No. of siblings	1904	2.142	1.999	0	14
Fertility					
Married (20 yrs)	1904	0.818	0.386	0	1
Ever married	1904	0.841	0.365	0	1
Year of marriage	1581	1978.322	9.548	1960	2008
Age at first birth	1569	25.371	4.961	16	44
No. of children (10 years)	1904	0.993	1.042	0	5
No. of children (20 years)	1904	1.773	1.190	0	9
No. of children (30 years)	1045	2.033	1.189	0	9
Spouse					
Age at woman's 20th year	1195	39.199	5.471	15	70
Has Further Education	1169	0.470	0.499	0	1

and Ward (1992) argue that the first ten years in a worker's career are the crucial ones and they account for two thirds (seven out of ten, on average) of the total number of jobs she will ever have. As the worker's experience in the labour market increases, the average duration of each job is prolonged and therefore the number of job changes increases less and less rapidly over time (Topel and Ward, 1992; Light and McGarry, 1998). As a matter of fact, the distribution of job changes at the 10th, 15th and 20th year after leaving full-time education in the sample is fairly unchanged,

Figure 3.2: Time of Leaving Education



indicating that these patterns are consistent with previous findings (Figure C.2.1).

Finally, I evaluate fertility at the 20th year after the individual has left full-time education. This corresponds to *quasi*-completed fertility, as the average age of women at the 20th year is 37 years old. At this time, women have on average 1.77 children (Figure 3.1). Fertility is higher for low-educated women, with a large fraction having two children or more, whereas many among women who achieved higher qualifications are childless. While it is true that women aged 37 are not necessarily past their biological cycle and that the average age at first birth is 25 years old, the average number of children at the 30th year, i.e. when women are aged 47, is only slightly larger (2.03 children). If fertility was evaluated at the 30th year, however, the number of observations would be drastically reduced (Table 3.2). The choice of the 20th year as a threshold is, hence, a compromise that accounts for the trade-off between the purpose of investigating full fertility decisions and the need to ensure a congruous sample size.[13]

The sample on which my analysis is conducted is made of women who left education in between 1959 and 1986, which corresponds to cohorts born between 1938 and 1970. In line with the widely documented increase in female schooling rates, the share of highly-educated women is higher for the youngest cohorts and the number of low-educated women steadily decreases over time (Figure 3.2, left panel). On average, one out of seven women has at least a degree, while 23% of people in the sample has gained A levels; the remaining 62% of women has either achieved O levels or no

[13]However, I do use the number of children at the 30th year as outcome in the robustness checks.

Table 3.3: Descriptive Statistics II

Variable	Obs	Mean	Std. Dev.	Min	Max
Job experience					
At 5th yrs in the labour market:					
- No. of job spells	1904	1.956	1.365	0	9
- No. of voluntary changes	1904	0.900	1.105	0	7
- No. of involuntary changes	1904	0.249	0.624	0	8
- No. of other changes	1904	0.791	0.735	0	4
At 10th yrs in the labour market:					
- No. of job spells	1904	2.972	1.936	1	14
- No. of voluntary changes	1904	1.283	1.447	0	10
- No. of involuntary changes	1904	0.386	0.849	0	10
- No. of other changes	1904	1.253	1.004	0	7
- Share of voluntary changes	1904	0.361	0.339	0	1
- Share of involuntary changes	1904	0.110	0.227	0	1
- Share of other changes	1904	0.529	0.362	0	1
At 20th yrs in the labour market:					
- No. of job spells	1904	4.846	3.031	1	23
- No. of voluntary changes	1904	2.075	1.977	0	12
- No. of involuntary changes	1904	0.689	1.205	0	17
- No. of other changes	1904	1.940	1.485	0	10

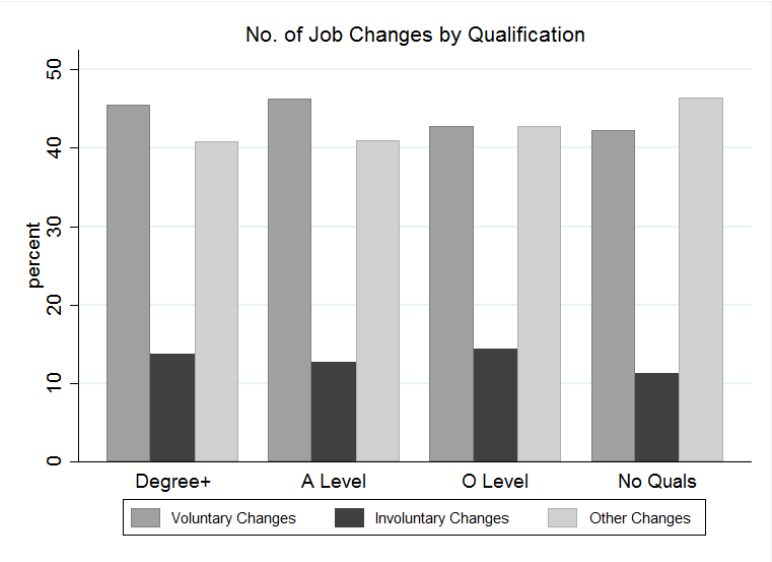
qualification at all (Table 3.2). Also, as expected, the average age of exit from full-time education is higher the higher the qualification level attained: the median age of entry into the labour market is 20 for graduates, 18 for women with A levels and 16 for those with lower qualifications (Figure 3.2, right panel).

As indicators of the characteristics of the household of origin, I look at the educational attainment, the working status and the birthplace of the mother and the number of siblings the respondent ever had.[14] The vast majority of the individuals in my sample have a low-educated, English-born mother; only 7% of women are second generation immigrants (i.e. their mother was born outside of the UK). The average number of siblings is 2.14, with a large prevalence of women coming from families with less than 4 children.

More than three quarters of women are married at the 20th years into the labour market. I specifically look at marriage status at this time because it coincides with the moment at which their fertility outcome is evaluated. However, this roughly coincides with the indicator for ever

[14]The working status of the mother refers to when the respondent was 14 years old.

Figure 3.3: Voluntary vs Involuntary Changes by Qualification



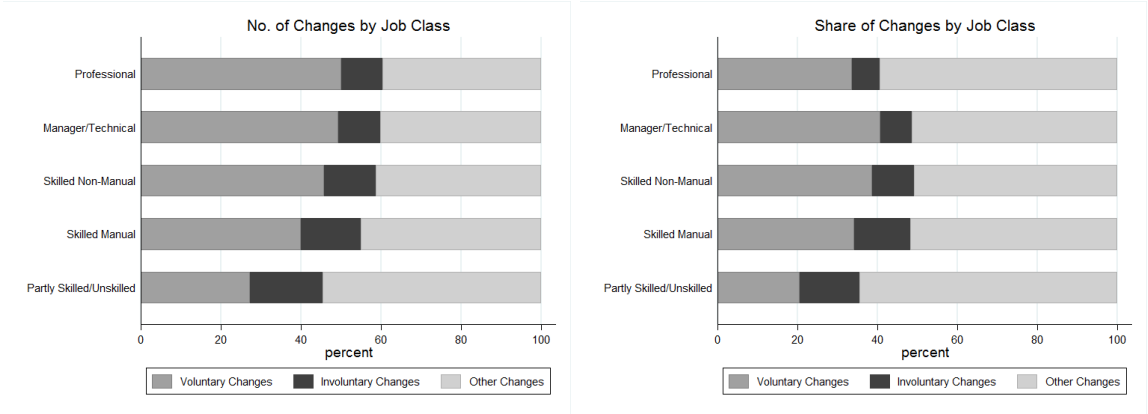
been married.[15] With regards to the sub-sample of married women, I also look into some of the spouse's characteristics. Specifically, men are on average two years older than their wives in the sample and almost half of them have achieved some further qualifications (A Level or higher).

As far as the experience in the labour market during early career (first 10 years after leaving full-time education), each woman has changed on average 3 jobs (Table 3.3). Of these, 36% (1.28) are left voluntarily, 11% (0.49) are left because of dismissal or redundancy and 53% (1.25) have ended for other reasons.

Given the absence of any information about wealth or income in the retrospective datasets, I compare the different measures of job turnover to educational attainment and job class of women in the sample. These might be interpreted as rough proxies of wealth and their comparison to the different types of job changes is intended to give an idea about the relationship between the two: as a matter of fact, if voluntary changes are associated to career advancement and involuntary changes to job loss, one would expect the first to be more common for highly-educated and highly-skilled women and vice versa. Indeed, voluntary changes are (slightly) more frequent among highly-educated women, whereas involuntary changes are indistinctly experienced by all education sub-groups; conversely, low-qualified women are those who go more often through job separations for

[15]The two indicators are identical for all but 47 observations (92% of women in the sample).

Figure 3.4: Job Changes by Type and by Social Class



Note: Reasons for Voluntary Changes: Better job, Different job, Promoted; Reasons for Involuntary Changes: Redundancy, Dismissed, Temp job ended; Other Reasons: Retired, Health reasons, To have baby, Family care, Other.

other reasons (Figure 3.3). When breaking down the sample by job class (Figure 3.4), voluntary job changes appear to be experienced in greater proportion by women who belong to higher job classes, especially professionals and managers; women who incur involuntary job changes are mostly skilled or party skilled manual workers; *per contra*, other types of job separation are disproportionately distinctive of unskilled workers.[16]

3.4 Empirical Model

In order to estimate the effect of early career employment experience on the timing of fertility, the empirical model becomes:

$$C_{it+20} = exp(J'_{ir\bar{t}}\beta_0 + X'_{it}\beta + \delta_t) + \epsilon_{it}, \tag{3.1}$$

where C_{irt+20} is the number of children born to woman i at time $t+20$, where t is the year when she has left school. The main variables of interest, i.e. job experience during early career, are included into $J_{ir\bar{t}}$, where $\bar{t}$ indicates the years t to $t+10$. Individual controls (X_i) are included,

[16]The job class is defined as the modal job class evaluated over the first ten years of the woman's career. In case of bimodal distributions, the higher order job class is assigned.

as well as year fixed effects.[17] As I am dealing with count data, the model is estimated with a standard Poisson model (Windmeijer and Santos Silva, 1997), hence the exponential specification.

The variables included in $J_{ir\bar{t}}$, i.e. voluntary and involuntary job turnover, are both treated as endogenous. I use two specifications of the same model: the first one exploits the information given by the count of the voluntary and of the involuntary job changes during the woman's early career; in the second specification, I substitute the count with the share of voluntary and involuntary job changes over the total number of jobs. This second strategy is meant to evaluate the relative impact of voluntary and involuntary job separations weighted for the amount of job turnover incurred by the worker.

A woman's experience on the labour market may influence fertility through different channels. The ones that are traditionally considered in the literature are the income effect and the substitution effect. The income effect operates on fertility through a change in earnings and is therefore expected to be associated to a higher number of children in case of career advancements (voluntary job changes) and to lower fertility in case of a job loss (involuntary job changes). Conversely, the substitution effect that is generated by changes in the opportunity cost of not working predicts lower levels of fertility for those women who incur a career upgrade, which is possibly accompanied by a higher wage rate, and a higher number of children born to women who see their value of time reduced because of a job loss. Del Bono et al. (2012) also identify two additional channels that may affect the demand for children. One is what they call the 'employability' effect, which consists of lower attractiveness to employers of women who have small children or intend to have one. The other effect determines a fall in fertility because of expected long-term income losses if a woman becomes a mother at the beginning of her career ('career' effect). Here, the negative effect on the number of children born is to be expected regardless of the type of job separation (voluntary or involuntary). While excluding that the income effect plays a meaningful role in fertility decisions, Huttunen and Kellokumpu (2016) support a predominance of career concerns in shaping the demand for children. Hence, the overall correlation between fertility and job turnover is expected to be negative, as this has also been the case in previous empirical findings (Winter-Ebmer

[17] I cannot control for regional fixed effects as I have no retrospective information on the place of residence. As a proxy, I use is the place of birth of the woman's mother, which is included among the individual characteristics.

and Zweimüller, 1997; Ahn and Mira, 2002; Adserà, 2005, 2011; Del Bono et al., 2012).

Employment experience is hardly exogenous to fertility decisions, because both reverse causality and unobserved characteristics issues may arise. First, it may be that planned fertility affects a woman's employment history when the risk of job loss or of failed career advancement increases for women who expect to have a child in the future. This may happen as a consequence of their (potentially) reduced productivity or because employers may sacrifice their job first in case of need (Del Bono et al., 2015). In the second case, there may exist some unobserved characteristics that drive women with stronger family taste to either work less or undertake careers with lower returns and higher uncertainty (De La Rica and Iza, 2005). In both cases, estimates for involuntary changes would be biased towards zero if endogeneity was not accounted for, while those on voluntary job turnover would be biased away from zero. Conversely, it could be that women who are about to start a family tend to look for a more stable and secure job in view of the financially important commitment that comes with the birth of a child (Easterlin, 1973).[18] In this latter case, coefficients on job instability would be biased away from zero and those associated to career advancement (and higher earnings) would be biased towards zero.

For the same simultaneity issues mentioned above and in order to avoid the inclusion of extra endogeneity in the model, I do not consider any other information regarding past or current employment status, including the job class, whether the job was full-time or part-time, etc.[19] Likewise, the woman's marital status is not included in the model.[20] Instead, I run a separate analysis on a sub-sample of married women to evaluate possible differences in the estimated effects of job experience on fertility (see subsection 3.5.2). Educational attainment is included in the model in order to control for differences in education. However, it might be that the coefficients associated to it are biased, although the time at which education is left is intended as the starting point of

[18] Ermisch (1988), coherently with this hypothesis, finds evidence that British women from larger generations tend to reduce fertility and to postpone child bearing as a response to their decreased economic prospects (relative to other cohorts).

[19] Moreover, I ignore the possible eligibility to government transfers to families with children such as tax credits and children benefits because this information is not fully available in the data, since I have no records on retrospective income. In the time period I consider, while child benefits are provided to all families regardless of their income and wealth levels, child tax credit is aimed at low-income families. Still, when having a child, these individuals already have expectations concerning their eligibility to the tax credit.

[20] Winter-Ebmer and Zweimüller (1997) find that being married reduces the probability of promotion possibilities for women, possibly because it signals an increased risk of child-bearing to the employer.

the analysis and, hence, might be considered as predetermined.[21] Other controls included in all regressions are: age (both linear and squared), the region of origin of the mother as a proxy for region of residence, and the mother's occupational status and the number of siblings, to account for family background characteristics.

In the recent literature only a few papers have attempted to rule out the endogeneity bias from the estimated effect of job experience indicators on fertility outcome. While Huttunen and Kellokumpu (2016) and Del Bono et al. (2012) exploit the exogeneity of plant closure when evaluating the effect of job displacement, Auer et al. (2013) are able to profit from the panel structure of their data and estimate fixed effects regressions. Furthermore, Auer and Danzer (2016) aknowledge the potential existence of endogeneity in their model by including a wide range of control variables such as family background, personality traits and attitudes towards career and family formation. Finally, Del Bono et al. (2015) use instrumental variables to account for the bias in the likelihood of going into unemployment.

In this particular context, I instrument job turnover during the woman's early career with the means of the industry-specific female unemployment rate and the industry-specific growth of the female average earnings. In doing so, I match the unemployment rate and the growth of the average earnings in the Industry Group to which the woman belonged in each of the first ten years of her career. Hence, for example, if a woman worked in the 'Textile' industry in the first 3 years of her career (say, from 1973 to 1975) and then switched to the 'Clothing and footwear' industry in the remaining 7 years (1976 to 1982), she is assigned the unemployment rate and the growth in average earnings in the 'Textile' industry for the years 1973 to 1975 and in the 'Clothing and footwear' industry for the years 1976 to 1982.[22] Then, I average out these values over the ten years of the woman's early career. Following Windmeijer and Santos Silva (1997), I use a (IV-Poisson) GMM estimator with additive error terms.[23]

The choice of these instruments stems from a number of considerations. First, in principle

[21] Fort et al. (2016) thoroughly discuss the endogeneity of education to fertility and come to the conclusion that schooling does not have a causal impact on fertility in European countries but England, for which they observe a negative and significant effect.

[22] In case of multiple changes within the same year where more than one industry is reported, only the first (in chronological order) is taken into consideration.

[23] The model is estimated by GMM using the Stata commands `poisson` and `ivpoisson`.

there should be no evident reason why the instruments should directly affect the outcome variable (i.e. the number of children evaluated 10 to 19 years later). Moreover, while the type of occupation that a woman chooses is potentially endogenous to fertility, this should not be the case for the fact of working within a particular Industry Group, where all types of occupations may coexist.

Second, labour market trends such as industry-specific unemployment rate and growth in the average earnings are expected to be strongly correlated to the amount of job turnover a worker experiences. On the one hand, the higher the unemployment rate in a specific industry, the higher the probability that a worker employed in that industry incurs an involuntary job separation. Likewise, this is plausibly associated to a lower probability that the same worker quits her job because she has managed to find a better one (either in terms of wage or of amenities) within that industry. On the other hand, an increase in the growth of the average earnings within an Industry Group, which should pick up the profitability in that particular industry, is presumed to impact negatively the number of involuntary job separations and positively the number of voluntary job changes, i.e. the higher the growth in earnings, the lower the number of layoffs and the higher the chances for a worker to be promoted or to find a better job within that industry. Admittedly, there is also the possibility that the growth of earnings within an Industry Group may be linked to an actual reduction in voluntary job turnover because workers may be content with wage increases in their current job post and hence they may not aspire to switch to a better one. As a matter of fact, however, this would determine an underestimation of the positive correlation between the growth in the average earnings and voluntary job turnover, therefore it is not an element of concern.

Finally, although it may be argued that the trends at the macro level are, *de facto*, determined at the micro level, the exogeneity of the two series to the individual job experience measures is secured by the first being measured on the overall female (full-time) working population, while the latter is based on a specifically selected sub-sample.[24]

Hence, by instrumenting the woman's early career job experience as described above, I try to evaluate its true impact on the number of children born in the long-run and rule out any confounding effect that may be driven by preferences and unobservable characteristics.

[24] A similar approach, i.e. the use of time-, region- and industry-specific shares of fixed-term employees as instrumental variables, is also suggested by Auer et al. (2013).

3.5 Results

In this section I present the main results based on the two specifications discussed above that are referred to the full sample of women. Then, I show the results concerning a number of sub-samples and some robustness checks.

3.5.1 Main Specifications

Estimates run on the entire sample of women are reported in Tables 3.4 and 3.5, where the main variables of interest are the count and the share of job changes, respectively.

The coefficients of the number of voluntary and involuntary separation in the Poisson estimations (Table 3.4, column III) are both negative and significantly different from zero, suggesting that an extra job change yields around a 6% and a 8% decrease in the predicted number of children born, respectively (holding the other constant). At the average, these figures correspond to a decline by 11 and 15 less children born every 100 for every additional voluntary and involuntary job separation, respectively. I exclude the residual category of other changes because its coefficient would yield an ambiguous interpretation. This category, in fact, apart from those due to family care that are evidently positively correlated to fertility, includes a large fraction of unspecified reasons and therefore giving estimates a precise meaning would be rather problematic (see Table 3.1).

As mentioned in the previous sections, however, the coefficients on the indicators for job turnover are likely to be biased because of the potential endogeneity in the model. When this endogeneity of job experience is dealt with and the two variables related to job turnover are instrumented with the industry-specific unemployment rate and growth in average earnings, results do not hold anymore and both coefficients come to be not statistically different from zero (Table 3.4, column VI). The coefficient for involuntary job turnover now implies that, *ceteris paribus*, an extra involuntary job separation yields a 18% increase in the predicted number of children born. At the average, this translates into 0.32 more children born for every involuntary job separation. Conversely, voluntary job turnover displays a larger, negative coefficient that implies a reduction of the predicted number of children by 23%, rather than 6%, for each additional voluntary job change, holding the involuntary job separations constant, which on average corresponds to 0.40 less children. This

Table 3.4: Number of Job Changes: All Women

Dep. Variables	(I) Poisson Children (20 yrs)	(II) Poisson Children (20 yrs)	(III) Poisson Children (20 yrs)	(IV) Poisson No. of Volunt Changes	(V) Poisson No. of Invol Changes	(VI) IV-Poisson Children (20 yrs)
No. of Voluntary Changes	-0.058***	-0.057***	-0.061***			-0.225
	(0.011)	(0.011)	(0.011)			(0.183)
No. of Involuntary Changes	-0.078***	-0.081***	-0.084***			0.179
	(0.022)	(0.022)	(0.022)			(0.147)
Age Left Edu		-0.011	-0.010	-0.017	-0.098*	0.008
		(0.018)	(0.018)	(0.030)	(0.056)	(0.033)
Age Left Edu Squared		-0.002	-0.002	-0.002	0.008**	-0.004
		(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Qualif: Degree+		-0.146**	-0.142**	0.199*	0.187	-0.110
		(0.063)	(0.064)	(0.105)	(0.230)	(0.091)
Qualif: A Level		-0.111**	-0.096*	0.158*	0.036	-0.061
		(0.049)	(0.051)	(0.090)	(0.152)	(0.069)
Qualif: O level		-0.068*	-0.057	0.013	0.065	-0.052
		(0.040)	(0.040)	(0.077)	(0.133)	(0.046)
Mother: Scotland			-0.044	-0.194**	0.087	-0.074
			(0.052)	(0.083)	(0.168)	(0.059)
Mother: Wales			-0.058	-0.433***	0.015	-0.115
			(0.063)	(0.127)	(0.172)	(0.098)
Mother: N. Ireland			-0.145	-0.642**	-0.080	-0.187
			(0.124)	(0.252)	(0.347)	(0.153)
Mother: Eire			-0.145	-0.001	0.318	-0.151
			(0.095)	(0.198)	(0.417)	(0.107)
Mother: Non-UK			0.085	0.081	0.311	0.067
			(0.059)	(0.106)	(0.196)	(0.069)
Mother: High-Skilled job			0.040	0.033	0.061	0.047
			(0.038)	(0.074)	(0.134)	(0.044)
Mother: Low-Skilled Job			0.072**	0.125**	0.064	0.096**
			(0.035)	(0.058)	(0.117)	(0.044)
No. of Siblings			0.023***	0.009	-0.010	0.026***
			(0.008)	(0.013)	(0.025)	(0.008)
Avg Unempl Rate				-0.034*	0.152***	
				(0.020)	(0.031)	
Growth of Avg Earnings				3.073***	0.289	
				(0.737)	(1.422)	
Constant	0.694***	0.826***	0.736***	0.205	-1.503***	0.740***
	(0.089)	(0.096)	(0.101)	(0.213)	(0.341)	(0.237)
Observations	1,904	1,904	1,904	1,904	1,904	1,904
Pseudo R-Squared	0.0174	0.0220	0.0244	0.0271	0.0623	
Log-likelihood	-2965	-2951	-2944	-2987	-1570	

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Whole sample. Year (at which edu is left) dummies included. Reference categories: 'No qualifications'; 'Mother: England'; 'Mother: not working'.

would suggest that the Poisson coefficient for the voluntary turnover from column III is biased towards zero and the one for the involuntary turnover are biased away from zero, hence, implying that women with a higher demand for children are perhaps those who undergo more voluntary job

changes and a lower amount of involuntary turnover, possibly as a result of their pursuit of better employment conditions.

In columns IV and V of Table 3.4 a '*pseudo* first stage' is shown, where I regress the two endogenous variables separately on all covariates and the excluded instruments. In doing this, I attempt to give a taste of what the first stage would be and how the two instruments impact the measures of job turnover herein used. As expected, the growth of the average earnings positively and significantly affects the number of voluntary changes, possibly by making it easier for the worker to come across better job opportunities within the Industry Group she operates (column IV). The average unemployment rate, on the contrary, is positively correlated to the number of involuntary changes (column V), suggesting that the latter increases as becoming unemployed becomes more likely (i.e. the risk of job loss grows at higher levels of unemployment rate). Likewise, a higher unemployment rate is associated to a lower number of voluntary job changes, which may indicate that when this is the case switching to a better job becomes more difficult. The (heteroskedasticity-robust) F-statistics on the coefficients of the first stage, which are meant to test for the relevance of the instruments, are just above the conventional threshold for both the endogenous variables: they are 10.32 in the case of voluntary job changes and 10.56 for the involuntary job turnover measure.

In line with the theoretical predictions and recent findings, the level of schooling attainment is negatively and increasingly (although not significantly) linked to the number of children. On the other hand, a positive and significant association arises with the number of siblings, suggesting that coming from larger households is associated to a higher propensity of having more children (Fort et al., 2016). The same is found for having a mother working in a low-skilled job rather than not working at all.

Table 3.5 displays the estimates pertaining to the second specification, where the (endogenous) variables of interest are the shares of voluntary and involuntary changes over the total number of job changes. These are computed in order to obtain a measure of the intensity of the voluntariness and involuntariness in changing job during the first years of a worker's career. Since both shares are included in the same model, their coefficients are not directly comparable to the ones in Table 3.4, as the reference category is slightly different: while in the previous specification only the number

Table 3.5: Share of Job Changes: All Women

Dep. Variables	(I) Poisson Children (20 yrs)	(II) Poisson Children (20 yrs)	(III) Poisson Children (20 yrs)	(IV) Poisson Share Volunt Changes	(V) Poisson Share Invol Changes	(VI) IV-Poisson Children (20 yrs)
Share of Voluntary Changes	-0.389***	-0.389***	-0.416***			-1.135
	(0.048)	(0.047)	(0.048)			(0.860)
Share of Involuntary Changes	-0.490***	-0.512***	-0.536***			0.218
	(0.082)	(0.082)	(0.082)			(0.622)
Age Left Edu		-0.016	-0.013	-0.003	-0.102**	-0.005
		(0.018)	(0.018)	(0.024)	(0.049)	(0.026)
Age Left Edu Squared		-0.002	-0.002	-0.003	0.008**	-0.003
		(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Qualif: Degree+		-0.131**	-0.128**	0.205**	0.095	-0.064
		(0.062)	(0.063)	(0.086)	(0.189)	(0.095)
Qualif: A Level		-0.101**	-0.085*	0.187**	-0.076	-0.030
		(0.049)	(0.050)	(0.073)	(0.157)	(0.073)
Qualif: O level		-0.063	-0.051	0.032	0.066	-0.040
		(0.039)	(0.039)	(0.063)	(0.134)	(0.047)
Mother: Scotland			-0.040	-0.081	0.072	-0.066
			(0.051)	(0.070)	(0.147)	(0.059)
Mother: Wales			-0.058	-0.350***	0.339**	-0.163
			(0.062)	(0.112)	(0.159)	(0.105)
Mother: N. Ireland			-0.192	-0.661***	-0.248	-0.275
			(0.127)	(0.216)	(0.332)	(0.188)
Mother: Eire			-0.174*	-0.208	0.152	-0.201*
			(0.091)	(0.179)	(0.399)	(0.111)
Mother: Non-UK			0.084	-0.032	0.285*	0.051
			(0.059)	(0.085)	(0.170)	(0.070)
Mother: High-Skilled job			0.059	0.087	0.217*	0.062
			(0.038)	(0.060)	(0.126)	(0.058)
Mother: Low-Skilled Job			0.082**	0.118**	0.133	0.103**
			(0.034)	(0.048)	(0.105)	(0.052)
No. of Siblings			0.026***	0.019*	0.012	0.028***
			(0.007)	(0.011)	(0.024)	(0.009)
Avg Unempl Rate				-0.051***	0.171***	
				(0.019)	(0.033)	
Growth of Avg Earnings				2.104***	0.651	
				(0.670)	(1.398)	
Constant	0.765***	0.901***	0.801***	-1.100***	-3.088***	0.874***
	(0.088)	(0.094)	(0.099)	(0.164)	(0.361)	(0.258)
Observations	1,904	1,904	1,904	1,904	1,904	1,904
Pseudo R-Squared	0.0238	0.0287	0.0318	0.0135	0.0451	
Log-likelihood	-2946	-2931	-2922	-1263	-598.9	

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Whole sample. Year (at which edu is left) dummies included. Reference categories: 'No qualifications'; 'Mother: England'; 'Mother: not working'.

of (in)voluntary changes was held constant, here the interpretation of coefficients should be made with respect to an equivalent decrease in the share of other kinds of job changes. Column III in Table 3.5 reports coefficients for the full uninstrumented specification of the model. The number of

children is associated to a significant reduction by 0.34% following a one-percentage-point increase in the share of voluntary changes, keeping the fraction of involuntary changes fixed. That is, an increase in the share of voluntary changes is simultaneously coupled to an equivalent decrease in the share of other changes because the denominator is composed of all three types of changes. Similarly, a one-percentage-point increase in the share of involuntary changes is associated to a significant fall in the number of children by 0.42% in substitution to an equivalent decrease in the share of job changes for other reasons. When using instrumental variables, like in the specification discussed above, the magnitude of the coefficients seems to indicate a bias in the uninstrumented estimates that is coherent with the hypothesis that women with stronger preferences for children tend to incur more voluntary and less voluntary job turnover. A one-percentage-point increase in the share of voluntary job separations decreases the predicted number of children by 0.68% while an equivalent increase in the share of involuntary job changes increases the number of children by 0.24%. All other covariates keep sign and significance consistent with those in Table 3.4.

Columns IV and V report significant associations between the instruments and the endogenous variables that are consistent with the hypotheses of the unemployment rate affecting negatively the number of involuntary job changes and of the growth in average earnings being linked to a greater number of voluntary job separations.[25]

3.5.2 Robustness Checks and Estimation on Sub-samples

First, I estimate the relationship between fertility and voluntary or involuntary job turnover separately (Table C.2.1). The uninstrumented Poisson estimated coefficients and corresponding average partial effects are largely comparable to the ones obtained in the main specifications, both in magnitude and significance. Likewise, when instrumental variables are used, the coefficients associated to the job turnover indicators are very similar to the ones in the main specifications. Moreover, they gain significance in some cases. The estimated effects for the IV-Poisson estimations are fairly robust to the instruments employed, whether the latter are used jointly or on their own (namely, the average weekly earnings for the voluntary changes and the unemployment rate for the involuntary

[25]The (heteroskedasticity-robust) F-statistics on the first stage are 10.96 and 13.23 for the shares of voluntary and involuntary changes, respectively.

changes) and the F-statistics are always in a range between 10.25 and 25.50. Such correspondence in the estimated coefficients confirm the implications above discussed. Specifically, in the case of voluntary job turnover, a one-percentage-point rise in the share of this type of separations that is accompanied by an equivalent fall in the share of involuntary *or* other job separations yields a decrease in the predicted number of children at the twentieth year by 0.73%. With regards to involuntary job separations, instead, when their share increases by one percentage point (and the share of voluntary *or* other ones falls by the same amount) the number of children is predicted to rise by 1.24% (Panel B).[26] Correspondingly, an extra involuntary job separation is predicted to increase fertility by 28%, i.e. by 44 every 100 children at the average (Panel A).

Then, I check whether the effects found in the main specifications are robust to different definitions of early career job experience (Table C.2.2). In order to do so, I also evaluate the impact of voluntary and involuntary job turnover during the first 5 (Panel A), 15 (Panel C) and 20 years (Panel D) of a woman's career on the number of children she has had. The estimated effects both in the Poisson and the IV-Poisson models, in most cases, are fairly consistent with the main specifications discussed above.[27] Similarly, I run the main specifications on the number of children at the 30th year after leaving full-time education, which should correspond to completed fertility (Table C.2.3). Results are, again, in line with the ones previously discussed.[28]

Moreover, I run the analysis on a restricted sample of women who have been married at least once since they left education.[29] This is to account for the potential differences in fertility behaviour of this particular sub-sample of women, compared to their single counterparts (i.e. women who have never been married up to their twentieth year in the labour market). In doing so, I am essentially excluding nearly a fifth of the sample, which should hypothetically be composed of less family-inclined (and perhaps more job-oriented) women. Indeed, women in the full sample have on average 1.77 children each, while in the only-married sample the mean is 1.96 children born to

[26] The larger effect is expected as the reference category now includes voluntary job separations, which were held constant in the main specification.

[27] F-statistics are always above the rule-of-thumb threshold of 10.

[28] The coefficients on involuntary turnover in the instrumented model now become negative and not significant. Nevertheless, these still imply a bias away from zero in the corresponding coefficients of the uninstrumented specifications.

[29] The actual restriction is based on an indicator for being married at the twentieth year into the labour market, which is roughly equivalent to ever been married (see Table 3.2).

each woman, compared to an average value of 0.93 for the non-married. Hence, one might expect to obtain a weaker correlation between job-related indicators and the number of children born to a woman compared to the estimates run on the full sample, as people in this particular sub-group might already have revealed their preference for starting a family with their decision to marry their partner (Winter-Ebmer and Zweimüller, 1997). Consequently, fertility choices for these women (and their spouse) might be less affected by changes in their working experience because they may pursue their child-bearing intentions regardless of their condition in the labour market. Nevertheless, I still find a negative and significant association between job experience indicators and fertility: the predicted number of children born to married women decreases by 7% and 9%, following an additional voluntary or involuntary job separation (keeping the other constant), respectively (Table C.2.4, column I). Likewise, fertility falls by 0.37% (0.45%) following a one-percentage-point increase in the share of voluntary (involuntary) changes *in lieu* of other types of changes (column III). When the IV approach is used, the coefficients of the job turnover indicators, although not significant, imply a more negative impact of voluntary job changes on the number of children and a more positive response to involuntary job losses with respect to the full sample.[30] It may be, then, that working married women are subject to a relatively stronger dominance of the substitution effect in their fertility choices compared to their non-married counterparts, perhaps because of the presence of their spouse as an additional source of income. As the demand for children and the household income are jointly determined by the woman and her spouse (Huttunen and Kellokumpu, 2016), I also control for the educational attainment of the husband.[31] Given the absence of any information about wealth and income in the data, this is intended to serve as a proxy for the spouse's wage rate on the labour market. Interestingly, the educational attainment of the husband seems not to have any notable association to the number of children born (column IV), while the estimated coefficients for job turnover still suggest a predominance of the substitution effect.

[30] It may be worth pointing out that married women in the sample undergo significantly more job interruptions than those without a spouse: non-married women, as expected, experience less of the other types, i.e. those including family care motives, of job separation (0.69 vs. 1.40 other types of job changes per woman, on average). However, while there are no significant differences in the number of involuntary job changes across the two groups, married women have on average 1.39 voluntary job changes, compared to 0.69 of the non-married.

[31] The sample size is further restricted as the information on the spouse's education is retrieved by matching each woman to her husband in the main dataset. Hence, no information is available in case of death of the spouse or divorce.

Finally, I examine potential differences in the impact of job turnover across educational groups and across cohorts. When I divide the sample by educational attainment, with A levels or more on one side and any lower qualification on the other, I observe that the count of job changes is always negatively correlated to the number of children (Table C.2.5). However, involuntary changes seem to be significantly linked to fertility only in the case of the less educated group of women, where the number of children is associated to a decrease by 10% for every additional job separation. When ruling out the endogeneity from the model, the magnitude in absolute value of the coefficients of the voluntary job changes rises, especially in the case of highly-educated women, although standard errors become very large. On the contrary, involuntary changes imply a lower effect on the less qualified. When I examine potential differences in the impact of job turnover across cohorts the estimated coefficients suggest a partial confirmation of the mechanism just mentioned (Table C.2.6).[32] This is because the educational attainment of women has jumped to high levels in relatively little time in the past few decades (Joshi et al., 1985) and therefore the low-educated group is greatly represented by women in the older cohorts, who also used to face a much tighter labour market than their younger counterparts.[33]

What these result suggest is a dampening of the total impact of job turnover on the demand for children of women belonging to older cohorts or to the less-qualified. This may be due to a relative dominance of the income effect for a group of women who, possibly, is more financially constrained. Conversely, a more negative coefficient on the voluntary job changes and a more positive impact on involuntary turnover for the younger, better educated women implies a stronger substitution effect for those who work in a relatively less tight labour market.

3.6 Conclusions

The aim of this paper is to explore to what extent voluntary and involuntary job mobility during the first years of a woman's career affect her fertility decisions in the long run. With this investigation,

[32]The cohorts are computed on the distribution of the year when education is left. The breakpoint is 1975, which is the 50th percentile of the distribution and also the year at which the series used as instrumental variable are joint together (see Appendix C.1). The year 1975 is also the year to which the implementation of the Equal Pay Act and the Sex Discrimination Act date back.

[33]See also Figure 3.2.

I intend to contribute not only to the debate on the long-term effects of job turnover, but also to the literature that deals with the link between individual conditions in the labour market and fertility choices.

The analysis reveals the existence of a significant and negative correlation between job turnover in the first ten years after women enter the labour market and their *quasi*-completed fertility. Specifically, an additional voluntary or involuntary job change is associated to a decrease in the predicted number of children by 6% and 8%, respectively.

However, when I take into consideration the possibility that women with different preferences for children select themselves into diverse career paths, results point in direction of the hypothesis that women with a stronger taste for child-bearing may be more likely to undergo more career enhancing (voluntary) job separations and less (involuntary) job losses. Presumably, this may happen as a consequence of their pursuance of better labour market conditions that can guarantee a more comfortable child rearing, which is supportive of the hypothesis by Easterlin (1973). Such findings, however, are likely to be a specific prerogative of working women, as those who have been inactive in their first ten years after leaving education are excluded from the sample. Restricting the analysis to married women, who are usually the second earners within the household, suggests a predominance of the substitution effect. On the contrary, fertility seems to be largely affected by the income effect in the case of older cohorts and less-educated women.

Appendix C

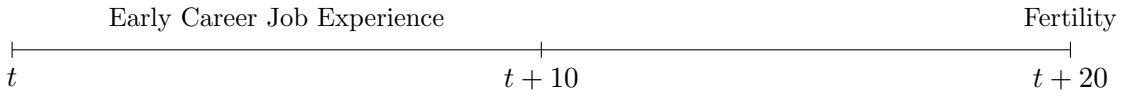
C.1 Appendix: Data Construction

In this section I briefly describe how (i) the historical information on individual work experience and family formation is constructed and (ii) how the time series on unemployment rate and average weekly earnings (i.e. the two instruments employed in the analysis) are put together.

Reconstructing individual historical information

I start from the whole BHPS sample and gather information on all women for whom I can derive the year in which they first left full-time education. If this cannot be retrieved, or if the school leaving date is prior to 1959 or after 1986, I drop the individual from the sample.[34]

Figure C.1.1: Timeline of Individual History



Then, I reconstruct the job history for the individuals left in the sample using the retrospective information drawn from the cLIFEJOB dataset, together with that contained in the wJOBHIST and wINDRESP files.[35] In doing so, I closely follow the methodology suggested by Halpin (1998) and Maré (2006). I keep all individuals for which I can retrieve full information on the job spells experienced during their first ten years in the labour market (i.e. early career), which are computed starting from the date when education was left. For each job spell, I obtain details on both the Industry Group in which the employing firm was operating (according to the SIC 1958 classification), whether the worker was operating on a manual or a non-manual regime and the reason why the job

[34] This latter restriction is to be attributed to the availability of data on the average earnings. If only the year is known, I assume the education spell ending date to be on July 1st as an approximation of the end date of the academic year.

[35] See the BHPS Codebook, Volume A, for a description of the datasets.

ended.[36] The Industry Group and the manual work indicator are needed because they will allow the match with the instrumental variables (see discussion below). On the grounds of the reason why the job ended I compute the number of voluntary, involuntary and other types of job separations at different times after the woman has left full-time education, as described in Section 3.3. These will provide the information on which the main variables of interest are based on: the count and the share (over the total amount of job separations) of the voluntary and involuntary job changes throughout the woman's early career.

Moreover, when applicable, I retrieve the date of first marriage from the wMARRIAG and the wINDRESP files, and the birth date and the number of children born to every woman from the wCHILDNT and the wINDRESP files. This information is then used to compute the corresponding variables, which are evaluated at the twentieth year after entering the labour market (see Figure C.1.1). Fertility is also computed at the 30th year after leaving education in one of the robustness checks, but it evidently implies a decrease in the number of observations available. Also, I exclude all women who have children before they leave full time-education. Additionally, I only consider women who have at least a spell of working experience in the labour market, hence all women that are out of the labour force in the first ten years are dropped from the sample. Finally, I drop a few observations for which I cannot match the information pertaining to the instruments because the instrument is missing for some industry-year observations. Table C.1.1 displays the number of observations remaining in the sample after applying all the filters mentioned above.

Table C.1.1: Sample Selection

	Individuals	%
Whole sample	32,380	100.00
Leaving school age info non missing	28,792	88.92
Women only	15,023	46.40
Left education in between 1959 - 1986	6,209	19.18
Job experience info non missing	6,075	18.76
Fertility info non missing	5,455	16.85
Childless when left edu	5,435	16.78
Out of Labour Force during early career excluded	2,385	7.37
Instrumental variables non missing	2,136	6.60
Main individual characteristics non missing	1,904	5.88

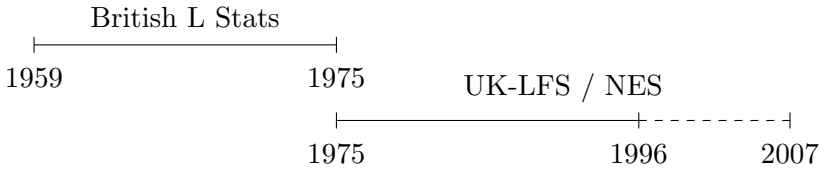
[36] Given the large amount of inconsistencies in the retrospective datasets, I do not consider the length of each spell as a reliable information. Hence, I do not consider duration in my analysis.

Aggregate Data on Unemployment Rate and Average Weekly Earnings

Data on the female unemployment rate is extracted from the British Labour Statistics tables and the UK Labour Force Survey (see the sources listed in Table C.1.2). The unemployment rate for the years 1959-1975 is calculated as the ratio of the number of people registered as wholly unemployed over the sum of the employees in employment and of the people registered as wholly unemployed in each Industry Group as defined by the Standard Industrial Classification of 1958. The unemployment rate for the following years, which is drawn from the UK-LFS, is computed consistently with the older data.[37]

Information on the female average weekly earnings is extracted from the British Labour Statistics tables and the New Earning Survey, for the years 1959-1975 and 1975-1996, respectively (see the sources listed in Table C.1.3). I construct two different series: one for manual female workers and one for non-manual female workers. The growth in the average earnings of manual and of non-manual female workers is calculated over the year before and the year after the reference date. This will then be matched to the individuals in the sample according to whether they work in a manual or non-manual job, such that I can account for differences in wage growth not only across Industry Group but also across types of job (manual or non-manual).

Figure C.1.2: Timeline of Macro Series



In order to link two non-comparable series coming from different sources (namely, the series from the British Labour Statistics for the years 1959-1975 with the series from both the UK-LFS for the years 1975-2007 and the NES for the years 1975-1996), I use harmonisation by backcasting: given that the two series overlap at the year 1975 (see Figure C.1.2), I calculate the yearly growth

[37] In the case of unemployed individuals, when the Industry Group is not stated I assign the one in which the employee previously worked.

rate for each series and then report the levels from the newer series to the older one, after adjusting for the growth rate, and go backwards.[38]

Also, depending on the reference year I can access data that is based on different SIC classifications (1958, 1968, 1980, 1992). The less disaggregated index I come across is the (one-digit) 1958 SIC definition. Hence, I redefine all SIC classification pertaining to the subsequent years on the basis of the 1958 classification.[39]

All in all, the series that are effectively used in the analysis are: (i) the female unemployment rate, (ii) the growth of the average weekly earnings of female manual workers and (iii) the growth of the average weekly earnings of female non-manual workers, all disaggregated by Industry Group (SIC 1958). Descriptive statistics are displayed in Figures C.1.3, C.1.4 and C.1.5, where each time series is plotted by SIC and year (above panel) and main statistics are tabulated for each SIC (below panel).[40]

[38] This methodology is widely used, see e.g. this explanatory note of the European Central Bank: https://www.ecb.europa.eu/stats/pdf/money/aggregates/hist_series.pdf?592cd102598dbd20e00a83c50d162fdf (link last accessed 02/01/2017).

[39] A list of the Industry Groups resulting from this reclassification is available in Figures C.1.3- C.1.5.

[40] Some values are missing. In the case of the British Labour Statistics Yearbooks and the New Earnings Survey, this is due to the fact that too few workers in an Industry Group were counted and therefore national estimates were not produced. Accordingly, when I compute the unemployment rate with the Labour Force Survey, the value is set to missing for all those Industry-year cells with too few individuals (less than 70).

Table C.1.2: Unemployment Rate Data Sources

Time	Definition	Group	Source	Table
1959-1968	Numbers of persons registered as wholly unemployed	Total	Br. L. Stats Historical Abstract 1886-1698	171
1959-1968	Numbers of employees in employment	Females	Br. L. Stats Historical Abstract 1886-1698	134
1959-1968	Numbers of persons registered as wholly unemployed	Males	Br. L. Stats Historical Abstract 1886-1698	172
1969-1970	Numbers of employees in employment	Females	Br. L. Stats Year Book 1970	87
1969	Numbers of persons registered as wholly unemployed	Females	Br. L. Stats Year Book 1969	121
1970	Numbers of persons registered as wholly unemployed	Females	Br. L. Stats Year Book 1970	137
1971-1975	Numbers of employees in employment	Females	Br. L. Stats Year Book 1975	62
1971	Numbers of persons registered as wholly unemployed	Total	Br. L. Stats Year Book 1971	107
1971	Numbers of persons registered as wholly unemployed	Males	Br. L. Stats Year Book 1971	107
1972	Numbers of unemployed persons	Females	Br. L. Stats Year Book 1972	109
1973	Numbers of unemployed persons	Total	Br. L. Stats Year Book 1973	101
1973	Numbers of unemployed persons	Males	Br. L. Stats Year Book 1973	101
1974	Numbers of unemployed persons	Females	Br. L. Stats Year Book 1974	123
1975	Numbers of unemployed persons	Total	Br. L. Stats Year Book 1975	96
1975	Numbers of unemployed persons	Males	Br. L. Stats Year Book 1975	96
1975	Numbers of unemployed persons	Total	Br. L. Stats Year Book 1976	105
1976	Numbers of unemployed persons	Males	Br. L. Stats Year Book 1976	105
1975-2008	Employees (weighted)	Females	UK Labour Force Survey	-
1975-2008	Unemployed (weighted)	Females	UK Labour Force Survey	-

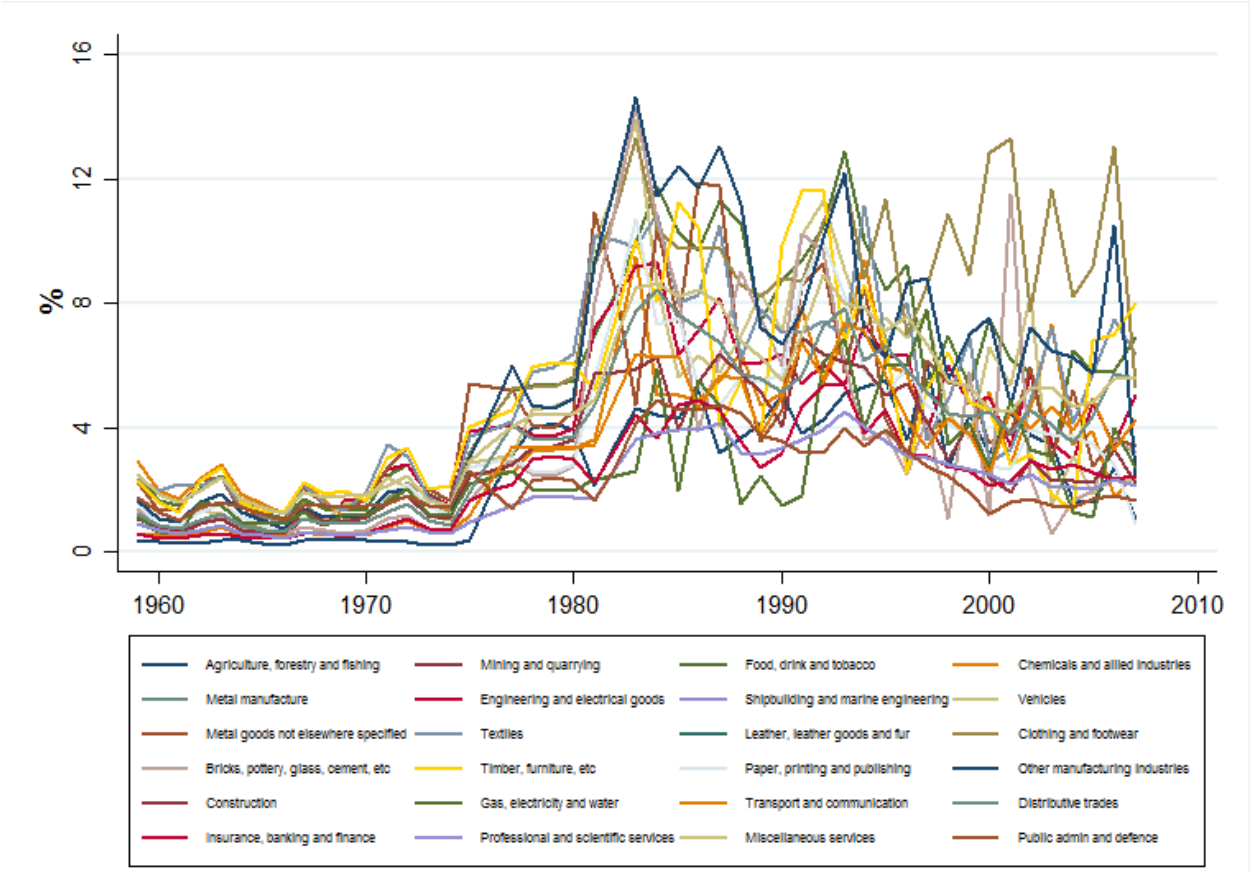
All women aged 18+ and working full-time, mid-year (June). Self-employed excluded. When two data are available, the most recent classification is chosen (e.g. 1969). In some cases tables do not report figures specifically for female workers: hence, these are calculated by subtracting the number of male workers from the total number of workers.

Table C.1.3: Average Weekly Earnings Data Sources

Time	Definition	Currency	Source	Table
1959-1968	Avg Wk Earnings of manual women	£.s.d	Br. L. Stats Historical Abstract 1886-1698	42
1959-1968	Avg Wk Earnings of admin, technical and clerical employees	£.s.d	Br. L. Stats Historical Abstract 1886-1698	53
1969-1974	Avg Wk Earnings of manual women	£	Br. L. Stats Year Book 1974	35
1969-1970	Avg Wk Earnings of admin, technical and clerical employees	£	Br. L. Stats Year Book 1970	17
1971	Avg Wk Earnings of non-manual women	£	Br. L. Stats Year Book 1971	36
1972	Avg Wk Earnings of non-manual women	£	Br. L. Stats Year Book 1972	18
1973	Avg Wk Earnings of non-manual women	£	Br. L. Stats Year Book 1973	18
1974	Avg Wk Earnings of non-manual women	£	Br. L. Stats Year Book 1974	14
1975	Avg Wk Earnings of manual women	£	Br. L. Stats Year Book 1975	22
1975	Avg Wk Earnings of non-manual women	£	Br. L. Stats Year Book 1975	14
1976	Avg Wk Earnings of non-manual women	£	Br. L. Stats Year Book 1976	14
1975-1996	Avg Wk Earnings of manual women	£	New Earnings Survey	-
1975-1996	Avg Wk Earnings of non-manual women	£	New Earning Survey	-

All women aged 18+ and working full-time, October. When two data are available, the most recent classification is chosen (e.g. 1969).

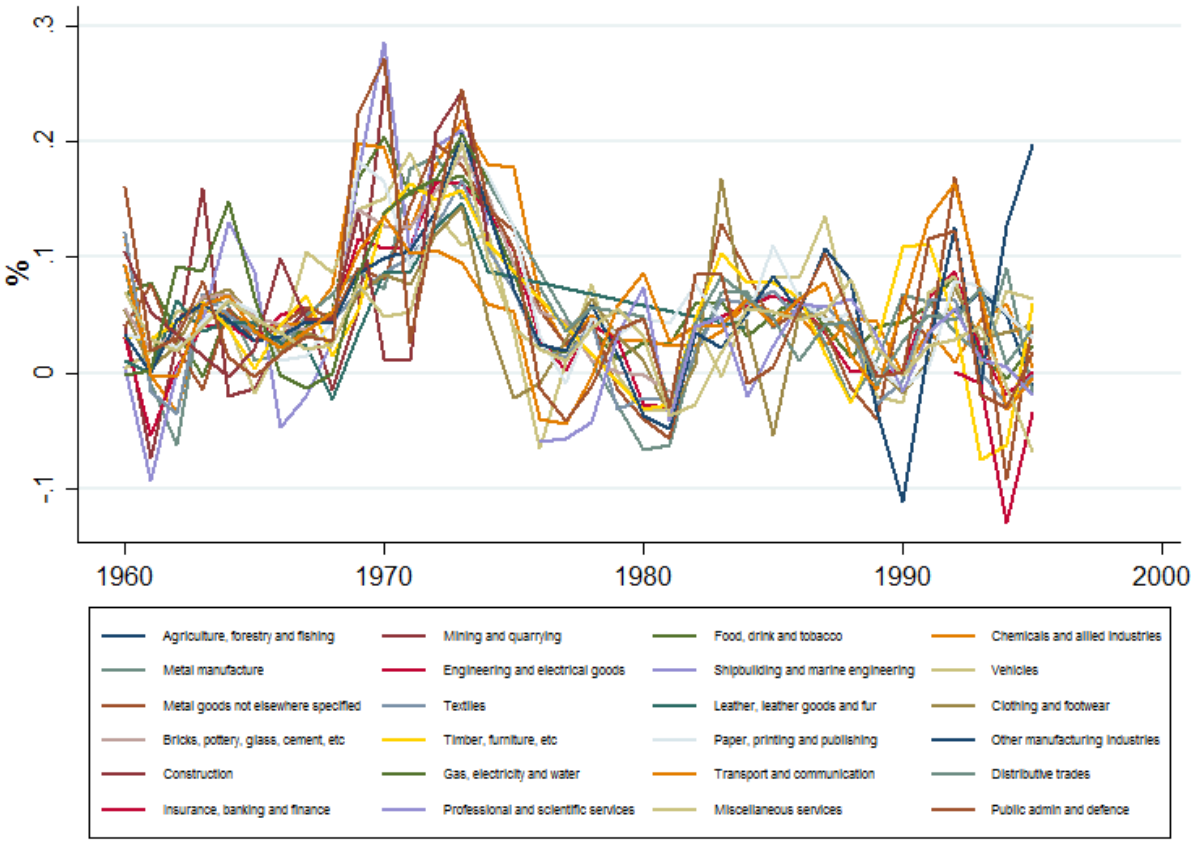
Figure C.1.3: Unemployment Rates by Industry Group



Industry Group	N	Mean	SD	Min	Max
Agriculture, forestry and fishing	49	2.556	1.915	0.198	6.044
Food, drink and tobacco	49	5.669	3.443	1.051	12.901
Chemicals and allied industries	49	3.826	2.151	1.044	9.511
Engineering and electrical goods	49	4.145	2.484	0.543	9.338
Vehicles	49	4.623	3.486	0.492	13.900
Metal goods not elsewhere specified	49	4.594	2.922	1.015	11.908
Textiles	49	5.192	2.979	0.894	11.127
Clothing and footwear	49	6.436	4.291	0.624	13.311
Bricks, pottery, glass, cement, etc	49	3.806	3.645	0.563	14.347
Timber, furniture, etc	49	4.876	3.066	1.265	11.674
Paper, printing and publishing	49	3.715	2.622	0.629	10.709
Other manufacturing industries	49	5.766	4.045	0.721	14.663
Construction	49	3.170	1.996	0.567	6.907
Gas, electricity and water	49	2.690	1.829	0.543	7.775
Transport and communication	49	3.241	2.189	0.450	7.357
Distributive trades	49	3.887	2.417	0.618	8.448
Insurance, banking and finance	49	2.384	1.517	0.403	5.362
Professional and scientific services	49	2.074	1.272	0.435	4.484
Miscellaneous services	49	4.694	2.429	1.242	8.930
Public admin and defence	49	2.352	1.146	1.021	4.866
All sectors	49	4.267	2.540	0.773	8.821

Only females, aged 18+. The unemployment rate is computed as the number of unemployed people over the sum of the unemployed and the employed workers in a particular Industry Group. Industry Groups are based on the SIC 1958 classification. Missing values: 'Mining and quarrying', 'Metal manufacture', 'Shipbuilding and marine engineering' and 'Leather, leather goods and fur'. Sources: British Labour Statistics (pre-1975), UK LFS (weighted, post-1975).

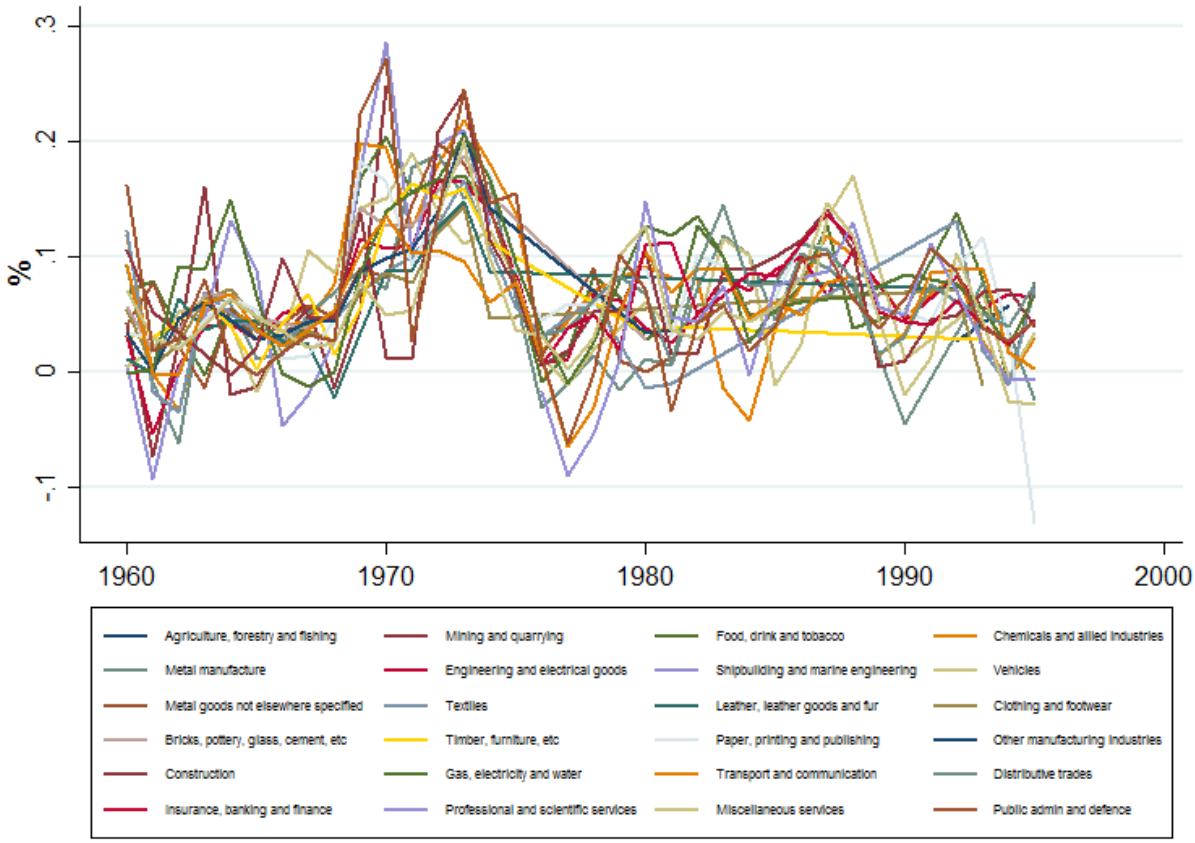
Figure C.1.4: Growth of Average Weekly Earnings of Manual Workers by Industry Group



Industry Group	N	Mean	SD	Min	Max
Agriculture, forestry and fishing	4	0.040	0.035	-0.011	0.069
Mining and quarrying	11	0.045	0.09	-0.074	0.248
Food, drink and tobacco	36	0.061	0.054	-0.005	0.205
Chemicals and allied industries	36	0.066	0.064	-0.034	0.218
Metal manufacture	31	0.049	0.065	-0.067	0.188
Engineering and electrical goods	36	0.046	0.052	-0.054	0.165
Shipbuilding and marine engineering	15	0.082	0.107	-0.093	0.286
Vehicles	36	0.053	0.060	-0.066	0.190
Metal goods not elsewhere specified	36	0.054	0.065	-0.092	0.198
Textiles	36	0.041	0.049	-0.035	0.167
Leather, leather goods and fur	26	0.040	0.044	-0.054	0.147
Clothing and footwear	35	0.039	0.046	-0.054	0.167
Bricks, pottery, glass, cement, etc	22	0.068	0.057	-0.016	0.187
Timber, furniture, etc	31	0.052	0.061	-0.076	0.163
Paper, printing and publishing	36	0.063	0.054	-0.013	0.197
Other manufacturing industries	36	0.054	0.065	-0.112	0.207
Construction	15	0.076	0.075	-0.004	0.243
Gas, electricity and water	15	0.087	0.075	-0.013	0.205
Transport and communication	36	0.050	0.05	-0.044	0.164
Distributive trades	20	0.040	0.028	-0.028	0.084
Insurance, banking and finance	4	-0.043	0.059	-0.130	0.000
Professional and scientific services	20	0.014	0.043	-0.059	0.074
Miscellaneous services	36	0.040	0.046	-0.068	0.199
Public admin and defence	36	0.058	0.079	-0.042	0.272
All sectors	36	0.05	0.046	-0.021	0.179

Only manual female workers, aged 18+. The growth of the average weekly earnings is computed as the growth rate from the year before to the year after the reference date. Industry Groups are based on the SIC 1958 classification. The average weekly earnings are deflated using CPI (Base: January 1974; source: ONS). Missing values: 'Agriculture, forestry and fishing' (1959-1990); 'Mining and quarrying' (1973-1996); 'Shipbuilding and marine engineering' (1976-1996); 'Leather, leather goods and fur' (1976-1982); 'Bricks, pottery, glass, cement, etc' (1982-1996); 'Distributive trades' (1959-1970). Sources: British Labour Statistics (pre-1975), New Earnings Survey (post-1975).

Figure C.1.5: Growth of Average Weekly Earnings of Non-Manual Workers by Industry Group



Industry Group	N	Mean	SD	Min	Max
Agriculture, forestry and fishing	2	0.042	0.022	0.027	0.057
Mining and quarrying	11	0.045	0.09	-0.074	0.248
Food, drink and tobacco	34	0.076	0.056	-0.012	0.205
Chemicals and allied industries	32	0.075	0.068	-0.043	0.218
Metal manufacture	34	0.054	0.063	-0.063	0.188
Engineering and electrical goods	34	0.065	0.045	-0.054	0.165
Shipbuilding and marine engineering	15	0.082	0.107	-0.093	0.286
Vehicles	34	0.064	0.057	-0.018	0.190
Metal goods not elsewhere specified	20	0.066	0.06	-0.015	0.198
Textiles	24	0.055	0.053	-0.035	0.167
Leather, leather goods and fur	17	0.050	0.047	-0.022	0.147
Clothing and footwear	17	0.055	0.040	-0.011	0.144
Bricks, pottery, glass, cement, etc	16	0.084	0.055	0.018	0.187
Timber, furniture, etc	18	0.067	0.052	0.003	0.163
Paper, printing and publishing	36	0.071	0.059	-0.131	0.197
Other manufacturing industries	17	0.069	0.054	-0.001	0.207
Construction	36	0.067	0.057	-0.004	0.243
Gas, electricity and water	34	0.076	0.057	-0.013	0.205
Transport and communication	36	0.056	0.043	-0.065	0.136
Distributive trades	20	0.066	0.034	0.007	0.144
Insurance, banking and finance	20	0.064	0.037	0.006	0.136
Professional and scientific services	20	0.041	0.060	-0.09	0.147
Miscellaneous services	36	0.055	0.049	-0.029	0.199
Public admin and defence	36	0.069	0.074	-0.062	0.272
All sectors	36	0.063	0.043	-0.005	0.179

Only non-manual female workers, aged 18+. The growth of the average weekly earnings is computed as the growth rate from the year before to the year after the reference date. Industry Groups are based on the SIC 1958 classification. The average weekly earnings are deflated using CPI (Base: January 1974; source: ONS). Missing values: 'Agriculture, forestry and fishing' (1959-1990); 'Mining and quarrying' (1973-1996); 'Shipbuilding and marine engineering' (1976-1996); 'Leather, leather goods and fur' (1976-1982); 'Bricks, pottery, glass, cement, etc' (1982-1996); 'Distributive trades' (1959-1970). Sources: British Labour Statistics (pre-1975), New Earnings Survey (post-1975).

C.2 Appendix: Figures and Tables

Figure C.2.1: Job Changes at 10th, 15th and 20th Year after FT Education

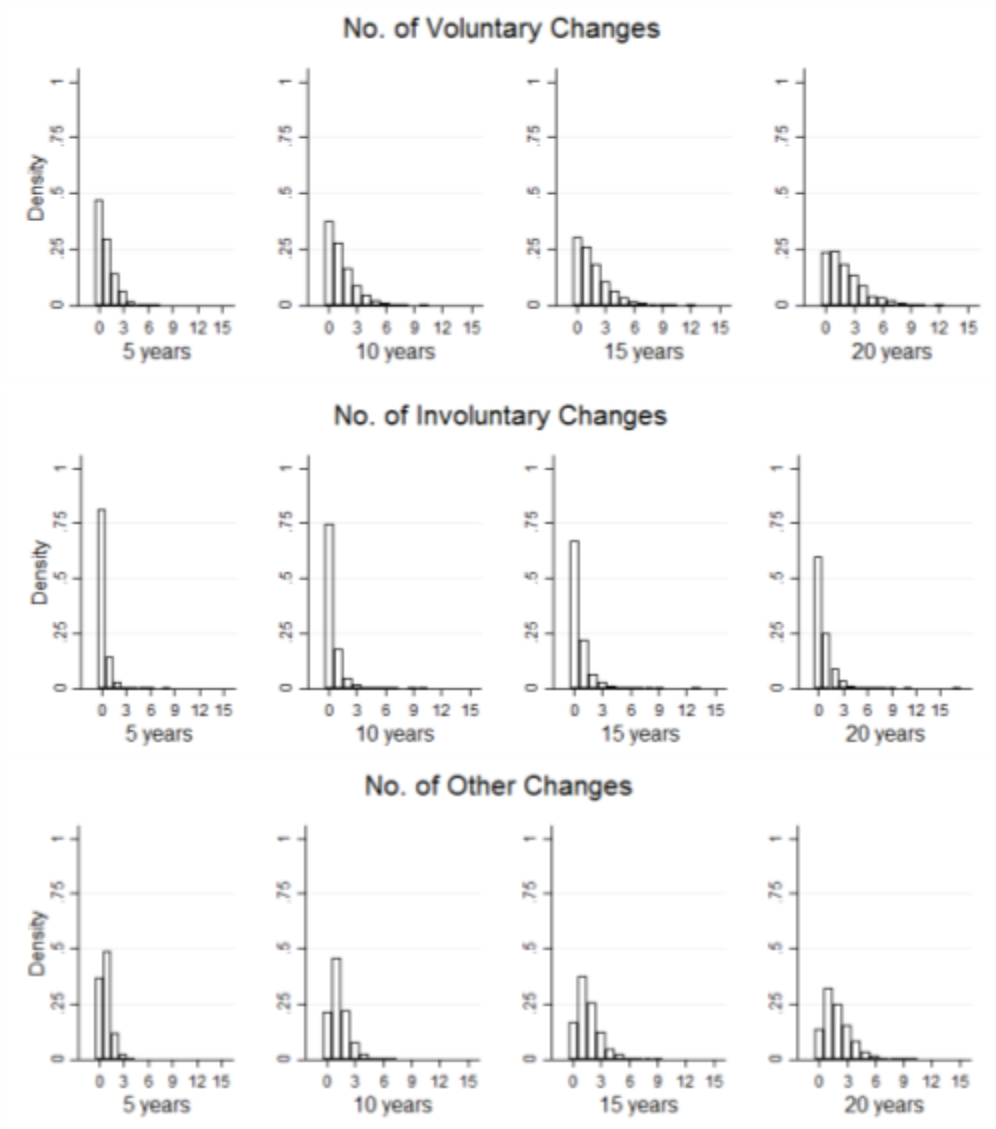


Table C.2.1: Only Voluntary or Involuntary Changes

Dep. Variables	(I) Poisson Children (20 yrs)	(II) IV-Poisson Children (20 yrs)	(III) IV-Poisson Children (20 yrs)	(IV) Poisson Children (20 yrs)	(V) IV-Poisson Children (20 yrs)	(VI) IV-Poisson Children (20 yrs)
Panel A: Counts						
No. of Voluntary Changes	-0.063***	-0.295	-0.223			
	(0.011)	(0.189)	(0.173)			
No. of Involuntary Changes				-0.088***	0.245**	0.252**
				(0.023)	(0.118)	(0.117)
Panel B: Shares						
Share of Voluntary Changes	-0.344***	-1.298*	-1.118			
	(0.049)	(0.755)	(0.854)			
Share of Involuntary Changes				-0.400***	0.806*	0.824*
				(0.084)	(0.444)	(0.443)
Observations	1,904	1,904	1,904	1,904	1,904	1,904
Instruments	.	AWE/URate	AWE	.	AWE/URate	URate

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Whole sample. Year (at which edu is left) dummies included. Other controls include: age left edu (linear and squared), education, mother's place of birth, mother's job status, number of siblings.

Table C.2.2: Different Thresholds

Dep. Variables	(I) Poisson Children (20 yrs)	(II) IV-Poisson Children (20 yrs)	(III) Poisson Children (20 yrs)	(IV) IV-Poisson Children (20 yrs)
Panel A: 5 Years				
No. of Voluntary Changes	-0.058***	-0.331		
	(0.014)	(0.284)		
No. of Involuntary Changes	-0.092***	0.342*		
	(0.030)	(0.203)		
Share of Voluntary Changes			-0.293***	-1.115
			(0.041)	(0.832)
Share of Involuntary Changes			-0.338***	0.686
			(0.079)	(0.626)
Panel B: 10 Years				
No. of Voluntary Changes	-0.061***	-0.225		
	(0.011)	(0.183)		
No. of Involuntary Changes	-0.084***	0.179		
	(0.022)	(0.147)		
Share of Voluntary Changes			-0.416***	-1.135
			(0.048)	(0.860)
Share of Involuntary Changes			-0.536***	0.218
			(0.082)	(0.622)
Panel C: 15 Years				
No. of Voluntary Changes	-0.054***	-0.436		
	(0.010)	(0.279)		
No. of Involuntary Changes	-0.044**	0.067		
	(0.019)	(0.168)		
Share of Voluntary Changes			-0.413***	-2.445*
			(0.055)	(1.483)
Share of Involuntary Changes			-0.519***	-0.189
			(0.088)	(0.590)
Panel D: 20 Years				
No. of Voluntary Changes	-0.040***	-0.369		
	(0.008)	(0.247)		
No. of Involuntary Changes	-0.027*	0.040		
	(0.015)	(0.140)		
Share of Voluntary Changes			-0.378***	-3.550
			(0.060)	(3.039)
Share of Involuntary Changes			-0.484***	-0.193
			(0.090)	(0.516)
Observations	1,904	1,904	1,904	1,904

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Whole sample. Year (at which edu is left) dummies included. Other controls include: age left edu (linear and squared), education, mother's place of birth, mother's job status, number of siblings.

Table C.2.3: Fertility at the 30th Year

Dep. Variables	(I) Poisson Children (20 yrs)	(II) IV-Poisson Children (20 yrs)	(III) Poisson Children (20 yrs)	(IV) IV-Poisson Children (20 yrs)
No. of Voluntary Changes	-0.061***	-0.189		
	(0.014)	(0.218)		
No. of Involuntary Changes	-0.122***	-0.035		
	(0.039)	(0.823)		
			-0.395***	-1.068
Share of Voluntary Changes			(0.059)	(1.094)
			-0.739***	-0.192
Share of Involuntary Changes			(0.123)	(1.299)
Observations	1,045	1,045	1,045	1,045
Pseudo R-Squared	0.0181		0.0275	
Log-likelihood	-1653		-1637	

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Only obs for which fertility at the 30th year after full-time education is known. Year (at which edu is left) dummies included. Other controls include: age left edu (linear and squared), education, mother's place of birth, mother's job status, number of siblings.

Table C.2.4: Married Women

Dep. Variables	(I) Poisson Children (20 yrs)	(II) IV-Poisson Children (20 yrs)	(III) Poisson Children (20 yrs)	(IV) IV-Poisson Children (20 yrs)
Panel A: Counts				
No. of Voluntary Changes	-0.072***	-0.412	-0.064***	-0.348
	(0.011)	(0.299)	(0.014)	(0.390)
No. of Involuntary Changes	-0.091***	0.346	-0.083***	0.282
	(0.021)	(0.285)	(0.026)	(0.473)
Spouse: High Edu			-0.069*	-0.044
			(0.036)	(0.051)
Panel B: Shares				
Share of Voluntary Changes	-0.462***	-2.384	-0.469***	-3.129
	(0.046)	(2.918)	(0.059)	(4.022)
Share of Involuntary Changes	-0.593***	1.026	-0.551***	0.270
	(0.083)	(4.133)	(0.101)	(2.327)
Spouse: High Edu			-0.069**	-0.003
			(0.035)	(0.140)
Observations	1,558	1,558	1,015	1,015

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Only married women. Year (at which edu is left) dummies included. Other controls include: age left edu (linear and squared), education, mother's place of birth, mother's job status, number of siblings.

Table C.2.5: Estimates by Education

Dep. Variables	(I) Poisson Children (20 yrs)	(II) IV-Poisson Children (20 yrs)	(III) Poisson Children (20 yrs)	(IV) IV-Poisson Children (20 yrs)
Panel A: Counts				
No. of Voluntary Changes	-0.047**	-0.768	-0.061***	-0.131
	(0.020)	(3.833)	(0.013)	(0.122)
No. of Involuntary Changes	-0.038	0.287	-0.107***	0.147
	(0.033)	(0.457)	(0.030)	(0.181)
Panel B: Shares				
Share of Voluntary Changes	-0.435***	-2.176	-0.383***	-0.691
	(0.082)	(6.360)	(0.060)	(0.633)
Share of Involuntary Changes	-0.361**	0.553	-0.593***	0.117
	(0.159)	(1.001)	(0.094)	(0.726)
Observations	721	721	1,183	1,183
Education	High	High	Low	Low

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Only low-educated. Year (at which edu is left) dummies included. Other controls include: age left edu (linear and squared), mother's place of birth, mother's job status, number of siblings.

Table C.2.6: Estimates by Cohort

Dep. Variables	(I) Poisson Children (20 yrs)	(II) IV-Poisson Children (20 yrs)	(III) Poisson Children (20 yrs)	(IV) IV-Poisson Children (20 yrs)
Panel A: Counts				
No. of Voluntary Changes	-0.072***	-0.086	-0.044**	-0.226
	(0.014)	(0.217)	(0.019)	(0.247)
No. of Involuntary Changes	-0.156***	-0.019	-0.041	0.229*
	(0.044)	(0.547)	(0.025)	(0.137)
Panel B: Shares				
Share of Voluntary Changes	-0.458***	-0.580	-0.345***	-0.476
	(0.061)	(1.371)	(0.082)	(1.203)
Share of Involuntary Changes	-0.870***	-0.002	-0.301***	0.718
	(0.148)	(1.128)	(0.102)	(0.982)
Observations	1,044	1,044	792	792
Cohort	Pre-1975	Pre-1975	Post-1975	Post-1975

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parentheses. Whole sample. Year (at which edu is left) dummies included. Other controls include: age left edu (linear and squared), education, mother's place of birth, mother's job status, number of siblings.

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