Assortative Mating, Income Inequality, and Place.

By

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Abstract

There is a growing concern internationally about levels of income inequality, and the negative effect this has on the functioning of societies both in terms of productivity and social harmony. An unexpected contributor to inequality is assortative mating - the phenomenon of "like marrying like". Educational attainment is highly correlated with income; when two highly educated people partner and form a household they are more likely to appear at the top of the household income distribution, while couples with only primary or incomplete secondary education appear at the bottom. Therefore the greater the propensity to mate assortatively the more unequal the distribution of household income becomes.

I ask two questions of the relationship between educational assortative mating and household income inequality. Firstly, how do countries (in Europe) differ in their *degree* of educational assortative mating? Secondly, what is the *evidence* that such differences are reflected in indicators of household income inequality?

My study differs from the prevailing approaches to this question by taking a geographical approach. Instead of comparing a single country over time and monitoring the correspondence between assortative mating and income inequality, I compare a wide range of countries, using a uniform instrument, at one point in time. In order to do so I draw on the unit records of 29 countries from the European Social Survey administered in 2012.

From these unit record data I have been able to identify two important patterns. Firstly, there is a clear presence of educational assortative mating in each country. However, the degree differs and it does so primarily as a reflection of the overall level of education in the country. Rising levels of education lower the returns for education, in turn making assortative mating comparatively less attractive. As a result, the level of assortative mating, compared to what would be expected under random conditions, is lower in highly educated nations. The lowered level of assortative mating in highly educated nations reduces the barriers to social mobility through marriage for those without university educations. Consequently, household income inequality is seen to be intrinsically related to assortative mating, although the outcomes can be mitigated by redistribution policies.

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Contents

List of Figures

List of Tables

Preface

Income inequality is a growing concern of mine. Like many others, I have become concerned with the proliferation of neo-liberal discourse, and the acceptance that income inequality is inevitable. I believe there to be a growing belief, certainly amongst the political establishment, and the economic structures they protect, that growth will result in a trickle-down effect, will not only eventually rising everyone's standard of living.

I show in this thesis that social, and most importantly educational, position does matter to the economic fortunes of individuals and households. More so than this, individuals, particularly those who are educated, are encouraged to partner with people similar to them; assortative mating. There are institutional forces as well as personal motivations which encourage university educated individuals to partner with their like. While people reasonably seek those like them, partnering behaviours also have societal wide outcomes which leads to increasing household income inequality. These patterns of partnering serve only those with power, wealth, and education.

In the thesis I present here, I take a positivist epistemological approach. In line with my positivist epistemology, I use quantitative research methods. The use of the positivist framework serves to address these issues, providing empirical evidence to the ideas addressed above.

Chapter 1: Introduction

The writing of this thesis was motivated by a growing concern about income inequality. It is no secret that income inequality grew universally throughout the latter parts of the 20th Century. The period of low income inequality the developed world ushered in after the two World Wars was replaced by growing inequality with neo-liberal reform in the 1970s onwards (Alderson & Nielsen, 2002). The growth in income inequality has continued into the 21st Century, with only a brief plateau during the first years of the Global Financial Crisis (GFC) with no signal that income inequality will recede in the foreseeable future (Cingano, 2014).

Perhaps it is a product of the liberal networks in which I largely operate, but daily I see and hear evidence of the damage created by high income inequality. I will not list the impacts of high income inequality here; they are well publicised and have been written and spoken about by writers and scholars (Piketty, 2014; Reich, 2015; Stiglitz, 2012; Wilkinson & Pickett, 2010).

Despite the widespread understanding of how income inequality operates to create a society which unfairly restricts the growth of many individuals, there appears to be little political will to adapt the neo-liberal framework to create a fairer system. There is little argument that some income inequality is inevitable and desirable. After all, there must be rewards and incentives for providing skills or labour which are in-demand and valuable.

In the thesis presented here I am concerned with the way assortative mating exacerbates income inequality. Educational assortative mating is the practice of selecting partners based on similarities in educational attainment (Mare, 1991). The greater 'like-for-like' matching we observe, the higher the degree of assortative mating. The level of assortative mating appears to be both temporally and spatially dependent. From the literature, and my findings presented here, individuals' propensity to select partners based on shared educational attainment is dependent on a range of social, cultural, and economic factors.

The motivation for examining educational assortative mating (hereafter assortative mating) is the potential for these patterns of partnership to change the distribution of

income across households; concentrating income in a smaller number of households. The high incomes achieved by the educated become concentrated in a smaller number of households than they would under random mating (Schwartz, 2013).

It is assumed by many in the West that decisions regarding who to partner with are driven by 'love'. While I am not denying the presence of romance in partnering, and it is a modern phenomenon of which we can be individually grateful, I take the position that romantic decisions are made contextually; they take place under certain social, economic, and political conditions which constrain who partners with who.

Throughout this year while talking to people about the focus of my thesis, most people have responded with surprise, followed by an immediate understanding of how assortative mating could exacerbate household income inequality. More surprising then is that its properties are not better understood.

While the decisions made by individuals about who to partner with are deeply personal and private, once these decisions are multiplied across an entire population they have wider implications. Despite the macro consequences of micro level partnering decisions, the relationship remains relatively unexplored academically, and almost totally neglected by human geographers.

1.1: Geography

Geography, particularly cross-cultural geography, is a dimension which has been under-explored in the assortative mating literature. I exploit the geographic organisation of societies to better understand how assortative mating operates, and the role it plays in continuing income inequality. In this thesis I compare levels of assortative mating across countries with different social, economic, political, and cultural institutions. The varying levels of education across nations will be a particularly salient example of how geography affects assortative mating. This level of geographic analysis is rarely carried out within the assortative mating field of research.

1.2: Outline of thesis

My aim in this thesis is to construct an assessment of the impact of assortative mating on household income inequality. In order to investigate this question I investigate the role of educational attainment in driving assortative mating. The idea of educational attainment will be further discussed in chapter 2, as a primary driver of assortative

mating. I also want to investigate what assortative mating looks like in contemporary Europe.

The thesis will address three central questions:

1. To what extent does assortative mating occur between individuals of various levels of education, and how does this vary by age cohort?
2. What is the role of education and the wage premium in generating country level degrees of assortative mating?
3. Does assortative mating generate household income inequality? If so, how?

Chapter 1 introduces the ideas and themes of this research. In this chapter I provide context for the examination of the relationship between assortative mating and income inequality. I also justify the importance of integrating a geographic perspective into a largely a-spatial body of literature.

Chapter 2 reviews of the literature on assortative mating and income inequality. Chapter 3 introduces my research design and methodology along with the European Social Survey (ESS) variables.

In Chapter 4 I go about answering the first question posed here; to what extent does assortative mating occur between individuals of various levels of education, and how does this vary by cohort. I show that assortative mating occurs at all levels of education, contrary to much of the literature. I explain how gender and cohort intersect to create a context where women face pressure to engage in assortative mating, whereas men experience fewer of these pressures. How these pressures intersect with men and women's relative scarcity at each level of education dictates the ability and propensity to assortatively mate.

In chapter 5 I establish that there is a negative relationship between assortative mating and educational attainment at the country level. As the level of the population with a university level education rises from country to country, the level of assortative mating falls. As the level of educational attainment rises, it is thought that the wage premium for educated individuals falls, making assortative mating amongst those with university educations comparatively less attractive.

Chapter 6 addresses the central issue of my thesis, looking at the impact of assortative mating on household income inequality. I discuss how assortative mating and household

income inequality appear to be linked, but that economic interventions may negate the impact of assortative mating.

Chapter 7 is the conclusions chapter where the salient findings of my thesis are disseminated and further recommendations for research are made.

Support for this thesis is sought in a sample of 29 European nations collected in the European Social Survey, Round 6 in 2012. I use the data in two ways, one where the unit record data is used, N=~30,000 households. The second uses country level data, where N=29 nations.

Chapter 2: Literature Review

For as long as we have known, humanity has been interested in the romantic selections of others. Like other curiosities of human life, attempts to understand these decisions have been taken on by academia. One way in which we have attempted to grasp an understanding of these complex relationships is through an examination of the characteristics of partners. More specifically, the analysis of common traits between partners. The analysis of these similarities between partners is referred to within academia as assortative mating.

Assortative mating is referred to as the tendency for individuals to select partners based on a shared trait or characteristic at a greater rate than would be expected under random conditions (Mare, 1991). Levels of assortative mating can be assessed on any measurable characteristic of individuals, however, educational attainment is typically used. The levels of educational attainment of partners is the variable assessed in this study.

Educational attainment has increasingly become the primary mode of sorting. Smits, Ultee, and Lammers (1998) attribute the increasing reliance on education as a sorting tool to the role it plays in generating income. Educational attainment has become the preferred measure of assortative mating as inherited characteristics become less predictive of income (Kalmijn, 1991). There is potentially some discrepancy in the importance of education between more and less industrialised nations. However, as in my analysis I am solely focusing on European nations, educational attainment is the most suitable measure.

Marital couples have been the typical unit of measurement for assortative mating research due to the understanding that this pairing was the basic household unit. In order to reflect changing societal attitudes and behaviours over the decades since assortative mating research began, this study will also include couples who cohabitate outside of marriage. Few studies have approached the analysis of assortative mating with the inclusion of committed couples outside of marriage (Blackwell & Lichter, 2004).

Some within the literature have questioned the appropriateness of including non-married couples in the analysis. The motivations behind this exclusion stem from a perception that couples who cohabitate, but are not married, are in less committed

relationships, and therefore are less likely to remain partnered (Blackwell & Lichter, 2004). Within the literature, this preconception is referred to as the winnowing hypothesis. The winnowing hypothesis refers to the idea that non-homogamous couples will be 'weeded out' before committing to marriage, and consequently examining couples which cohabitate outside of marriage is not appropriate. I perceive the concern about duration of relationships to be an important consideration, particularly when assortative mating has long-term economic and social implications, such as income inequality.

Despite the winnowing hypothesis appearing to be somewhat accepted by scholars who exclude non-married couples, there is little evidence to support its validity. Schwartz (2013) discusses the permeation of the winnowing hypothesis is a consequence of a perception that a recent trend towards cohabitation in place of marriage fails to 'weed out' heterogamous (educationally different) couples. The winnowing hypothesis assumes that these heterogamous relationships will fail at a higher rate than homogamous (educationally similar) ones (Blackwell & Lichter, 2004).

Despite the apparent acceptance of the winnowing hypothesis within the assortative mating field, there appears to be no significant differences in the rates at which heterogamous and homogamous couples persist from cohabitation without marriage to cohabitation with marriage (Blackwell & Lichter, 2004; Goldstein & Harknett, 2006; Sassler & McNally, 2003; Schwartz, 2013). Essentially, the decision for couples to progress on to marriage is independent of educational characteristics of the two individuals. Once couples have reached a state of cohabitation, heterogamous couples separate at no higher rate than homogamous ones (Blackwell & Lichter, 2004).

Consequently, the study I present in this thesis will include couples who cohabitate both within and outside of the bounds of legal marriage. On this note, unless explicitly stated otherwise, marriage and (cohabitation) partnerships will be referred to interchangeably.

The question remains, why are we concerned with assortative mating? Assortative mating is thought to have a profound effect on the continuation of household income inequality within and between generations.

2.1: Assortative mating drivers

There is well documented tendency for people to partner with their educational like. One of the questions that arises from this knowledge is why do people engage in these behaviours. Three general theories have emerged in order to explain this behaviour. Two of the three discussed here are situated within an understanding of how individuals react to varying degrees of income inequality. The third main hypothesis used to explain educational mating preferences focuses on a more sociological understanding of human choice.

The first theory as to why people have a preference to select their educational equivalents deals with the costs imposed upon people if they decide to engage in hypogamy ('marrying down'). In the discussion of these economically motivated partnering decisions, I will look at the ways in which the current literature understands how existing individual income inequality is thought to drive behaviours. In the discussion I argue that marriage is culturally motivated, however we should not ignore the economic contexts individuals exist within, and how these may drive partnering behaviour.

Secondly, I will investigate ways in which individual income inequality shapes social conditions in which individuals interact. Through the exploration of this theme I hope to be able to further unravel some of the cross-cultural variations we see in assortative mating.

Lastly, I will investigate the sociological aspect of human behaviour that some have used to justify partnering decisions. The drivers of partnering decisions cited here are those relating to values, beliefs, and interests, and how these operate as proxies to education. This sociological aspect of decision making is frequently cited by individuals when justifying their partnering choice. Using geography I will assess the validity of these justifications.

Income inequality driver

Differing levels of income inequality have profound impacts on the ways in which people are able to utilise their decision making skills. Individuals are able to partner with anyone they chose (within legal boundaries). Despite this ability to exercise free will, we continue to see consistent patterns of partnering across nations, indicating that individual's decisions are constrained by geographically specific factors. One of the

most salient ways in which we see patterns emerge is through the partnering of educationally like individuals. While this propensity for individuals to select educationally like partners prevails in all nations, there remains significant variation. As a geographer my interest in this issue lies in unveiling why people select partners based on educational attainment. However, perhaps more significant to the domain of geography is uncovering the reasons why the level of assortative mating varies across nations.

Within the literature there has been a distinct lack of geography. The geographic approach taken in my research uses geography as a theoretical and research tool. Using geography as a research tool allows for more conventional methods of analysis to be used, for example regression.

The first theory I will explore, in relation to understanding partnering behaviour, looks at the literature surrounding the relationship between income inequality and aggregate levels of educational attainment. Through an examination of this literature, I can begin to make inferences about the ways in which individual levels of income inequality influence partnering decisions at the individual level. As a consequence of exploring the literature around why income inequality matters when people are selecting partners, we can begin to explain why patterns emerge across nations.

In order to progress into exploring the literature, three crucial statements must be made. Firstly, income inequality varies across nations. Secondly, proportions of populations achieving university level qualifications, hereby referred to as educational attainment, varies across nations. Thirdly, it appears that the two above phenomena are not independent and are negatively correlated; more educated societies will also be more equitable.

The vast majority of households acquire income in exchange for human resources sold in the labour market. As a result, it is primarily income achieved in the form of wages that we are interested in when assessing the role of income inequality in partnering decisions. Income inequality can therefore be referred to as a measure of the variation of returns for labour.

Fernández, Guner, and Knowles (2005) conducted a cross-country comparison of 34 nations in order to understand the ways in which income inequality between individuals is determined. They uncovered that there is a sustained and persistent relationship

between aggregate levels of educational attainment and income inequality. In nations where educational attainment is higher, income inequality is reduced (Fernández et al., 2005).

Carnevale and Rose (2011) discuss the negative relationship between income inequality and educational attainment as a consequence of a discord in the supply-demand relationship for highly skilled workers. In their work "The Undereducated American", Carnevale and Rose (2011) undertake a longitudinal examination of the demand for university graduates, the corresponding numbers of students graduating American colleges, and the incomes these graduates demand. They then compared these to the long-term trends of income inequality in America. Across the two studies by Carnevale and Rose (2011) and Fernández et al. (2005), a similar conclusion was reached. When demand for highly skilled labour outstrips supply, university educated people are able to demand higher wages (Carnevale & Rose, 2011; Fernández et al., 2005)

Although demand for university educated labour stays relatively constant across nations, supply does not. Nations where university educated individuals are scarce, income inequality tends to be greater (Fernández et al., 2005). As discussed above, when labour is scarce, these workers are able to demand higher wages. This ability to demand increased wages increases what Fernández et al. (2005) refer to as the wage premium. Essentially this is the increased income a university educated person will receive over a non-university educated person, ceteris paribus. When the wage premium is greater, as a result of low educational attainment, income inequality is increased because the differentials in income between groups are greater. Fernández et al. (2005) discuss that high levels of educational attainment place downward pressure on wages at the top, reducing income inequality.

The nature of the negative relationship between income inequality and educational attainment is further explored in "Education and income inequality: New evidence from cross-country data" by De Gregorio and Lee (2002). De Gregorio and Lee (2002) explore the obverse of the wage premium, examining scenarios where the relative educational attainment increases. The consequences of the wage differentials between highly educated people and their less educated peers is reduced under this scenario, causing what is referred to as wage compression (De Gregorio & Lee, 2002). De Gregorio and Lee (2002) come to the same conclusion as discussed above; there is a

negative relationship between overall levels of educational attainment and income inequality.

The study presented by De Gregorio and Lee (2002) however also examines the outcomes for changes in the distribution of educational attainment as well as the educational attainment of the average person in a society. De Gregorio and Lee (2002) found that, like the research done by Fernández et al. (2005) and Carnevale and Rose (2011), an increase in the proportion of the population gaining university qualifications reduced the income premium university graduates could expect, and therefore placed downward pressure on income inequality.

De Gregorio and Lee (2002) also investigated the effect of changing average levels of educational attainment; what level of education does the average person in society have? De Gregorio and Lee (2002) investigated the effect of the average level of educational attainment as a way to evaluate the efficacy of policy approaches which typically focus on this measure. Average educational attainment only works to place downward pressure on income inequality if there is investment in increasing minimum educational attainment levels (De Gregorio & Lee, 2002). From this research we can draw the conclusion that to reduce income inequality, there needs to be sustained effort increase the size of the university educated population.

The question remains how does this relate to assortative mating; in what ways do these existing income inequalities contribute to partner selection? We are aware that in nations with lower levels of educational attainment, people are more likely to engage in assortative mating (De Gregorio & Lee, 2002). Despite the relative prevalence of literature examining the relationship between educational attainment rates and income inequality, there appears to be scant explanation of why individuals have an increased preference for educationally like mates in unequal societies. We know, however, that in these low attainment nations, the rewards for skilled labour is greater (wage premium). As a consequence, assortative mating amongst those with skilled labour is incentivised because of the greater returns to household income (De Gregorio & Lee, 2002).

A few authors attempt to give some explanation of the motives for why this increased preference exists. Becker (1974) makes note that the marriage market, as he calls it, is primarily reliant on an understanding of the hierarchy of choice. Those who have the

most personal assets to offer the market, in this case educational attainment, will be best placed to select their preferred mate (Becker, 1974).

Torche (2010), writing nearly forty years after Becker first proposed the notion of the hierarchy of choice, reiterated the idea that those with the strongest economic prospects will select the best partners available. As everyone in the market is assumed to be driven by the same motivation, hypergamy ('marrying up') is not numerically possible for much of the population, and therefore we see a general trend towards homogamy (Torche, 2010). As those with the highest levels of education have the greatest bargaining power on the market, the filtering mechanism of partnering works from the top, down (Schwartz, 2013). Those with the highest level of education will have the first pick of partners, followed by the next highest educated; the filtering continues throughout the strata of society with the least choice being offered to those with little education (Schwartz, 2013).

Despite the apparent obviousness of this filtering mechanism hypothesis, some scholars propose that assortative mating may only be occurring amongst those at the top, or by those at the top and bottom, but not the middle (Rosenfeld, 2008; Schwartz & Mare, 2005). Torche (2010) proposes that the difference in wage earnings between education groups is important in determining the degree to which this sorting occurs throughout society. There is an isomorphic relationship between earnings differentials between groups and the ability to straddle these barriers in marriage (Torche, 2010). For example, in Chile there are strong barriers to inter-marriage at the top of the education distribution and relative fluidity throughout the middle and bottom. (Torche, 2010) attributes the difference in barriers across the education spectrum to the returns to education. In Chile, those with higher educations have a greater income differential (wage premium) than is seen between any other educational groupings.

It is with this understanding about how the marriage market is theorised to operate that we can begin to gain some understanding as to why assortative mating is more preferred in economically unequal societies. Much of the literature surrounding this phenomena relies on an acceptance, either explicitly or implicitly, of Becker's claim that when entering into a marriage individuals will seek to maximise their utility from the union (Becker, 1974).

In nations where the income differentials between those with university education and those without are the greatest, the costs of hypogamy are greater in comparison to more equitable societies (Han, 2010). Consequently, individuals who engage in hypogamy fail to maximise their utility. Nakonezny and Denton (2008) also discuss this concept of maximising utility from marital unions. They argue that for someone to enter a union, the returns of the marriage must be greater than all other opportunities available; remaining single or partnering with a different individual (Nakonezny & Denton, 2008). In this sense, it is assumed that people will act as rational economic decision makers when entering into a partnership, and hypogamy will be avoided.

Torche (2010) highlights the idea that economic disparities in terms of income lower the economic incentives to intermarry. I would go one step beyond this, and say that not only are there fewer incentives to engage in hypogamy in a more unequal nation, but the practice is also discouraged through household opportunity costs. When the wage premium is greater, the opportunity cost for those with university educations to marry down occurs in the form of a significantly higher potential household income (Fernández et al., 2005). The greater potential gains in household income in high wage premium societies may explain evidence of a higher prevalence of assortative mating in these nations.

Proximity driver

The second theory the literature uses to explain why people appear to have a preference for those with similar educational characteristics relies on the idea of proximity as an important determinant of mating selection. Proximity in the sense used here refers to geographic proximity as well as social and economic proximity. As well as discussing why proximity contributes to individuals' partnering preferences, the literature also focuses on how proximity is affected by differing levels of income inequality.

Social conditions that inform peoples mating decisions are frequently heavily conditional on economic conditions. Within the literature, several authors make the assertion that economic distance create social distance. It is believed that it could be these social distances which decrease the opportunities for individuals to meet potential partners from different educational groups in potentially romantic settings.

Torche (2010) proposes that social distances are predominantly created by increases in income inequality. When these social gulfs emerge, it becomes less natural to find a

partner outside of your educational and income group (Torche, 2010). The search for a potential romantic partner can be costly and time consuming (Becker, 1974). If the social distances between groups widen, individuals, particularly those with high levels of education, are unlikely to invest in searching for a partner outside of their immediate proximity. Individuals are also unlikely to extend their search if they assume that the returns for this search will not be sufficiently great. As the literature outlined previously, the opportunity costs for educated singles to seek non-educated partners is greatest when there is the greatest economic and social disparity in society.

Income inequality doesn't just act to widen the social distance between groups, it also creates spatial distinctions between groups. Various academics have explored this idea through examining the ways in which income inequality affects patterns of residential and employment segregation. Kremer (1997) talks about the "cognitive elite" gravitating together. It is this idea which frames much of the debate; the impact of income inequality on spatial inequality is not distributed evenly across the education spectrum.

Reardon and Bischoff (2011) investigate the ways in which income inequality is associated with residential segregation. The study they present uses longitudinal data for income inequality and the spatial distribution of different income groups in one hundred United States metropolitan areas. Reardon and Bischoff (2011) discovered that there was an effect of income inequality on generating spatial patterns of segregation. During times of greater income inequality, the geographic differences between groups of differing incomes were greater.

However, spatial segregation was not evenly distributed across the income strata. It appears that to understand the spatial inequalities, a geography of affluence rather than a geography of poverty lens must be applied. Reardon and Bischoff (2011) unearthed that in periods of high inequality, those considered affluent were likely to be segregated from the rest of the populace, while those in poverty had a similar spatial distribution to those in the middle classes.

We can assume that, to a greater or lesser extent, income is positively correlated with educational attainment. We are also aware that the likelihood of meeting a potential partner increases the closer you live to them (McPherson, Smith-Lovin, & Cook, 2001). Consequently, if those with higher incomes and higher educations are geographically

segregated from the rest of the population they have a greater chance of meeting an educationally similar partner. This geographic segregation results in educational assortative mating, at least of the "cognitive elite". It appears that social, economic, and geographic segregation operates to facilitate assortative mating, particularly amongst the most educated and wealthy.

There is debate within the literature as to whether assortative mating occurs at all levels of education. The findings of Reardon and Bischoff (2011) support the idea that the propensity to mate assortatively does not occur equally throughout the educational ranks. Schwartz and Mare (2005) observed the tendency for highly educated people to partner amongst themselves, but evidence to describe to what extent assortative mating also occurred at other educational levels was limited. Schwartz and Mare (2005) could not provide a definitive explanation for why this pattern emerged. Perhaps the ways in which residential sorting occurs provides some basis for understanding these patterns.

Hellerstein, McInerney, and Neumark (2007) explore a similar idea in relation to residential sorting, instead using the workplace as the measure of segregation within society. In their examination of United States workplaces in 1990 and 2000, they discovered that rising returns for skilled workers encouraged work place segregation (Hellerstein et al., 2007). It is in situations such as this where we see an overlap of the proximity theory of assortative mating and the theory that assortative mating is driven by the economic rewards or costs in situations of high inequality.

It was once thought that meeting a potential spouse in educational institutes such as high schools, and later universities, created a significant portion of the educational homogamy witnessed. While these institutions still remain as potential fertile mating ground for some people, Schwartz (2013) claims that the rising importance of residential and workplace sorting mean that you are just as likely to meet a potential educationally alike partner at work, in your neighbourhood, or in a local bar.

It is this theory of proximity creating the conditions which allow people to engage in homogamy which has driven much of the discourse around assortative mating. Undoubtedly an individual's likelihood of meeting an educationally like partner by virtue of crossing paths with them in a meaningful way is linked to levels of income inequality. I would argue that under current economic frameworks, the way in which our society organises itself cannot be separated from the economic conditions in any

meaningful sense. The literature tends to acknowledge this interplay, and the discussion of economic and social conditions are frequently talked about in tandem.

While many writers and academics acknowledge the intermarriage of economic and social conditions, the mechanics of this interplay is relatively under-explored. Frequently a statement like "economic distance creates social distance" is made. There is an understanding that there is an intuitive sense of what this means, however the mechanics of why societies with greater economic disparities have greater social divisions remains unanswered. The examination of this question lies beyond the scope of this thesis, however it remains a frustrating gap within the literature.

Cultural preferences driver

The third theory used to explain why there is a tendency for individuals to partner along lines of education relates to more intangible, cultural preferences. These cultural preferences relate to those things people frequently claim they are attracted to when seeking a mate; similar tastes, beliefs, values.

The notion that individuals will seek partners who are culturally like them is possibly the easiest of the theories presented here to relate to. We have an inherent understanding that we will be attracted to those who are similar to us in terms of values, interests, and attitudes. Within partnerships, similarities between partners on these factors reduces conflict and improves the chances of the longevity of the relationship. Perhaps because it is such an inherent understanding, or perhaps because these factors are hard to measure, there seems to be only a passing interest within the literature in exploring how these factors relate to assortative mating.

Torche (2010) and Han (2010) both explain that education can be used as a predictor of cultural similarities. The likelihood of a person with one level of education finding a partner culturally similar to themselves is increased if they search amongst similarly educated peers.

From what we understand about the role of education in determining income, we can make an assumption that education is also a predictor of social standing. Weeden and Grusky (2012) assert that lifestyles, attitudes, and beliefs, terms which fall under this idea of cultural preferences, are closely linked to social position.

In her 2014 book, "No Country for Old Maids", Hannah August conducts qualitative interviews on a small number of single, educated women in New Zealand. While the focus around this book is on the discourse surrounding what she terms the 'educated man drought' in New Zealand, aspects of her discussions feed into this notion of how cultural preferences for certain social traits is related to educational assortative mating (August, 2015). Despite being rather disparaging of what she sees as the clinical nature of assortative mating herself, the women August interviews unconsciously allude to aspects of assortative mating.

The education man drought August (2015) is investigating refers to the fact that, in New Zealand, amongst the 25-49 year old age group, there are roughly 50,000 more women than men (Statistics New Zealand, 2013). Once educational attainment is factored in, educated women outnumber educated men by more than 78,000 people (Statistics New Zealand, 2013). In August (2015) single, university aged women, mostly in their 30s, are asked about their views on the discourse, particularly within the media, surrounding the educated man drought. Eventually the discussion turns to the importance of education in selecting partners.

A number of women interviewed assert that the level of education in a partner is important when evaluating potential mates. However, the overall tendency for women is to say that education is not important to them, but it is these cultural values which they look for. The question remains; the literature supports the notion that education is frequently a predictor of cultural similarity, so is the distinction semantic?

Based on the evidence presented by Brynin, Longhi, and Pérez (2008), Han (2010), Torche (2010), and Weeden and Grusky (2012) there is an argument to be made that while these two groups of women are both saying that education is important, perhaps their motivations behind seeking these particular mates is different.

2.2: Assortative mating driving income inequality

In a sense, the decisions individuals make on a micro scale, such as selecting a partner, have macro outcomes when these decisions sum to wider societal patterns. Individuals make partnering decisions based on cultural preferences driven, at least in part as I have argued here, by economic constraints. Individuals are likely to be largely unaware of the macro outcomes of their decisions when these micro decisions are multiplied across

many thousands of households. If enough people engage in educational homogamy, we begin to see patterns of assortative mating emerge.

The way this works relies once more on this understanding that education is the most significant determinant of income. This wage premium is widely accepted, although the extent to which the returns to education vary, as outlined by De Gregorio and Lee (2002) Fernández et al. (2005), and Carnevale and Rose (2011) in this literature review. In order to progress our understanding of the way in which these individual decisions contribute to income inequality, we will assume the relationship between income and education to hold on average.

Assortative mating creating income inequality theories

As we are aware of already, individual income inequality exists to varying extents in different nations. However, as assortative mating examines the characteristics of couples, we are primarily interested in how these individual inequalities are transferred to household inequality through marriage. We are interested to what extent do individual income inequalities become amplified through the process of assortative mating.

Breen and Salazar (2011) note that despite the concern about increasing household inequality, little empirical research has been done to explore assortative mating as a contributor to household income inequality. In this section I will explore some of the theory relating to the assortative mating-income inequality relationship, as well as leading my reader through some of the results scholars have unearthed.

As Schwartz (2013) notes, individuals will set up a household with a partner in order to share resources. Through the pooling of these resources, a single person can greatly increase their household income, while reducing per person costs of running the household.

Numerically speaking, marriages do not necessarily need to result in an increase in household inequality. If mating was randomly carried out, household inequality would be equal to individual inequality. However, we know random mating does not occur within any society.

Schwartz (2013) expresses that there is a relationship between levels of educational assortative mating and household inequality. She claims that the greater the propensity

for people to marry their educational like, the greater the concentration of income in a relatively small number of households (Schwartz, 2013). If we observe this trend for individuals with high incomes (as a result of educational advantage) to partner amongst themselves, the consequence is a small number of households with a, relatively speaking, greater income than when their incomes are examined individually.

It is important to examine the level of individual income inequality, and how this works to shape household inequality. Higher levels of individual inequality should result in greater household inequality; this occurs through two mechanisms. Firstly, as I have already discussed, a greater level of individual inequality leads to a greater propensity to engage in educational assortative mating, as the costs for not doing so are maximised. As we acknowledged above, greater levels of assortative mating lead to greater household inequality as high incomes are concentrated in a disproportionately small percentage of households.

The second mechanism behind the association between high levels of individual inequality and household inequality relate more to the numeric possibility of generating household inequality under already unequal conditions. Even if individuals in highly unequal societies entered in to homogamous marriages at no higher rates than in low-inequality nations, the ability to generate greater income differentials would remain greater. Greater individual differences would allow those households with a dual-high income partners to have a comparatively higher wage differential than the same couple in a more equal society.

Several authors have also highlighted how the increasing prevalence of single-adult households may be increasing household income inequality. As mentioned above, marriage allows couples to pool their resources, including income (Schwartz, 2013). The increasing likelihood of individuals choosing not to partner means that there is an increasing proportion of households with only one income (Breen & Salazar, 2011; McCall & Percheski, 2010). These single-adult households are disadvantaged in terms of a relatively low income, which contributes to the widening of the household income distribution (Breen & Salazar, 2011; McLanahan & Percheski, 2008).

Empirical evidence

The association between increased educational assortative mating and increasing household income inequality was investigated by Schwartz (2010). Schwartz (2010)

attempted to estimate the effect of a growing association between spouses' earnings and household inequality. In her 2010 paper "Earnings inequality and the changing association between spouses' earnings" Schwartz uses log-linear models in order to attempt to estimate the role the increasing association between partner's earnings has had on growing income inequality (Schwartz, 2010).

While Schwartz (2010) examines changes in household composition in the United States between 1967 and 2010, her findings are useful for informing the debate around the role of homogamy and household inequality. Schwartz (2010) discovered that depending on how the models were run, growing similarity of partner's has contributed somewhere between 17 and 51% of the growth in household income inequality during that time (Schwartz, 2010). While this is only one study, it concurs with estimates done by Blackburn and Bloom (1994) and Cancian and Reed (1999). There is no question that this contribution is significant, however we must question the origin of this increasing association.

Some scholars, including Schwartz (2010), have questioned whether the effect of increasing association between partners income levels is as a result of changing preferences for partners or increased female labour force participation. In the following section I will examine some of the existing literature surrounding the effect of female labour force participation on household income inequality.

The role of female education and employment

Female education and earnings, and the role these play in partnering and household income inequality, has largely been examined through a temporal lens. One of the first things that emerges from the literature about female education and employment is the discussion of how educational attainment is related to employment. We tend to assume that there is a direct correlation between educational attainment and employment. Schwartz (2013) discusses that while for men this relationship has tended to hold true, at least on average, the returns for female education have been more varied.

Historically there have been greater structural barriers to women's participation in the labour force. Goldin (2006) discusses how prior to World War II the women who were employed in the labour force tended to be women with low earning husbands. These women typically had low levels of education, much like their husbands. Consequently, the bulk of the female labour force came from low educationally homogamous

households. In this instance the labour force participation of wives acted to equalise the income distribution of households (Goldin, 2006). As few women worked, the household income distribution was not substantially different to the individual income distribution of men. The change from individual to household income inequality came through an increase of household income at the low end, reducing overall income inequality (Goldin, 2006).

After World War II, an increasing number of women entered the workforce. Despite the economic boom witnessed in many nations during this period, women did not see the returns for their education like men did (Goldin, 2006). The distribution of women's incomes was relatively flat, most women achieving similar wages irrespective of education. Unlike for the pre-War period, Goldin (2006) is less confident in attributing the rise in female employment to any particular change in income inequality. During this post-War period the United States (where Goldin was conducting her analysis) saw a downturn in inequality (Mare, 2013). Goldin (2006) asserts that there may have been some equalising effect of female earnings on household income inequality.

As we move into the modern era, the role of women in the household changes, and consequently so does the effect of her earnings on the distribution of household income across the population. Despite ongoing issues with gender inequality, women's access to the labour force is far greater today than it was a few decades ago.

In recent years, women have seen a closer association between their education and their incomes (Goldin, 2006). The closer relationship between women's income and education is likely generating increased household inequality (Breen & Andersen, 2012).

Opposition to theories

The argument within the literature advanced thus far dictates that greater levels of assortative mating, when examined across nations, leads to greater household income differentials. The primary reason for assortative mating creating household income inequality is that it acts to concentrate income received from educated labour in a small proportion of households.

While there are differences in experiences in women's employment according to their socio-economic status, there are also geographic differences. Breen and Andersen

(2012) conducted a cross-cultural study of the United States and Denmark, examining the role of female education in assortative mating and income inequality.

The first thing of importance to note is that female participation in the labour market differs greatly between these two nations. In Denmark, income inequality is low (albeit growing), largely due to a cultural preference for redistribution (Breen & Andersen, 2012). By contrast, income inequality is high in the United States where a distaste for redistributive policy measures dominates political rhetoric.

Interestingly, Breen and Andersen (2012) note that household income inequality generated through educational assortative mating is greater in Denmark than the effect of educational assortative mating in the United States (Breen & Salazar, 2011; Western, Bloome, & Percheski, 2008). Breen and Andersen (2012) appear somewhat confounded by this result, as educational homogamy in Denmark has actually declined during the period examined (1987-2006) while household income inequality has increased.

Breen and Andersen (2012) are reluctant to draw a causal link between high rates of female labour force participation and household income inequality growth, although they do highlight the increased participation as a highly plausible explanation. Breen and Andersen (2012) are also quick to note that the Danish labour market is highly regulated, allowing women to receive a fairer return for their education. They highlight that this may explain some of the difference between the impact of wives' earnings on household income inequality in Denmark versus the relatively under-regulated markets of the United States.

Schwartz (2013) conducts somewhat of an overview of the current literature within the assortative mating field. The relationship between wives' earnings and education, assortative mating, and household income inequality is complicated and frequently convoluted. Despite this, Schwartz (2013) has made an attempt to explain the mechanism. Educational assortative mating will only produce increases in household income inequality if women see appropriate returns on their education in the form of higher incomes for university educated women (Schwartz, 2013). If this fails to occur, the impact of assortative mating on household income inequality will be negligible as relationship between education and income will be violated for women.

Schwartz (2013) highlights the geography of returns on education as a relatively unexplored field which could be explored to further our understanding of assortative

mating and household income inequality. Once the returns for (female) education begin to increase, any increases in the prevalence of educational assortative mating will act to further increase household income inequality (Schwartz, 2013).

As mentioned, there is some controversy within the literature as to whether educational assortative mating is resulting in increasing household income inequality. Some scholars have disputed this claim, saying that they have found little evidence to support the role of assortative mating in generating household income inequality.

Breen and Salazar (2011) and Western et al. (2008) both carried out studies examining the changes in household income inequality in the United States between the 1970s and the early 2000s. During this period in the United States, like in most developed nations, there was an increase in household income inequality (Breen & Salazar, 2011; Western et al., 2008). During this period there was also an increase in educational assortative mating. Despite this correlation, both studies concluded that assortative mating was not generating household income inequality.

The study conducted by Breen and Salazar (2011) decomposed income inequality between families into between-group and within-group components. The distinction between these two types was marked. Households were broken down into types based on education levels of the adult(s) within them. An increase in between-household income inequality indicates that educational sorting is driving inequality. Between-group refers to differences in households of different types of education. Within-group differences is variation in the income received by households of the same type.

Breen and Salazar (2011) and Western et al. (2008) discovered that the contribution of between-group differences to the growth in overall household income inequality was negligible. Within-group household income inequality was shown to be a far more significant contributor to growing inequality (Breen & Salazar, 2011; Western et al., 2008). Within each of the groups, each household had the same educational characteristics. Therefore, education is not useful in explaining income differentials within each of these groups.

In order to explain an increasing within-group inequalities we must assume that there has been an increasing preference within the labour market for non-educational characteristics such as intrinsic ability or work effort (Western et al., 2008). We can infer from these changes in income distribution that during the period from the 1970s to

the early 2000s there has been an increasing heterogeneity of earnings for the same level of education.

The question remains, if assortative mating was shown to play only a modest at best role in generating household income inequality in the United States during the examined period, does this invalidate the theory of assortative mating as a driver of household income inequality? All authors discussed above, Breen and Andersen (2012), Breen and Salazar (2011), and Western et al. (2008), were quick to assert that their research in no way universally invalidates the theory that assortative mating generates household income inequality.

The United States labour market has been heavily deregulated during this period which has resulted in education being a poor predictor of earnings (Breen & Salazar, 2011; Western et al., 2008). As a result, the link between educational assortative mating and income inequality is weak, or potentially non-existent, in the United States under current economic conditions.

By acknowledging the importance of economic structures in influencing the relative importance of assortative mating on income inequality, the importance of geography is highlighted. The current research has been heavily focused around understanding the situation in the United States. The two studies explored through this section highlight the importance of considering geography. By extending the analysis beyond the United States, as I do in my thesis, we can begin to understand the role of these market mechanisms in determining the relative importance of partnering decisions on household income inequality.

2.3: Conclusion

In our lives, most of us will have to make a decision about who we chose to partner with, often more than once. While these partnering decisions are intimate choices, made by individuals and families, they have wider implications. Within this literature analysis I have explored the ways in which these decisions are made. It is reasonable to assume most people chose their partner based on a series of personal features I have labelled here as cultural preferences. Without dismissing the significance of cultural preferences, I have also proposed that individuals also have a tendency to select educationally like partners as a result of structural constraints; primarily those controlled by the market.

Regardless of the reason why people select mates, we see a general trend towards educational homogamy, resulting in educational assortative mating. Micro decisions made by individuals have macro outcomes for the society as a whole. Educational assortative mating allows for the concentration of resources in a disproportionality small number of households. This clustering of resources is thought to have long-run implications, particularly for income inequality. It is proposed that the uneven distribution of educational resources and income has implications for generations. It is possible, and plausible, that assortative mating plays a role in the replication of income inequality across generations.

The degree to which each of these phenomena occur is highly dependent on geography. However, the role of geography remains relatively unexplored within the literature. It is my hope that this study can work towards aiding the understanding of the relationship between assortative mating, income inequality, and place.

Chapter 3: Methodology and Research Design

In Chapter Two I outlined the existing literature surrounding the interactions between educational assortative mating and income inequality. I summarised the existing understanding of the various drivers of educational homogamy. I then explored some of the current theory surrounding the effects of educational assortative mating on income inequality.

In the thesis presented here, the importance of education is emphasised. The importance of education for individuals lies in how education determines their ability to select a desirable mate. However, the importance of education also extends beyond the individual, into playing a role in determining how the labour market operates. As I have explored in the literature review, educational attainment of a population is key in determining rewards for labour.

It is primarily the relationship between assortative mating as a driver of income inequality which I am investigating in this thesis. Despite countless studies into understanding the drivers of income inequality, we still have scant understanding of how it operates, and why society continues to allow it to prevail to such an extent.

Within the literature review I also explored the role geography could play in the interaction between assortative mating and income inequality. In my opinion, geography has been under-utilised within the assortative mating literature. Particularly there is scope for the comparative research to be extended beyond the United States. I believe that geography can be better used to address the concern we have for increasing income inequality.

3.1: Data

In have used data from the European Social Survey (ESS) for this analysis. The ESS is collected every two years; the first iteration collected in 2002. At the time of writing this thesis, the most recent complete survey was Round 6 (2012). Round 7 (2014) has been partially released to the public. In order to complete a thorough analysis on all available countries using the most contemporary data available, my analysis will use ESS Round 6 which was collected across 29 European nations.

As the name suggests, the role of the ESS is to provide information relating to social conditions in Europe. The ESS collects both empirically based measures, such as educational attainment, and more subjective data. These subjective measures allow participants to articulate their experiences of residing in modern Europe.

The data from the ESS is in the form of unit records. This format means I am able to identify the characteristics of individual respondents. The primary reason for selecting this dataset is that it has substantial information about respondents' partners. The data about the respondents' partners means I am able to build a picture about the make-up of households across the 29 countries.

The ESS is administered by individual countries. Nations have a target of a minimum response rate of 70 percent (The Sampling Expert Panel of the ESS, 2012). Probability samples of the entire population aged 15 years and over are used. It is intended that the sample collected will be representative of the survey population (The Sampling Expert Panel of the ESS, 2012). In nations with more than 2 million inhabitants, a minimum sample size of 1,500 respondents is expected. In countries with fewer than 2 million inhabitants, a target sample size of 880 respondents is set down.

Four nations in total do not meet the expected sample sizes for their population size. Iceland, with a population of roughly 300,000 people was expected to collect a minimum of 880 responses (as opposed to the 752 collected). Albania, Italy, and Switzerland, with populations exceeding two million inhabitants were expected to collect 1,500 responses which they failed to meet. I am not going to discard the results from these nations, however, their small sample size means that sometimes results from these countries will not be useable.

Sampling methods vary between countries. It is stipulated by the ESS governance that all nations must use random sampling methods. The ESS allows countries to choose their own sampling method as it acknowledges that the optimal sampling design will vary according to cultural characteristics (The Sampling Expert Panel of the ESS, 2012). Typically, some method of stratified random sampling is to be used. This method of sampling, however, relies on some register of residents or households. When these registers are not available, multi-stage sample designs are used.

In the sample collected by the ESS the proportion of males and females is uneven, with more women in the sample than men. Men, and in particular young men, typically have lower response rates than the rest of the population.

3.2: Variable description

The ESS is released to users with individuals responses coded under a number of headings. The majority of the data provided surplus to requirement for this thesis. However, descriptions of the variables I have used in this thesis are included below.

Six key variables are used in my thesis, a description of each variable, how the variable is obtained from respondents, and how I have formatted the variable are all included below. The six key variables examined relate to education, partnership, sex, age, country, and household income.

Education

I have chosen to categorise education into 5 levels; primary school only, secondary school (high school), vocational education, bachelor's level education, and post-graduate education. The level of education for the respondent and their partner (where applicable) are coded into one of the five categories. In instances where the response was not able to be used in the analysis, for example when a respondent answered "not sure' or 'other', these responses were removed from the analysis.

In the ESS questionnaire, respondents are asked

> *What is the highest level of education you have successfully completed?*

The responses are then coded into one of 27 categories. For this question, International Standard Classification of Education (ISCED) categories are used to maintain consistency across nations.

The Table below, Table 3.1, shows how the total sample (aged 26 years and over) are classified into the five levels of education.

Table 3.1: Respondents' levels of education from 29 European nations, 2012.

Level of education	Frequency	Percentage	Cumulative Percentage
Primary	5,861	10.79	10.79
Secondary	16,803	30.94	41.73
Vocational	15,502	28.54	70.28

Bachelor	9,432	17.37	87.64
Post-graduate	6,711	12.36	100.00
Total	54,309	100.00	

Source: ESS, 2012

The same question is also asked about the respondent's partner. I have coded the respondent's partner's education in the same way.

Partnership

The second variable of significance is the partner variable. The unit of analysis in assortative mating is primarily the household. In order to conduct analysis at the household level, respondents and partners must be matched.

The ESS questionnaire asks respondents how many other people live in the household. If the respondent indicates that they live with at least one other person, they will be asked their relationship with each of these people. If the respondent says they live with a partner, the interviewer will ask what their relationship with the partner is (for example, married, civil union, de facto union). In the analysis here I am not interested in the type of relationship the respondent has with their partner. Therefore I have categorised the relationship variable into a yes or no response. Yes if the respondent lives with a partner, no if they do not. Once again, ambiguous responses (refuse to answer, for example) have resulted in the respondent's record being excluded from the analysis.

The relationship variable is coded as below in Table 3.2.

Table 3.2: Do respondents from 29 European nations live with a partner, 2012

Partner?	Frequency	Percentage
Yes	31,683	58.54
No	22,436	41.46
Total	54,119	100.00

Source: ESS, 2012

Sex

Sex is an important variable in my analysis. The ESS asks the sex of the respondent but it does not ask the sex of the respondent's partner. Therefore, I have had to make the assumption that everyone in the sample is in a heterosexual relationship. Ambiguous responses have been excluded from the data.

Sex of the respondents is presented below in Table 3.3.

Table 3.3: Respondent's sex from 29 European nations, 2012.

Sex	Frequency	Percentage
Male	24,645	45.55
Female	29,459	54.45
Total	54,104	100.00

Source: ESS, 2012

Age

Temporal changes are thought to be significant within assortative mating. Therefore, knowing the age of respondents is important. I have chosen to exclude all respondents (and partners, if applicable) aged under 26 years of age. The decision to exclude the youngest respondents was inspired by Callister (1998) who justified excluding those aged under 25 due to the likelihood that they had not yet established serious relationships and/or completed formal education.

We do not know the age of the partners, unfortunately, and I have simply used the respondent's age as a proxy for the partner's age.

The ESS establishes respondent's age by asking what year they were born.

In my analysis I have chosen to classify age into three levels, 26<40 years, 40<65 years, and 65+ years, while excluding those aged under 26. Table 3.4 below shows the three age groups and the number of respondents in each age group.

Table 3.4: Number of respondents from 29 European nations in each of the three age groups, 2012.

Age	Frequency	Percentage	Cumulative Percentage
26<40 years	11,456	24.66	24.66
40<65 years	22,983	49.47	74.13
65+ years	12,021	25.87	100.00
Total	46,460	100.00	

Source: ESS, 2012

Country

Cross-country analysis is a central component of this thesis. Therefore, it is essential that individual countries in the 29 nation sample can be identified. Each response has been connected to one of the 29 countries, and each of these countries have been assigned a two letter code as in Table 3.5.

Table 3.5: Table of 29 European countries in the 2012 ESS, number of respondents per country.[1]

Country	Frequency	Percentage
AL	1,156	2.14
BE	1,851	3.34
BG	2,260	4.19
CH	1,486	2.75
CY	1,109	2.05
CZ	1,926	3.57
DE	2,896	5.36
DK	1,645	3.05
EE	2,375	4.40
ES	1,874	3.47
FI	2,195	4.07
FR	1,967	3.64
GB	2,185	4.05
HU	2,008	3.72
IE	2,604	4.82
IL	2,443	4.52
IS	737	1.36
IT	885	1.64
LT	2,106	3.90
NL	1,840	3.41
NO	1,617	2.99
PL	1,888	3.50
PT	2,147	3.98
RU	2,481	4.59
SE	1,835	3.40
SI	1,251	2.32
SK	1,790	3.32
UA	2,155	3.99
XK	1,284	2.38
Total	53,996	100.00

Source: ESS, 2012

Household income

The last significant variable I have used is households net income. As the name would suggest, the income decile variable places each household into one of ten deciles according to their net household income. The decile groupings are set using net incomes in each country. Respondents are given a choice whether they report their household income as a weekly, monthly, or annual figure. These responses are then coded and placed in a decile.

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[1] Country codes: AL: Albania, BE: Belgium, BG: Bulgaria, CY: Cyprus, CZ: Czech Republic, DK: Denmark, EE: Estonia, FI: Finland, FR: France, DE: Germany, GB: Great Britain, HU: Hungary, IS: Iceland, IE: Ireland, IL: Israel, IT: Italy, LT: Lithuania, NL: Netherlands, NO: Norway, PL: Poland, PT: Portugal, RU: Russia, SK: Slovakia, SI: Slovenia, ES: Spain, SE: Sweden, CH: Switzerland, UA: Ukraine, XK: Kosovo.

As per the other variables, ambiguous responses are excluded. The household income decile reports on all sources of income, with 1 having an income in the lowest 10%, 10 in the highest 10% of the income distribution. Table 3.6 below shows the distribution of income deciles across the 29 countries.

Table 3.6: Household net income deciles for respondents from 29 European countries, 2012.

Income decile	Frequency	Percentage	Cumulative percentage
1	4,994	11.46	11.46
2	5,438	12.48	23.93
3	4.970	11.40	35.33
4	4,850	11.13	46.46
5	4,498	10.32	56.78
6	4,284	9.83	66.61
7	4,118	9.45	76.05
8	3,802	8.72	84.78
9	3,227	7.40	92.18
10	3,409	7.82	100.00
Total	43,590	100.00	

Source: ESS, 2012

3.3: Measuring assortative mating

Measuring assortative mating is central to my analysis. The objective of measuring assortative mating is to distinguish the matching that is occurring from what would occur under conditions where individuals match randomly. The following approach outlined here has been used to establish the level of assortative mating at the country level. The assortative mating variable is used in chapter 5.

In order to measure assortative mating, I construct a contingency table for each country and age group included in the analysis of male partner's education by female partner's education, see chapter 4 for an illustration. Within each of the cells of the contingency table is a value signifying the frequency of households within that partnership type. By using the same procedure you would if you were running a chi-squared test, expected values are generated for each household type.

The measure of assortative mating I am calculating uses these two values to describe the degree to which observed assortative mating occurs above what would be expected under educationally random mating. In order to assign a numeric value to the degree of

assortative mating I have calculated the percentage of the expected frequency for each household type we observe. To measure this variable I compare the observed frequency of each household type to the frequency we would expect under educationally random mating. These expected values are generated by Stata. This measure can be represented as (expected frequency/observed frequency*100). Essentially the larger the percentage, the greater the preference for educational assortative mating.

3.4: Methods

I have used three statistical models throughout this thesis; contingency tables (chi-squared), linear regression, and non-linear, logistic regression.

3.5: Limitations

I have identified three main limitations to this research I would like to make my reader aware of. The first relates to potential issues with sampling. Secondly, there are two assumptions I have to make when coding the data which in some instances may be incorrect assumptions. Lastly, I would like to address the limitation of the inconsistency around one of the measures I have used.

The ESS is a large, well-funded, multi-national survey. Within this survey, rigorous sampling methods were used. However, these varied between nations. In some nations a register of individuals or households was available, allowing for stratified sampling. In instances where a register was not available, multi-stage sample design was used. While not necessarily an issue, the variation in sampling methods is a limitation of the survey.

The aim of a survey is to investigate a sample population in lieu of studying the entire population. Consequently, the sample population should be as alike the actual population as possible. However, it is unavoidable that certain some characteristics will be under- or over-represented in the sample population. Typically, we would expect to see young people (particularly young males), the less well-educated, and poorer people disproportionately under-represented in the sample. Conversely, we expect to see a relatively greater proportion of women, older people, those with higher levels of education, and the more-wealthy contained in the sample population. I compared the genders of the respondents, confirming what I expected; women tend to have a higher survey response rate. The survey is also unable to record people with informal housing and those who are incarcerated or in institutions.

Aside from the reasons I have already discussed in section 3.5 around the decision to exclude younger people from my analysis, I have also been driven to exclude young people to avoid some of the error arising from response rates of young people. As discussed above, young people, particularly young males, are less likely to respond to the survey. Therefore, those young people captured by the survey are likely to be less representative of the young population than the survey population of older groups.

The second limitation I want to communicate is to do with some assumptions I have had to make when processing the data contained in the ESS. The first assumption I needed to make in order to progress with my analysis was to assume that all couples were heterosexual. Within the ESS dataset, there is information about the gender of the respondent and whether or not they are living with a partner. However, there is no information relating to the gender of this partner.

While there is no information on the gender of the respondent's partner, there is also no information on the age of their partner. As mentioned previously, I have excluded some respondents (and their partners, if applicable) from the dataset if they are 25 years or younger. I have also chosen to analyse some age groups separately. These distinctions are based solely on the age of the respondent. In making these distinctions, I am assuming that their partner is also within the defined age structure. We are aware that people assortatively mate based on age. However, it is inevitable that some of the partners contained within the groups of analysis fall outside of the specified age brackets. As there is no way of identifying who these people are, I will have to accept this limitation.

The last significant limitation of this study arises as a result of how income is measured. As I discussed earlier, income is measured as a decile value, rather than a net income for each household. As a result, there have been some restrictions as to the extent to which I can generalise my findings. The implications of this limitation is discussed further in chapter 6.

3.6: Summary

The chapter has outlined the research design and methodology used to conduct a cross-country study of the relationship between assortative mating and income inequality. This comparative study will use results obtained from the ESS to test hypothesises and questions that have arose through an examination of the literature.

Chapter 4: Assortative Mating and Education, Unit Record Analysis

One of the advantages of the European Social Survey is that we have access to unit record data. Unit record data allows us to exploit the partnering decisions of individuals. The aim of this chapter is to use these responses of individuals to explore the way sampled partners across Europe in 2012 have matched on the basis of their education (as of 2012).

What does assortative mating look like? We are aware that there is a general tendency to partner with an educationally like person. However, I want to explore how these patterns manifest in order to assist in answering the central question of this thesis; what is the relationship between assortative mating and household income inequality?

In this chapter I assess the propensity of individuals to partner with their educational like. The analysis will examine how the propensity for assortative mating changes across the education levels, as well as examining the role of cohort and geography in partnering behaviours.

4.1: Education distribution

Education is defined here at five levels. Below is the distribution for men's and women's education for all respondents and their partners. For reasons discussed in chapter 3, I have excluded all respondents (and their partners, if applicable) aged 25 and under. In the distribution below I have only included those respondents who are living with a partner.

Table 4.1: Male distribution of education, ages 26-103 years, 29 European nations.

Male education	Frequency	Percentage	Cumulative percentage
Primary	2,751	9.20	9.20
Secondary	7,463	24.95	34.15
Vocational	10,222	34.17	68.32
Bachelor	5,198	17.38	85.70
Post-graduate	4,277	14.30	100.00
Total	29,911	100.00	

Source: ESS, 2012

Table 4.2: Female distribution of education, ages 26-103 years, 29 European nations.

Female education	Frequency	Percentage	Cumulative percentage

Primary	2,869	9.59	9.59
Secondary	8,203	27.42	37.02
Vocational	8,691	29.06	66.07
Bachelor	6,029	20.16	86.23
Post-graduate	4,119	13.77	100.00
Total	**29,911**	**100.00**	

Source: ESS, 2012

The two above distributions are similar. The main difference between the genders is the greater likelihood of men to have a vocational education, and the slightly elevated probability of a woman having a bachelor's qualification.

The value of unit record data is that I am able to access the educational attainments of the both partners in the household and show the educational attainments of the male and female partners in a cross-tabulation. Table 4.3 shows the proportion of men in each education category who are partnered with women in each education category. The cross-tab allows us to show, in simple terms, the likelihood of educationally homogenous households forming. Educationally homogenous households occupy the main diagonal, in bold.

Table 4.3: Column percentages of the proportion of women in each education category partnered with men in each category, aged 26+ years, 2012.

Male education	**Female education**					
	Primary	Secondary	Vocational	Bachelor	Post-grad	Total
Primary	**61.94**	7.41	2.77	1.79	0.41	9.20
Secondary	21.68	**50.52**	16.10	14.99	9.57	24.95
Vocational	12.37	28.81	**60.60**	26.89	14.96	34.17
Bachelor	3.10	9.12	13.47	**38.27**	21.44	17.38
Post-grad	0.91	4.14	7.05	18.06	**53.63**	14.30
Total	100.00	100.00	100.00	100.00	100.00	100.00

Pearson Chi^2 (16) = 2.4e+04   Pr=0.000
Source: ESS, 2012

I have included with Table 4.3 above, the chi-squared test statistic and p-value. The p-value of less than 0.05 indicates that at the 95% confidence level we are able to reject the null hypothesis that the two variables are independent. The chi-squared result indicates, without further analysis, that there is a relationship between the two variables; male and female education, in the formation of households.

The column percentages in Table 4.3 show that women are most likely to seek out an educationally alike mate at the primary school and vocational levels of education.

61.94% and 60.60% of women in these respective categories have an equally educated partner. At the lower end of the education distribution, it appears that women with only a primary education find it difficult to find a partner with more than their level of education, with only 21.68% having a secondary school educated partner. Just over 4% of women with only a primary school education are in a relationship with a man with some sort of university education. Women with a bachelor's education are the least likely to assortatively mate (38.27%). Only 21.44% of women with a post-graduate education are married to a man with a bachelor's education. However, 53.63% of women with a post-graduate are in a relationship with a man of equal education.

Table 4.4 (below) shows that men with only primary school educations are also the most likely to select an educationally like partner, with almost 65% of the sample population doing so. Men with secondary, vocational, and post-graduate educations have a slightly lower tendency to be in relationships with educationally like women. As in the case for women with post-graduate education, the likelihood of a man with a post-graduate education being in a relationship with a woman with a bachelors education is 16.99%, but that jumps to 51.65% for a woman with a post-graduate education.

Table 4.4: Column percentages of the proportion of men in each education category partnered with women in each category, respondents aged 26+ years from 29 European nations, 2012.

Male education	Female education					
	Primary	Secondary	Vocational	Bachelor	Post-grad	Total
Primary	**64.59**	22.10	8.76	3.93	0.62	100.00
Secondary	8.33	**55.53**	18.75	12.11	5.28	100.00
Vocational	3.47	23.12	**51.53**	15.86	6.03	100.00
Bachelor	1.71	14.39	22.53	**44.38**	16.99	100.00
Post-grad	0.61	7.95	14.33	25.46	**51.65**	100.00
Total	9.59	27.42	29.06	20.13	13.77	100.00

Pearson Chi^2 (16) = 2.4e+04   Pr=0.000
Source: ESS, 2012

The primary mode of analysis in the forthcoming chapter is logistic regression. The estimated odds ratio estimates from logistic regression is not easy to understand. Therefore, Stata has developed a more useful command called "margins" which estimates the predicted probability. By applying the margins command in my research I am able to report the probability of a woman (or man) being in a relationship with a

person with a particular level of education, given the woman (or man's) level of education. For example, if a man has a bachelor's degree, what is the estimated probability of a woman with a primary school education, secondary school education, and so on, being in a relationship with the man?

4.2: Bachelor's degree assortative mating

I will start my analysis by estimating the probability of a woman being in a relationship with a man with a bachelor's degree, given she also has a bachelor's degree. I then compare this with the probability she partners with men at lower and higher levels of education.

I begin with the whole sample population aged 26 years and over, first for men then women.

The three age groups will be assessed for differences. Country effects are also included to account for overall differences in education by country.

Table 4.5 and Figure 4.1 show at various levels of women's education, the probability of her partner having a bachelor's degree level education. While we are primarily interested in the level of assortative mating, the other levels of education provide some interesting insight.

Table 4.5: The probability of various matches by men with a bachelor's degree education, respondents aged 26+ years from 29 European nations, 2012.

Number of observations = 30,946

Expression: Pr(bmale), predict ()

	Delta method					
Female	**Margin**	**Std. Error**	**z**	**P>|z|**	**95% confidence interval**	
Primary	0.031	0.003	9.64	0.000	0.025	0.034
Secondary	0.091	0.003	29.47	0.000	0.085	0.098
Vocational	0.133	0.004	37.08	0.000	0.126	0.140
Bachelor	0.383	0.006	62.42	0.000	0.371	0.395
Post-grad	0.214	0.006	33.85	0.000	0.202	0.227

Source: ESS, 2012

Figure 4.1: The probability of a man with a bachelor's degree education will partner with a woman by education level, respondents aged 26+ years from 29 European nations, 2012.

Adjusted Predictions of female with 95% CIs
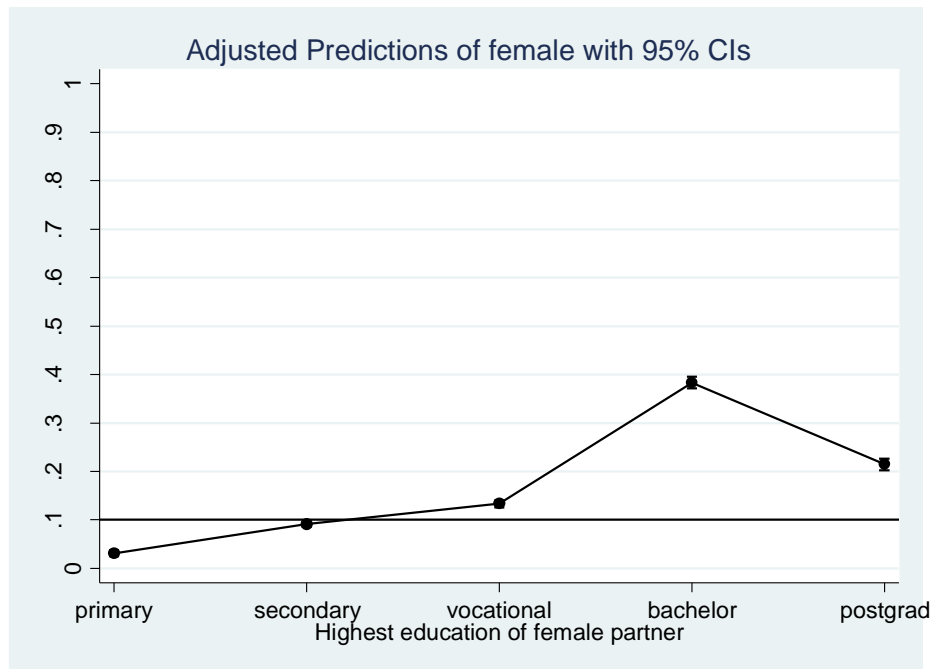
Source: ESS, 2012

We can see from the above results that assortative mating is occurring amongst the 2012 European sample at the bachelor's level of education. If we assess across all levels of female education, the highest probability of a man with a bachelor's education partnering with a woman is amongst those women with a bachelor's education (assortative mating). Men in the 2012 European sample have an estimated probability of 0.38 of partnering with a woman with a bachelor's education if they themselves have a bachelor's education. In comparison, the probability of a man with a bachelor's education partnering with a woman with a vocational education is just 0.13. Just 3% of men in the sample with a bachelor's education are partnered with a woman with only a primary school education. Men with a bachelor's education are slightly less (0.21) likely to be in a relationship with a women if she has a post-graduate education than if she has a bachelor's level education. Please note, these results differ from those in table 4.4 because the regression controls for country effects, which table 4.5 does not.

The next stage of analysis will be similar to the analysis in Table 4.5 and Figure 4.1, however this time male education will be the independent variable. The output of the margins analysis are shown below in Table 4.6 and Figure 4.2.

Table 4.6: The probability of various matches, woman with a bachelor's degree education.

Number of observations = 30,946
Expression: Pr(bfemale), predict ()

Male	Margin	Std. Error	z	P>|z|	95% confidence interval	
					Delta method	
Primary	0.040	0.004	10.85	0.000	0.033	0.048
Secondary	0.122	0.004	33.02	0.000	0.115	0.129
Vocational	0.159	0.004	44.66	0.000	0.152	0.166
Bachelor	0.447	0.007	65.93	0.000	0.434	0.460
Post-grad	0.256	0.007	38.79	0.000	0.243	0.269

Source: ESS, 2012

Figure 4.2: The probability of a woman with a bachelor's degree education will partner with a man by education level, respondents aged 26+ years from 29 European nations, 2012.
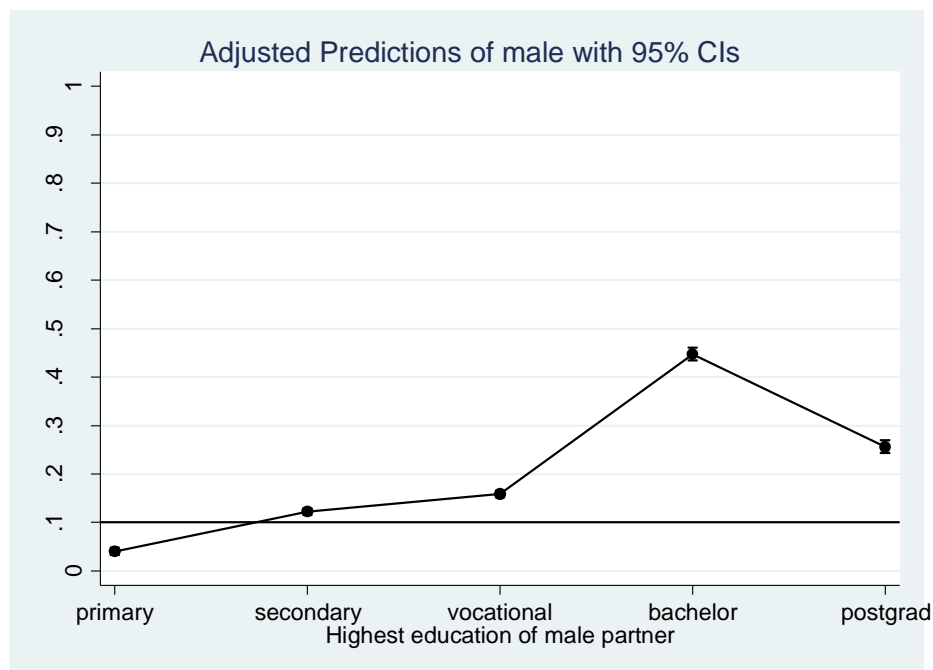
Source: ESS, 2012

The above results are similar to when the female education variable was the independent variable. The closeness of the results indicates that there is a symmetry in the way in which men and women in the sample partner based on education characteristics. The predicted probability that a man with a bachelor's level education will partner will a similarly educated partner is 0.45. The probability of the match drops

to 0.26 when he has a post-graduate education. These results are contrasted with 0.38 and 0.21 respectively when female education was the independent variable.

The likelihood of an educationally homogenous partnership is slightly higher when we examine the likelihood of a man with a bachelor's education having a similarly educated partner, as opposed to when the probability that a woman with a bachelor's education will have a similarly educated partner. The elevated likelihood of assortative mating when male education was the independent variable suggests that men in the European 2012 sample will seek partners of the same educational status as themselves at a greater rate than women will.

Assortative mating is closely linked to temporally situational social and economic conditions. Therefore, it is likely that there are changes over time in the propensity to assortatively mate. For this reason, I am interested in examining the differing degrees of assortative mating across the three age groups previously discussed.

In the following analysis, I examine cohort differences using the predicted probabilities (margins) command. My initial analysis will use women's education as the independent variable and the probability of the partner being a man with a bachelor's education as the response variable. After I have conducted the analysis using female education as the independent variable, I will reverse the test and use male education as the independent variable.

The results will be shown below in Table 4.7 and Figure 4.3 for the test using female education as the independent variable. Table 4.8 and Figure 4.4 will show the results of male education as the independent variable for the three age groups. The model includes the independent variable interacted with age, as well as the age main effect.

Table 4.7: The probability of a man with bachelor's education partnering with women at various levels of education, respondents aged 26+ years from 29 European nations, 2012. Age effects controlled for.

Number of observations = 29,911
Expression: Pr(bmale), predict ()

Female	Margin	Std. Error	z	P>|z|	95% confidence interval	
					Delta-method	
Primary	0.030	0.004	7.31	0.000	0.022	0.038
Secondary	0.091	0.003	28.61	0.000	0.085	0.097
Vocational	0.135	0.004	36.57	0.000	0.128	0.142
Bachelor	0.379	0.006	58.50	0.000	0.366	0.391
Post-grad	0.206	0.007	31.50	0.000	0.193	0.219

26<40 years	0.180	0.004	44.37	0.000	0.172	0.188
40<65 years	0.170	0.003	59.93	0.000	0.164	0.175
65+ years	0.167	0.005	32.00	0.000	0.157	0.177
Primary#26<40years	0.023	0.011	2.02	0.043	0.001	0.044
Primary#40<65years	0.033	0.005	6.27	0.000	0.023	0.044
Primary#65+years	0.030	0.004	6.96	0.000	0.218	0.039
Secondary#26<40years	0.089	0.007	13.38	0.000	0.076	0.102
Secondary#40<65years	0.100	0.004	21.25	0.000	0.084	0.100
Secondary#65+years	0.091	0.007	13.88	0.000	0.078	0.104
Vocational#26<40years	0.127	0.008	16.69	0.000	0.112	0.142
Vocational#40<65years	0.134	0.005	28.21	0.000	0.125	0.144
Vocational#65+years	0.145	0.009	16.72	0.000	0.128	0.162
Bachelor#26<40years	0.411	0.011	38.11	0.000	0.390	0.433
Bachelor#40<65years	0.367	0.009	42.84	0.000	0.350	0.384
Bachelor#65+years	0.370	0.017	21.46	0.000	0.337	0.404
Post-grad#26<40years	0.242	0.011	22.03	0.000	0.220	0.263
Post-grad#40<65years	0.206	0.009	23.46	0.000	0.189	0.224
Post-grad#65+years	0.163	0.017	9.65	0.000	0.130	0.197

Source: ESS, 2012

From the above margins output, I can see that with the exception of the higher degrees, age has little effect. The low overall effect of age is shown by the small marginal difference between the three age groups, as evidenced in the middle section of the table (under the heading 'age3'). As the education increases, there is a tendency for younger women to be more likely to partner with a man with a bachelor's education. The greater tendency for more highly educated young women to partner with bachelor's educated men is evidenced by the interaction effects of age and education. If I compare the last six rows of the table, it is clear that as we move down the age cohorts, from oldest to youngest, there is an increasing predicted probability that a woman in these groups will partner with a man with a bachelor's education. If I compare these bottom six rows of interaction effects to the other rows of interaction effects it is clear that there is a smaller degree of variation in the predicted probability of a woman partnering with a bachelor's educated man between cohorts for non-university educated women.

Figure 4.3: The probability of a man with bachelor level of education partnering with a woman by education level, three age groups, respondents aged 26+ years from 29 European nations, 2012.
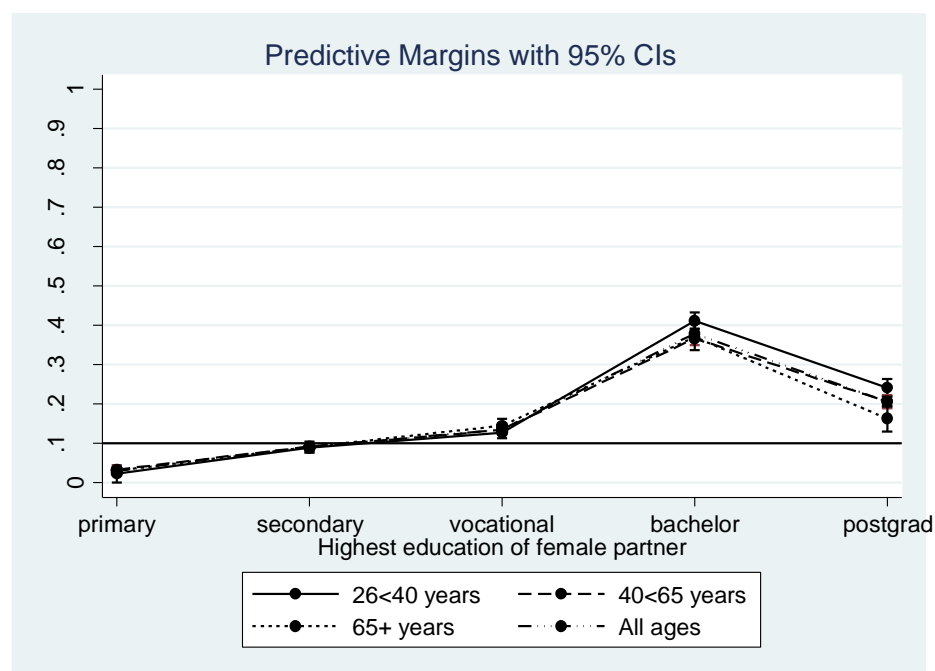
Source: ESS, 2012

Table 4.8: The probability of a woman with bachelor's education partnering with men with various levels of education, respondents aged 26+ years from 29 European nations, 2012. Age effects controlled for.

Number of observations = 29,911
Expression: Pr(bfemale), predict ()

Male	Margin	Std. Error	z	P>|z|	95% confidence interval	
					Delta-method	
Primary	0.051	0.006	8.51	0.000	0.039	0.063
Secondary	0.121	0.004	32.19	0.000	0.114	0.128
Vocational	0.156	0.004	44.07	0.000	0.149	0.163
Bachelor	0.434	0.007	62.75	0.000	0.420	0.447
Post-grad	0.254	0.007	37.90	0.000	0.241	0.268
26<40 years	0.253	0.005	52.24	0.000	0.244	0.263
40<65 years	0.197	0.003	65.72	0.000	0.191	0.203
65+ years	0.145	0.005	31.65	0.000	0.136	0.154
Primary#26<40years	0.081	0.019	4.17	0.000	0.043	0.119
Primary#40<65years	0.046	0.006	7.31	0.000	0.034	0.058
Primary#65+years	0.028	0.004	6.50	0.000	0.020	0.037
Secondary#26<40years	0.164	0.009	19.06	0.000	0.147	0.180
Secondary#40<65years	0.119	0.005	23.41	0.000	0.106	0.128
Secondary#65+years	0.076	0.007	11.26	0.000	0.063	0.090
Vocational#26<40years	0.227	0.008	27.18	0.000	0.211	0.243
Vocational#40<65years	0.153	0.005	32.63	0.000	0.144	0.162
Vocational#65+years	0.082	0.006	12.70	0.000	0.069	0.094
Bachelor#26<40years	0.524	0.124	42.36	0.000	0.499	0.548

Bachelor#40<65years	0.425	0.009	44.94	0.000	0.406	0.443
Bachelor#65+years	0.350	0.017	21.12	0.000	0.317	0.382
Post-grad#26<40years	0.254	0.012	21.10	0.000	0.131	0.278
Post-grad#40<65years	0.259	0.009	27.73	0.000	0.240	0.277
Post-grad#65+years	0.244	0.016	15.73	0.000	0.214	0.275

Source: ESS, 2012

There are some differences in the predicted probability of men of varying levels of education and cohorts to partner with women with a bachelor's degree. Across the group of post-graduate educated men, there is little difference across the three age cohorts in their predicted probability of partnering with a bachelor's educated woman. However, for men with all other levels of education, it seems that men in younger cohorts are more likely to have a female partner with a bachelor's degree than older men. The change over time is likely as a result of women's late entry into higher education, and their relative abundance in younger cohorts.

Figure 4.4: The probability of a woman with bachelor's levels of education partnering with a man by education level, three age groups, respondents aged 26+ years from 29 European nations, 2012.
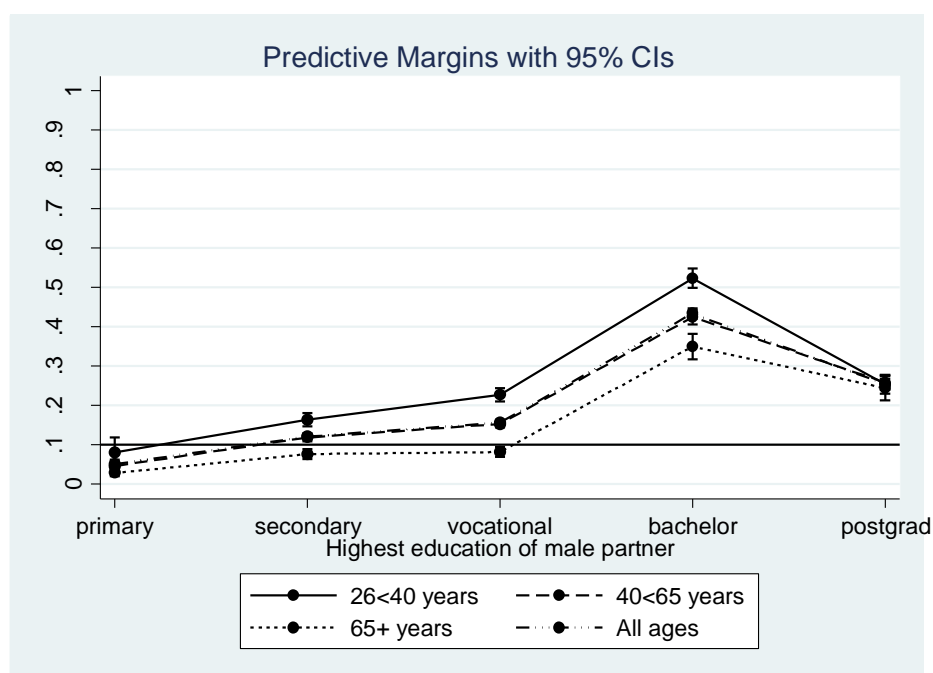
Source: ESS, 2012

Interestingly, when age is taken into account, the younger cohorts exhibit higher levels of assortative mating at the bachelor's education level. When female education is the independent variable (Table 4.7 and Figure 4.3), the probability of partnering with a man at each level of education differs little across the three age groups until bachelor's

and post-graduate education, where the age differences are more pronounced, as I have already noted. When male educational attainment is the independent variable, the differences between the age groups are more pronounced at all stages of education aside from the post-graduate level of education.

I will now carry out the above analysis, controlling for country effects in order to control for geographic variations in the way education is distributed across the population in Europe. I will first carry out the country-controlled analysis assessing the probability of a bachelor's educated man partnering with women with different education, with particular interest in bachelor's education when age differences are also controlled for. Following this, I will use male educational attainment as the independent variable.

Table 4.9: The probability of a man with bachelor's education partnering with women with various levels of education, respondents aged 26+ years from 29 European nations, 2012. Country and age effects controlled for.

Number of observations = 29,911
Expression: Pr(bmale), predict ()

| Female | Delta-method | | | | | |
	Margin	Std. Error	z	P>|z|	95% confidence interval	
Primary	0.035	0.005	7.06	0.000	0.025	0.044
Secondary	0.097	0.003	28.48	0.000	0.090	0.104
Vocational	0.143	0.004	35.39	0.000	0.135	0.151
Bachelor	0.326	0.006	54.85	0.000	0.315	0.337
Post-grad	0.200	0.006	31.27	0.000	0.188	0.213
26<40 years	0.183	0.004	45.21	0.000	0.175	0.191
40<65 years	0.170	0.003	60.97	0.000	0.164	0.175
65+ years	0.162	0.005	32.08	0.000	0.152	0.172
Primary#26<40years	0.028	0.014	2.04	0.042	0.001	0.054
Primary#40<65years	0.039	0.006	6.26	0.000	0.027	0.051
Primary#65+years	0.033	0.005	6.96	0.000	0.023	0.042
Secondary#26<40years	0.096	0.007	13.53	0.000	0.082	0.110
Secondary#40<65years	0.096	0.005	21.33	0.000	0.090	0.108
Secondary#65+years	0.095	0.007	14.05	0.000	0.081	0.108
Vocational#26<40years	0.138	0.008	16.98	0.000	0.122	0.154
Vocational#40<65years	0.144	0.005	27.92	0.000	0.133	0.164
Vocational#65+years	0.147	0.009	16.65	0.000	0.129	0.164
Bachelor#26<40years	0.367	0.010	36.99	0.000	0.348	0.387
Bachelor#40<65years	0.313	0.008	40.65	0.000	0.298	0.328
Bachelor#65+years	0.309	0.015	20.49	0.000	0.279	0.338
Post-grad#26<40years	0.234	0.011	22.11	0.000	0.213	0.255
Post-grad#40<65years	0.201	0.009	23.56	0.000	0.185	0.218
Post-grad#65+years	0.157	0.016	9.73	0.000	0.125	0.188

Source: ESS, 2012

Figure 4.5: The probability of a man with bachelor's levels of education partnering with a woman by education level, three age groups, respondents aged 26+ years from 29 European nations, 2012. Country effects controlled for.
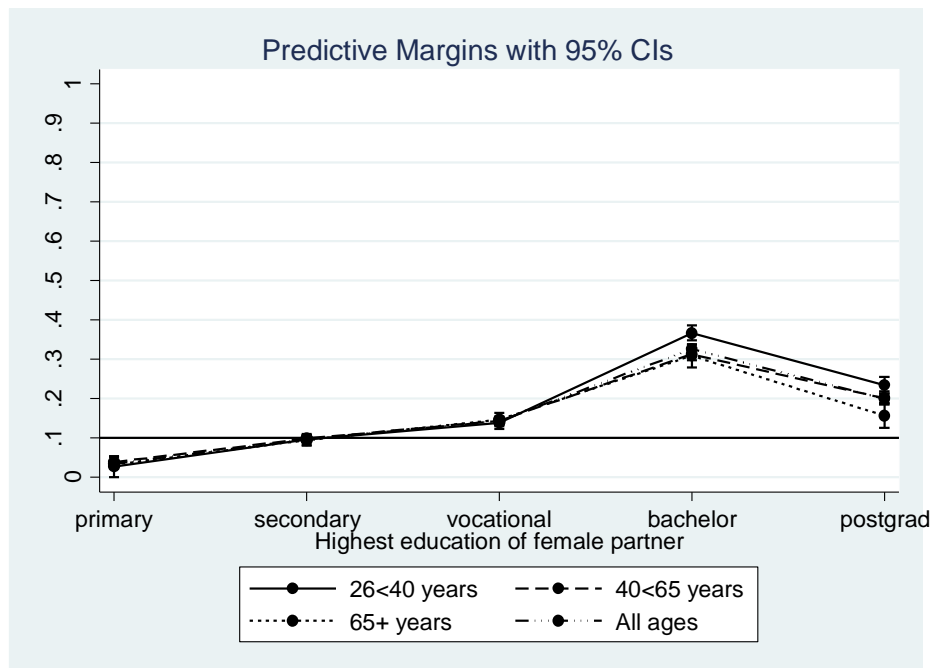
Source: ESS, 2012

Table 4.10: The probability of a woman with bachelor's education partnering with men with various levels of education, respondents aged 26+ years from 29 European nations, 2012. Country and age effects controlled for.

Number of observations = 29,911
Expression: Pr(bfemale), predict ()

Male	Margin	Std. Error	z	P>|z|	95% confidence interval	
Primary	0.056	0.007	8.35	0.000	0.043	0.069
Secondary	0.128	0.004	32.55	0.000	0.120	0.135
Vocational	0.171	0.004	44.37	0.000	0.164	0.179
Bachelor	0.373	0.006	58.32	0.000	0.231	0.256
Post-grad	0.244	0.006	38.18	0.000	0.231	0.256
26<40 years	0.253	0.005	53.08	0.000	0.243	0.262
40<65 years	0.198	0.003	67.63	0.000	0.192	0.204
65+ years	0.145	0.004	32.43	0.000	0.137	0.154
Primary#26<40years	0.091	0.021	4.28	0.000	0.050	0.133
Primary#40<65years	0.050	0.007	7.30	0.000	0.037	0.063
Primary#65+years	0.027	0.004	6.50	0.000	0.020	0.035
Secondary#26<40years	0.174	0.009	19.66	0.000	0.157	0.192
Secondary#40<65years	0.125	0.005	23.80	0.000	0.115	0.136
Secondary#65+years	0.079	0.007	11.43	0.000	0.065	0.093
Vocational#26<40years	0.247	0.009	28.54	0.000	0.230	0.264
Vocational#40<65years	0.169	0.005	33.14	0.000	0.159	0.179
Vocational#65+years	0.089	0.007	12.85	0.000	0.751	0.102

Bachelor#26<40years	0.456	0.012	39.54	0.000	0.433	0.478
Bachelor#40<65years	0.363	0.009	42.23	0.000	0.347	0.380
Bachelor#65+years	0.303	0.015	20.59	0.000	0.275	0.332
Post-grad#26<40years	0.235	0.111	21.18	0.000	0.213	0.257
Post-grad#40<65years	0.253	0.009	28.38	0.000	0.235	0.270
Post-grad#65+years	0.232	0.014	16.01	0.000	0.204	0.260

Source: ESS, 2012

Figure 4.6: The probability of a woman with bachelor's levels of education partnering with a man by education level, three age groups, respondents aged 26+ years from 29 European nations, 2012. Country effects controlled for.
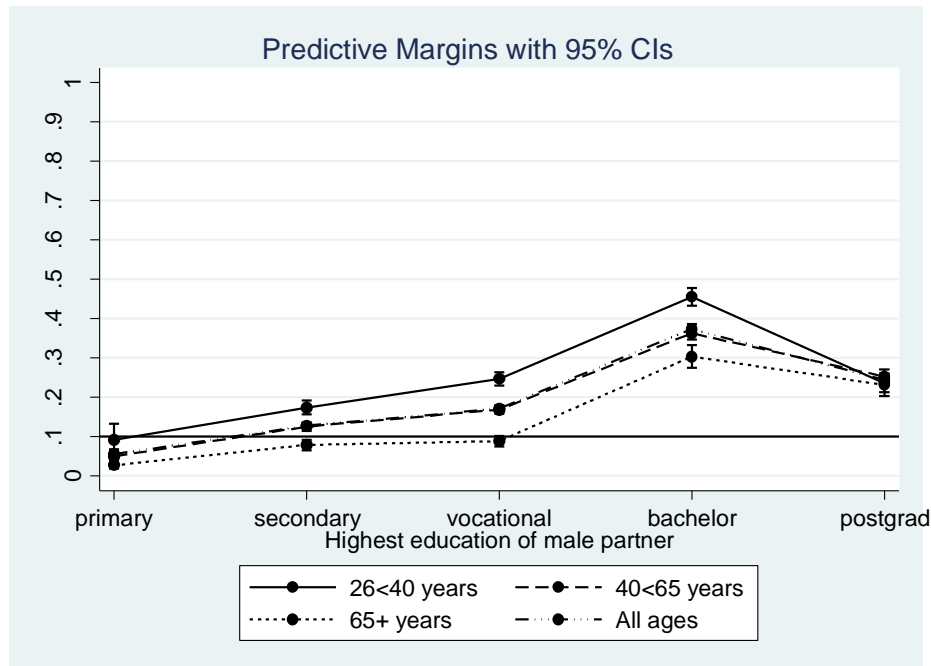
Source: ESS, 2012

In the above analysis, I have controlled for country effects. When country effects were not controlled for, but age cohort was, the probability of a man with a bachelor's level of education partnering with a similarly educated woman was 0.33. When country effects were taken into account, the probability of this same outcome was 0.38. The likelihood of a woman with a bachelor's level of education being in a relationship with a man with a bachelor's education, when country effects are controlled for, is 0.37. When country effects were uncontrolled for, the likelihood of this match occurring was 0.43.

The influence of geography between at the bachelor's level of educational assortative mating is telling. It is clear that the role of geography is important to understand, yet geographic variations do not play out equally across the education spectrum.

So far I have only compared the predicted probability of men and women engaging in assortative mating at the bachelor's degree level of education primarily in order to illustrate how I was using the model. To repeat the analysis for every level of education would be lengthy. Therefore, I will include tables in section 4.4 distilling the salient messages of the findings of the predicted probabilities of assortative mating at all levels of education.

4.3: Assortative Mating at all levels of education

In this section I will provide the predicted probabilities of assortative mating obtained for each of the levels of education. I have provided predicted probabilities on the likelihood of women with a certain level of education partnering with her educational equivalent. In the same table I have provided the predicted probability of a man with a particular level of education partnering with his educational equivalent. As we have already observed in section 4.2 and 4.3 there appears the potential for significant variation in cohorts, as well as when country effects are included and excluded in the model. In order to analyse these differences, the tables include information for the total sample, youngest, middle, and oldest cohorts. There is also information on the predicted probabilities when country effects are controlled for and when they are not.

Information pertaining to the level of assortative mating at the primary school, secondary school, vocational, bachelor, and post-graduate levels are displayed below in Table 4.11 to 4.15.

Table 4.11: Predicted probabilities at primary school level.

		Probability of assortative mating	Probability of assortative mating (country controlled)	Difference between country effects uncontrolled for and controlled for
Man with primary partnering with woman with primary	Total (26+ years)	0.62	0.36	0.26
	26<40 years	0.46	0.30	0.16
	40<65 years	0.58	0.34	0.24
	65+ years	0.67	0.46	0.21
Woman with primary partnering with man with primary	Total (26+ years)	0.65	0.34	0.31
	26<40 years	0.41	0.21	0.20
	40<65 years	0.60	0.33	0.27
	65+ years	0.72	0.54	0.18

Source: ESS, 2012

Table 4.12: Predicted probabilities at secondary school level.

		Probability of assortative mating	Probability of assortative mating (country controlled)	Difference between country effects uncontrolled for and controlled for
Man with secondary partnering with woman with secondary	Total (26+ years)	0.51	0.45	0.06
	26<40 years	0.54	0.48	0.06
	40<65 years	0.51	0.45	0.06
	65+ years	0.45	0.42	0.03
Woman with secondary partnering with man with secondary	Total (26+ years)	0.56	0.50	0.06
	26<40 years	0.53	0.48	0.05
	40<65 years	0.56	0.50	0.06
	65+ years	0.56	0.52	0.04

Source: ESS, 2012

Table 4.13: Predicted probabilities at vocational level.

		Probability of assortative mating	Probability of assortative mating (country controlled)	Difference between country effects uncontrolled for and controlled for
Man with vocational partnering with woman with vocational	Total (26+ years)	0.61	0.52	0.09
	26<40 years	0.63	0.55	0.08
	40<65 years	0.62	0.53	0.09
	65+ years	0.54	0.45	0.09
Woman with vocational partnering with man with vocational	Total (26+ years)	0.52	0.43	0.09
	26<40 years	0.48	0.41	0.07
	40<65 years	0.54	0.45	0.09
	65+ years	0.54	0.40	0.14

Source: ESS, 2012

Table 4.14: Predicted probabilities at bachelor's level.

		Probability of assortative mating	Probability of assortative mating (country controlled)	Difference between country effects uncontrolled for and controlled for
Man with bachelor's partnering with woman with bachelor's	Total (26+ years)	0.38	0.33	0.05
	26<40 years	0.41	0.37	0.04
	40<65 years	0.37	0.31	0.06
	65+ years	0.37	0.31	0.06
Woman with bachelor's partnering with man with bachelor's	Total (26+ years)	0.44	0.38	0.06
	26<40 years	0.52	0.46	0.06
	40<65 years	0.42	0.36	0.06
	65+ years	0.35	0.30	0.05

Table 4.15: Predicted probabilities at post-graduate level.

		Probability of assortative mating	Probability of assortative mating (country controlled)	Difference between country effects uncontrolled for and controlled for
Man with post-graduate partnering with woman with post-graduate	Total (26+ years)	0.54	0.52	0.02
	26<40 years	0.51	0.49	0.02
	40<65 years	0.54	0.51	0.03
	65+ years	0.60	0.58	0.02
Woman with post-graduate partnering with man with post-graduate	Total (26+ years)	0.52	0.47	0.05
	26<40 years	0.60	0.55	0.05
	40<65 years	0.52	0.49	0.03
	65+ years	0.37	0.35	0.02

Source: ESS, 2012

If we first examine the likelihood of assortative mating occurring when men's level of education is considered, we observe considerable variation. Men with primary school and vocational educations are the most likely to partner with a similarly educated woman. The likelihood is 0.62 and 0.61, respectively, when the total sample population with country effects included in the model are examined.

Interestingly, it is also these two levels of assortative mating - primary and vocational - which exhibit the biggest decrease in predicted probability once country effects are controlled for. Once country effects are controlled for, assortative mating at the primary school and vocational levels do not appear to be substantively different from assortative mating at other levels.

Men with a primary school only level of education have both the highest likelihood of partnering with a similarly educated woman and the largest decrease in the likelihood once country effects have been accounted for. Evidently, geography plays a strong role in predicting the level of assortative mating men at the lowest level of educational attainment will engage in. This finding is potentially significant, and will be examined further in part 4.4 of this chapter.

Men with bachelor's education have the lowest tendency to assortatively mate of all of the levels of education assessed. Only 38% of men with this level of education partner with similarly educated women, with 33% doing so once country effects are controlled for.

There is substantially less variation across the education levels when the likelihood of women at any particular level of education engaging in assortative mating are assessed. The one exception to this is the high likelihood of a woman with a primary school education engaging in assortative mating. However, as in the men's case, the likelihood of primary school assortative mating drops significantly once country level effects are controlled for. In fact, once country effects are controlled for, primary school educated women are the second least-likely group to engage in assortative mating.

One question which arose during the analysis of assortative mating bachelor's degree individuals was the differences in how the three age cohorts go about engaging in assortative mating. From the results presented above in Table 4.11 to 4.15, we can see that there is some considerable variation in how the propensity to assortatively mate changes across the genders, age groups, and levels of education. For those with primary school education, both men and women are more likely to partner with a similarly educated partner if they are part of the oldest cohort.

As we move into the secondary school and vocational educated groups, women in the youngest age cohort, 26<40 years, are more likely than their older peers to engage in assortative mating. For the men with either a secondary or vocational level of education, the trend is reversed, where young men are more likely to select a partner with an equivalent level of education than older men.

As we move up the educational strata, we observe that amongst both men and women with a bachelor's degree, there is a higher likelihood of assortative mating amongst those in the youngest cohort. Amongst those individuals in the sample with a post-graduate education, the trend was partially reversed, with younger women more likely to engage in assortative mating than their older counterparts, and young men less likely to do so. Possible reasons for the trends and variations I have observed will be further discussed in section 4.4.

We see that for women, young women are less likely than their older counterparts to engage in assortative mating at the non-university levels of education. As women move into the higher level of education, bachelor's and post-graduate, there is a shift to higher levels of assortative mating, with the younger age groups more likely to select a similarly educated partner than women in the older age groups. We see a greater likelihood of assortative mating occurring if a woman is in the youngest age cohort and

has a secondary, vocational, or bachelor's education compared to women in the older age groups. At both the lowest and highest levels of education women in the oldest age cohort are the most likely group to select a similarly educated partner.

Differences in men's and women's propensity to assortatively mate across the cohorts is possibly telling in regards to historical and social economic constraints women face. The idea of the gender disparity, and how it may manifest in assortative mating trends, will be discussed in section 4.4.

The following section of this chapter, section 4.4, discusses of some of the results presented above. In addition to drawing conclusions from the analysis, I relate my findings back to the literature reviewed in chapter 2.

4.4: Discussion

In this chapter I have examined the predicted probability of men and women, across five levels of education, to engage in assortative mating. The analysis in this chapter has been enabled by the unit record data produced by the European Social Survey (ESS). In order to assess the impact of geography I have conducted analysis before and after country effects were entered in the model. I have also tested for cohort effects which appear to also affect the level of assortative mating.

I begin with the role of geography in assortative mating. From the results given above, it is clear that geography – the differences between countries – plays a role in predicting the extent of assortative mating. Across all levels of education, not recognising country effects suppressed the level of assortative mating.

Country effects on assortative mating were greatest at the primary school level. When country effects are left in the model, those with primary schooling appear to engage in assortative mating at a much higher rate than those with higher educations. Once country effects were controlled for, the difference between the predicted probability of an individual with primary schooling engaging in assortative mating and the predicted probability for other groups was eliminated.

When I discuss country effects, I am essentially referring to the degree of influence carried by differences in country levels of assortative mating. Primary school assortative mating varies substantially across Europe, it is clear that the social and economic

conditions which allow mobility through marriage out of the lowest level of education vary considerably.

If we recall the theory of marriage Becker (1974) presented where the hierarchy of choice was discussed, we may be able to offer an explanation as to why such considerable variation occurs. Becker (1974) discussed how marriage is used to accrue the benefits of household formation, particularly in terms of lowered fixed costs and division of labour. It is assumed that individuals act as rational consumers, and seek out the best mate available in exchange for their market value. Consequently, Becker (1974) claimed that matching of like for like would occur first at the [educational] top as those with higher levels of education have, ceteris paribus, the highest market value and therefore are able to select partners free from most constraints. Once individuals at the top of the education strata have selected partners, filtering down through the social strata occurs. We can assume from Becker's statements that those at the 'bottom', those with only primary school educations, will partner amongst themselves as that is their best option available to maximise household income.

The filtering mechanism of partner selection, helps explain why we see higher levels of assortative mating amongst primary school educated individuals in some nations (Becker, 1974). However, it poorly explains the variation in country levels of assortative mating at this level, and why some nations experience low levels of assortative mating amongst the primary school educated.

In order to explain the substantial cross-cultural variation, I need to explore alternate avenues of thought. One possibility is that we are observing the marked geographic variation in primary level assortative mating due to the small primary school educated population size, relative to the total population. As the primary school population sample size diminishes, the likelihood that type I error (rejection of the true null hypothesis – a false positive) is being introduced increases.

Primary school education is the least common level of education. It makes up less than 10% of the respondents and their partners from the total population, and diminishes further to less than 1% of the sample population in some individual nations. It is likely that in these nations where the sample population of primary school aged people is very small, we are observing either an over- or under-representation of primary school educationally homogenous households. I believe it is likely that the small sample

population of primary school educated people allows for it to appear that there is significant variation in the level of assortative mating which may not actually exist.

While I believe that it is likely the small sample size which is accounting for the large country effect at the primary school level of assortative mating, it is important to explore other potential reasons. Breen and Andersen (2012) discuss the role of labour market regulation in influencing individuals partnering decisions. They discuss how in less regulated labour markets, using the example of the U.S., rewards for labour are less correlated with education than when markets have not experienced neo-liberal deregulation.

When education is a poor predictor of income, assortative mating will occur to a lesser extent as monetary incentives for a well-educated person to partner with a similarly educated person are not as strong. It is possible that the variations in levels of assortative mating are due to differences in labour market regulations.

If we use the example that Breen and Andersen (2012) provided, Denmark, we can gain some understanding of how labour market regulation, and the rewards for work, may play into generating national level differences in assortative mating. Denmark appears to have only average levels of assortative mating at the primary school level when compared to the other 28 nations in the sample even though their labour market is heavily regulated.

If differences in labour market practices were resulting in significant country effects when calculating the predicted probabilities of primary school level assortative mating, we would also expect to see significant variations at other levels of education. As the extent of the country effects at other levels of educational assortative mating are minimal in comparison, I do not believe differences in returns for education is a sufficiently explained by variations in labour market structures.

Another interesting finding the analysis presented here demonstrates is that assortative mating is occurring at all levels of education, with few salient differences. The revelation that in the 2012 European sample, individuals across all education levels gravitate towards similarly educated partners contests some of the existing literature.

Reardon and Bischoff (2011); Schwartz and Mare (2005) found a prevalence of assortative mating amongst those with university educations, however, the evidence to

describe the extent of assortative mating amongst the lower levels of educational attainment is limited. Schwartz and Mare (2005) in particular highlighted the possibility that assortative mating is occurring at the top and bottom of the education distribution, with weaker barriers for inter-marriage in the middle.

Schwartz and Mare (2005) acknowledged that the lower level of assortative mating amongst the middle educated groups is a feature of the latter part of the 20th Century. These authors acknowledged that the lack of evidence was in part due to a focus on the partnering behaviour of university educated individuals. Although, a lack of empirical evidence to suggest assortative mating is occurring at lower levels of education was also present in both research findings.

Clearly there is a mismatch between the theory presented by Becker (1974) who suggests that assortative mating can be reasonably expected to continue throughout the education strata, and the findings by Reardon and Bischoff (2011); Schwartz and Mare (2005) who suggest that assortative mating is predominantly a feature of the top levels of education. The analysis carried out in this chapter would suggest that in the European 2012 sample, Becker's theory of partner selection holds. It has become clear to me that the literature has an understanding of the drivers of assortative mating at the top of the education distribution. However, there appears to be a weaker understanding of why those with middle or low levels of educational attainment may select partners who are similarly educated.

The papers by Reardon and Bischoff (2011); Schwartz and Mare (2005) may offer some understanding as to why some authors may observe low levels of educational assortative mating at the middle and bottom of the educational distribution, while I have found evidence that assortative mating is consistent regardless of education. Schwartz and Mare (2005) analysed U.S. data from 1940 to 2003 and observed the growth of inter-marriage amongst the middle-educated group in the latter parts of the 20th Century. These authors theorised that this shift is likely as a result of decreasing social barriers between those with secondary school education and 'some' college. Schwartz and Mare (2005) proposed that the rise of community colleges – lower level tertiary institutions – may be allowing for a desegregation in the middle stages of education. Torche (2010) examined the prevalence of assortative mating in three Latin American countries. In the

comparative analysis, Torche (2010) observed that the barriers for intermarriage at various points in the education distribution change between nations.

I believe these two papers, in particular, may help to explain why I have observed assortative mating occurring at all levels across the education distribution. It appears that in the 2012 European sample, there are roughly equivalent barriers to intermarriage occurring at all levels, as evidenced by the consistency of the likelihood of individuals to engage in assortative mating. The comparison of the Schwartz and Mare (2005); Torche (2010) papers and the findings presented here illustrate how geography must be made central to the discussion around assortative mating.

Gender and assortative mating

Another strength of the European Social Survey's unit record format is that it allows for a gendered analysis of assortative mating. With the risk of falling foul to the fallacy of equating gender with women, the majority of the discussion around gender here will focus on the way in which women engage in assortative mating. Over the course of the 20th Century, women have increasingly moved towards educational parity with men. In most instances in the ESS 2012 sample, in the youngest cohort (26-<40 years), women actually achieved higher rates of university education than men. In the middle cohort (40<65 years) women were slightly more likely to have achieved a university education than men. In contrast, in the oldest group (65+ years), men exceeded women in rates of university achievement.

I believe the rise in the proportion of university educated women is altering the likelihood of the forming educationally homogenous households. In the results I presented above, in part 4.4, there were several important gendered distinctions in the likelihood of each cohort to engage in assortative mating at various levels of educational attainment. Young women were less likely to engage in assortative mating at the primary, secondary, and vocational, levels of education than older women, whereas they were more likely to engage in assortative mating at the bachelor's and post-graduate stage than their older counterparts. I believe these two features reflect the changing economic and social place of women in Europe.

The fact that young women with university levels of education are more likely than their older peers to find a similarly educated partner is a compelling finding. With the increase in women achieving university education, particularly as women in the tertiary

field outnumber men in the youngest two cohorts, I would have expected to see lower rates of assortative mating in the youngest cohort as the relative number of university educated men diminishes. However, this has not been the case.

One possible explanation is that women, who have historically faced social pressure relating to their partnering decisions, have faced increased scrutiny in recent times. Historically women have had limited choice but to seek partners with desirable social and economic prospects. Limited personal financial capacity has meant that women's primary mode of social mobility has been through marriage. There are two schools of thought as to how this historical expectation of women translates in to societies where it has become increasingly common, and now the norm, for women to be financially independent.

The first of these two theories, as proposed by Oppenheimer and Lew (1995); Sweeney (2002), links women's partnering decisions to their increasing financial independence as a way for them to liberate themselves from the need to select partners based on men's financial capabilities. These authors suggest that the increasing educational attainment of women in the younger cohorts should lead to a decrease in the level of assortative mating as they can select on non-educational characteristics. The theory suggested by Oppenheimer and Lew (1995); Sweeney (2002) run counter to the findings I have made here which show an increasing level of assortative mating in younger cohorts amongst those with university educations. Schwartz (2013) too is critical of the proposal by Oppenheimer and Lew (1995); Sweeney (2002), saying increased independence from selecting partners based only on economic characteristics does not necessarily mean a decrease in educational homogamy. Schwartz (2013) points out that non-economic factors (cultural characteristics) are closely associated with educational position.

The second theory, and one I believe is more consistent with my findings, relates to the time women are able to spend on the search for an appropriate partner. Weeden and Grusky (2012) claim that as women become more financially independent as a result of their increasing participation in the labour force and their higher rates of university attainment, they are able to extend the search for a partner until a suitable mate is found. The decreasing need to quickly enter into marriage upon adulthood may explain why younger cohorts of women at the bachelor's and post-graduate level have higher rates of assortative mating than their older peers.

Changing rates of men's assortative mating is also an interesting facet of the research presented here. Of particular interest to me was the difference in the likelihood of young men with bachelor's and post-graduate education to engage in assortative mating. I can see from Table 4.41 and 4.15 that men in the youngest cohort with bachelor's education are more likely to assortatively mate than their older counterparts. The obverse is true for men with a post-graduate education. I am particularly interested in the greater likelihood that older men with a post-graduate education will assortatively mate, as this appears counter to the trend amongst men, for assortative mating to increase with each new cohort.

Greater assortative mating for the youngest cohort, compared to the oldest cohort, in the bachelor's group aligns with current literature. We would expect to see young men in this group engaging in greater levels of assortative mating as, compared to women, they are relatively scarce. Men's relative scarcity, coupled with their position on the educational ladder should make them appealing prospects for partnership. I believe this is why I observe greater assortative mating from young, bachelor level men than their older counterparts who would have had fewer equally educated women to select from.

As young men can be seen as scarce resources in the university educated groups, they will have little difficulty selecting their most desirable partner. If we assume, as Becker (1974); Han (2010); Nakonezny and Denton (2008); Torche (2010) have done, that individuals will select partners based on economic potential, it is logical that the majority of men with university educations will select partners who also have a university education.

I am unaware of any reasons why young men would exhibit lower levels of assortative mating in the post-graduate group than their peers in the oldest cohort. Based on evidence presented above, I would have predicted that men in the youngest cohort of post-graduate educated men would exhibit greater levels of assortative mating than men in the oldest cohort as a result young men's scarcity compared to equally educated women. One inference I could possibly make from this result is that young men are not assortatively mating to the same extent as the rewards for post-graduate education are diminished compared to post-graduate education in the oldest cohort. A decrease in monetary rewards for post-graduate education may play a role in decreasing the

propensity to assortatively mate. As this line of thinking is largely conjecture, I will not explore it further, however it would be an interesting aspect for further research.

I am also interested in examining the greater likelihood of young women at the secondary, vocational, and bachelor's level to find an educationally like partner when compared to their older counterparts. Female rates of secondary and vocational educations have decreased from the oldest cohort to the youngest. According to my sample, the number of women in these education categories number fewer in the youngest cohort, whereas in the oldest cohort it was more common to find a woman with a secondary school or vocational education than a man. I am able to present the same scarcity argument as above, namely that the greater prevalence of women in these groups means that finding an educationally like partner will be easier for these young women than for their older peers.

The aim of this chapter has been to examine the way in which assortative mating is carried out across the 29 nation sample. A finding of this chapter, which I believe to be particularly salient, is the complex role geography plays in assortative mating. A further exploration of the role of geography will be carried out in the next chapter, where I explore how assortative mating manifests at the national level, and in particular how assortative mating at the country level is driven by economic conditions.

Chapter 5: Education and Assortative Mating, Country Analysis

In this chapter I will be examining the link between levels of educational attainment and assortative mating by country across the 29 countries in the ESS sample. As discussed in chapter 2, researchers believe there is a link between the proportion of the population with tertiary education (educational attainment) and assortative mating. As mentioned in the literature review, the relationship between these two is rarely fully developed within the literature. The wage premium and levels of educational attainment are intrinsically linked, however there is infrequent analysis of the direct relationship between educational attainment and assortative mating. The direct relationship between assortative mating and educational attainment is something I explore in this chapter.

Marriage, or serious partnership, is frequently accompanied by the end of education. Therefore, I will assume that the relationship between educational attainment predicts patterns of partnerships, as opposed to the other way around. As discussed in the methodology chapter, I have excluded all people under 26 years from this analysis as the vast majority are still studying and/or not in serious relationships.

The initial aim of my analysis was to explore the relationship between assortative mating and educational attainment across three age cohorts. It was my intention to divide the sample population into those aged 26<40 years, 40<65 years, and 65+ years. However, in the oldest cohort, more than half the 29 countries sampled had too few expected values to construct a reliable analysis. As only a small number of countries are reliable enough to be analysed, the results from the oldest cohort would not be comparable, and therefore I have made the decision to only analyse the two youngest cohorts. It is my hope that I will still be able to make some inferences about how the relationship between assortative mating and educational attainment has shifted over time.

The central issue being addressed in this thesis remains an assessment of the impact of assortative mating on household income inequality. I hope by building up the picture of the conditions assortative mating emerges under I will be better situated to answer the central question.

As stated above, I believe there to be some relationship between educational attainment and the propensity to engage in assortative mating. Therefore, I begin by regressing the degree of assortative mating on the level of university education in the given population. My initial objective was to measure the propensity to assortatively mate against total education, female education, and male education. However, gendered differences in education have been accounted for in the construction of the assortative mating variable. The assortative mating variable used in this chapter is a function of the difference between the expected and observed frequencies of educationally like households, the availability of an educationally like partner has been taken into account. In the case of nations where there is a gendered disparity between men and women at any level of education, the diminished possibility of an educationally homogenous partnership will be reflected in a lowered 'expected' frequency.

Conceptually it is the level of university educational attainment which is of greater importance compared to gendered levels of educational attainment in accounting for assortative mating. This is because the overall level of educational attainment of the population operates to set the wage premium. Changes in the wage premium change the propensity for individuals to engage in assortative mating.

5.1: Educational attainment and assortative mating.

I begin by regressing assortative mating on rates of tertiary (bachelor's and above) education. By assortative mating I mean the propensity for individuals to engage in assortative mating beyond what would be expected if there was no relationship between male and female education in the formation of households. The measure used is $AM_j = ((\text{frequency/expected frequency})*100)_j$ when j is country.

A cross-tabulation for the jth country of assortative mating can be expressed to show the frequency of each type of household. The cross tabulation for Finland, ages 26<65 years, is used to illustrate in Table 5.1.

Table 5.1: A cross-tabulation of male and female educational attainment, 2 education categories, Finland sample, respondents aged 26<65 years.

	Female		
Male	No university	University	Total
No university	368	194	562
	272	290	562

University	103	308	411
	199	212	411
Total	471	502	973
	471	502	973

*Frequency displayed above expected frequency

Source: ESS, 2012

The Table in 5.1 shows the 2*2 cross-tabulation of the Finnish sample. It is expected that there will be 212 households where both partners have at least a university level education if there is no relationship between male and female educational attainment in the formation of households. Instead, we see that there are actually 308 households of this type.

In this instance, the level of assortative mating would be frequency/expected frequency*100:

$$= (\text{frequency}/\text{expected frequency}) * 100$$

$$= \left(\frac{308}{212}\right) * 100$$

$$= 145\%$$

The level of assortative mating calculated above indicates that at the 2*2 level of analysis, assortative mating is occurring at nearly one and a half times what would be expected under random conditions. The same approach can be applied to the 5*5, 5 education category case as shown in Table 5.2 below. My reason for using the 5*5 table is that I want to differentiate between households where both partners have a bachelor's level of education and a post-graduate level of education. The two categories, bachelor's and post-graduate, are fundamentally different, and therefore partnering between people of equal levels of education is a different behaviour to partnering across these levels of education.

Table 5.2: A cross-tabulation of male and female educational attainments, five education categories, Finland sample, respondents aged 26<65 years.

Male	**Female**					
	Primary	Secondary	Vocational	Bachelor	Postgrad	Total
Primary	23	5	30	16	1	75
	3.5	5.4	27.4	26	12.7	75

Secondary	5	18	42	29	10	104
	4.8	7.5	38.1	36	17.6	104
Vocational	10	26	209	119	19	383
	17.7	27.6	140.1	132.7	64.9	383
Bachelor	7	7	56	125	41	246
	11.4	17.7	90.6	85.2	41.7	246
Postgrad	0	4	56	125	41	246
	7.6	17.7	90	85.2	41.7	246
Total	45	70	356	337	165	973
	45	70	356	337	165	973

*Frequency displayed above expected frequency

Source: ESS, 2012

As I discussed above, I am primarily interested in how the expected frequencies of university educationally homogenous households differ from the observed frequencies. In order to measure this I again use the formula to calculate what percentage of the expected frequency the observed frequency is. For example, using the data from Table 5.2, the percentage of expected frequencies we observe for households where both partners have an equivalent university education is:

$$= \text{(frequency/expected frequency)} * 100$$

$$= (125 + 94)/(85.2 + 28) * 100$$

$$= 193\%$$

For the Finnish sample of households where the survey respondent was aged 26<65 years, the probability of a household having two partners with a bachelors or post-graduate qualification was nearly two times what would be expected under random conditions.

In the next section of this chapter I will estimate the relationship between the percentage of the population with university or higher educations and the degree of assortative mating. When I refer to the percentage of the population with university education, I am referring to the sample of respondents aged 26<40 years or 40<65 years, and their partners (who may fall outside of this age bracket) if applicable.

In an effort to be concise, the measure of the propensity to assortatively mate will be referred to as the level of assortative mating.

The regression of the level of assortative mating on the total percentage of the population in the age cohort with a university education is carried out in this next section. The regression will examine the level of assortative mating at the top end of the education spectrum, bachelor's and post-graduate education. The choice to examine these households is because of an understanding that it is these households which drive income inequality (Atkinson, 2007).

5.2: Educational attainment and assortative mating within the university educated population.

As Rosenfeld (2008); Schwartz and Mare (2005); Torche (2010) proposed, there is evidence to suggest that assortative mating is a phenomenon limited to those 'at the top'. The restriction is largely thought to be as a result of the rigidity of intermarriage between this group and those without university educations, arising mainly from the wage disparity.

In the following analysis I will regress the degree of assortative mating amongst the university educated households in a country on the overall level of educational attainment. To measure the impact of educational attainment of a country on the degree of assortative mating at the top of the education distribution, the measure of assortative mating will be limited to examining the frequency of two bachelor's or two post-graduate educated households over the expected frequency.

I expect there to be a negative relationship between the level of assortative mating and the level of educational attainment. As Carnevale and Rose (2011); De Gregorio and Lee (2002); Fernández et al. (2005) state, the lower the overall level of educational attainment in a society, the greater the individual returns for skilled labour. When the demand for educated labour is greater than the supply, educated workers can demand a comparatively higher wage. It is theorised that this greater return incentivises those with a university education to assortatively mate at a higher rate than when the wage premium is reduced. The reasons for the greater propensity have been discussed in chapter 2.

The regressions of the level of assortative mating in a country on the proportion of the population with a university education are presented below in Tables 5.3 and 5.4. Some nations have been excluded from the analysis as the expected frequency did not reach the threshold required for this type of analysis.

Table 5.3: Regression of level of assortative mating (observed frequency/expected frequency*100) amongst those with university educations on the proportion of the population with university education, respondents aged 26<40 years, 25 European nations.[2]

Source	SS	df	MS		Number of obs =	25
Model	4981.068	1	49801.068		F(1, 23) =	28.40
Residual	40329.0521	23	1753.43705		Prob > F =	0.000
Total	90130.1203	24	3755.42168		R-squared =	0.553
					Adj R-squared =	0.533
					Root MSE =	41.874
PerfectAMHH	Coefficient	Std error	t	P>|t|	95% confidence interval	
Totaluni	-3.648	0.685	-5.33	0.000	-5.065	-2.232
_cons	378.459	32.913	11.50	0.000	310.373	446.545

Source: ESS, 2012

Table 5.4: Regression of level of assortative mating (observed frequency/expected frequency*100) amongst those with university educations on the proportion of the population with university education, respondents aged 40<65 years, 26 European nations.[3]

Source	SS	df	MS		Number of obs =	26
Model	175419.71	1	175419.71		F(1, 24) =	87.50
Residual	48117.021	24	2004.876		Prob > F =	0.000
Total	223536.731	25	8941.470		R-squared =	0.785
					Adj R-squared =	0.776
					Root MSE =	44.776
PerfectAMHH	Coefficient	Std error	t	P>|t|	95% confidence interval	
Totaluni	-6.425	0.687	-9.35	0.000	-7.842	-5.007
_cons	484.383	24.534	19.74	0.000	433.747	535.019

Source: ESS, 2012

As the level of educational attainment increases across countries, the level of assortative mating decreases. The regressions in Table 5.3 and 5.4 were statistically significant at the 95% confidence level. Therefore, we can reasonably reject the null hypothesis across both age cohorts; the coefficients attached to the independent variable (educational attainment) differ significantly from zero.

In the case of the youngest cohort, a one percentage point increase in the proportion of the 26<40 year old cohort's level of educational attainment is associated with a 3.65 unit decrease in the level of assortative mating (F/EF)*100. For the cohort aged 40<65 years, a one percentage point increase in the level of educational attainment is associated with a larger 6.42 unit decrease in the level of assortative mating.

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[2] Countries excluded: Albania, Italy, Kosovo, Portugal.
[3] Countries excluded: Albania, Kosovo, Portugal

The relationship can be represented graphically, as in Figure 5.1 and 5.2 below.

Figure 5.1: Level of assortative mating (observed frequency/expected frequency*100) amongst those with university educations vs. Proportion of population with university education, respondents aged 26<40 years, 25 European nations.[4]
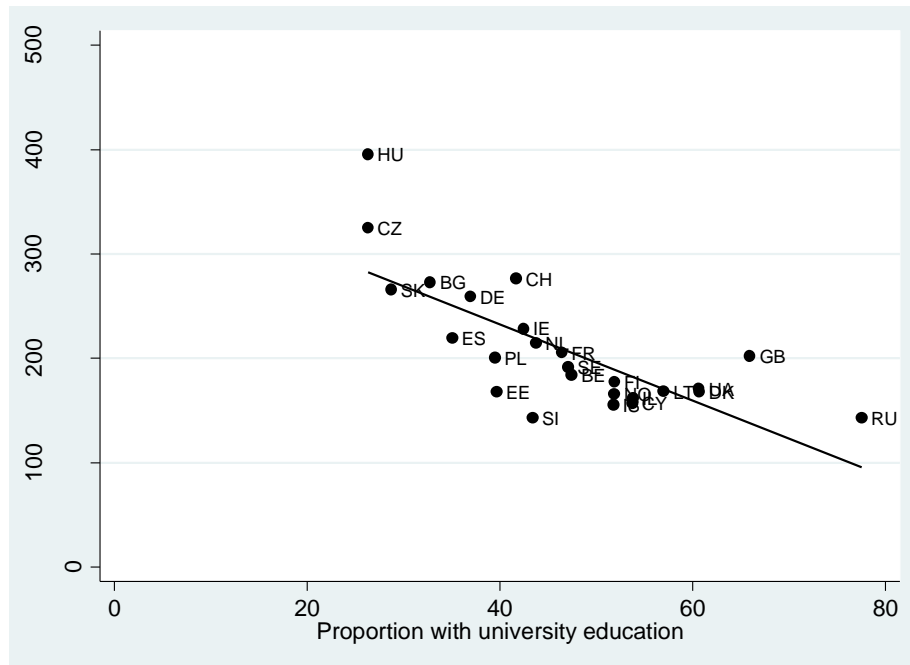
Source: ESS, 2012

[4] Country codes: BE: Belgium, BG: Bulgaria, CY: Cyprus, CZ: Czech Republic, DK: Denmark, EE: Estonia, FI: Finland, FR: France, DE: Germany, GB: Great Britain, HU: Hungary, IS: Iceland, IE: Ireland, IL: Israel, LT: Lithuania, NL: Netherlands, NO: Norway, PL: Poland, RU: Russia, SK: Slovakia, SI: Slovenia, ES: Spain, SE: Sweden, CH: Switzerland, UA: Ukraine.

Figure 5.2: Level of assortative mating (observed frequency/expected frequency*100) amongst those with university educations vs. Proportion of population with university education, respondents aged 40<65 years, 26 European nations.[5]

Source: ESS, 2012

Response to hypothesis

The results shown above support the stated hypothesis; that the likelihood of assortative mating diminishes as university educational attainment increases. We observe this trend across both two age groups. As mentioned previously, the regression model estimates are statistically significant.
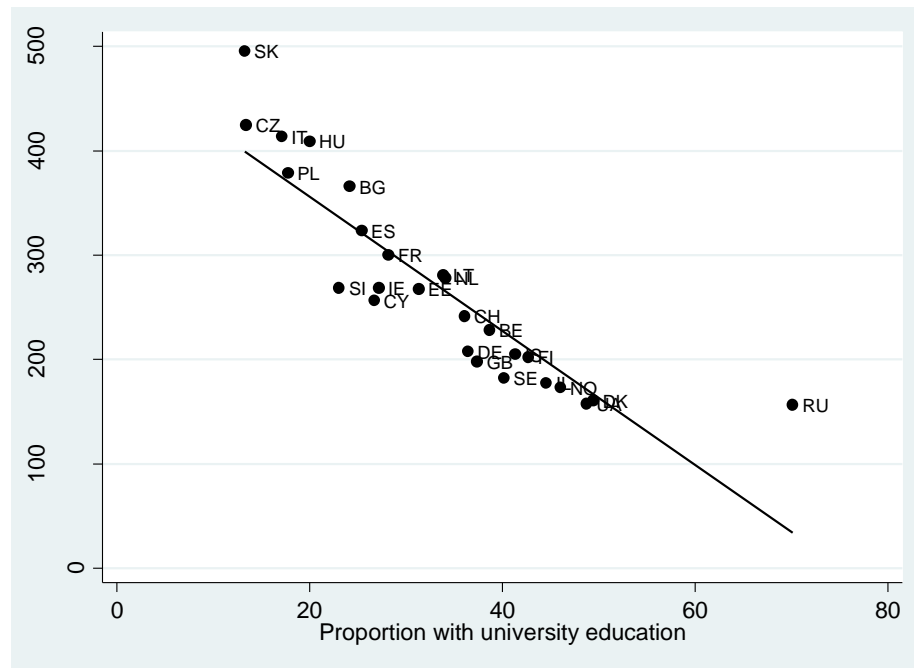
The regression estimates in Table 5.3 and 5.4 provide further evidence for support of the wage premium hypothesis. Nations with a high proportion of the population with a university qualification are expected to show a lower wage premium relative to nations where a small proportion of the population is university educated due to the diminished bargaining power of these individuals (Carnevale & Rose, 2011; Fernández et al., 2005).

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[5] Country codes: AL: Albania, BE: Belgium, BG: Bulgaria, CY: Cyprus, CZ: Czech Republic, DK: Denmark, EE: Estonia, FI: Finland, FR: France, DE: Germany, GB: Great Britain, HU: Hungary, IS: Iceland, IE: Ireland, IL: Israel, IT: Italy, XK: Kosovo, LT: Lithuania, NL: Netherlands, NO: Norway, PL: Poland, PT: Portugal, RU: Russia, SK: Slovakia, SI: Slovenia, ES: Spain, SE: Sweden, CH: Switzerland, UA: Ukraine.

When the wage premium is high, as in nations with low educational attainment, the incentive for those with university educations to assortatively mate is greater by contrast. When educational attainment is high the monetary rewards to educational assortative mating is not as great, and relatively fewer individuals will do so as a result. The results shown in Table 5.3 and 5.4 lend support to the wage premium theory.

Suitability of the linear regression model

From an inspection of Figure 5.1 and 5.2, it appears as though the propensity to assortatively mate does not decrease at a constant rate as the percentage of the population with a university education increases. Therefore, a log-log linear regression model may be a more suitable model.

5.3: Log.log linear regressions

Log-log linear regression analysis

I expect that following the log transformations, there will be a negative linear relationship between the two variables which was absent from the non-log transformed initial regressions.

The equation for the log-log linear regression takes the form of $\ln(Y)_j = \alpha + \beta\ln(X)_j$, where j is countries 1 to 29.

Table 5.5: Regression of log (level of assortative mating) (observed frequency/expected frequency) on the log (proportion of population with university education), respondents aged 26<40 years, 25 European nations.

Source	SS	df	MS		Number of obs =	25
Model	1.090	1	1.090		$F(1, 23) =$	44.85
Residual	0.559	23	0.024		Prob > F =	0.000
Total	1.648	24	0.069		R-squared =	0.661
					Adj R-squared =	0.646
					Root MSE =	0.156
Log26AM	Coefficient	Std error	t	P>|t|	95% confidence interval	
Log26uni	-0.7716	0.115	-6.70	0.000	-1.100	-0.533
_cons	8.241	0.439	18.76	0.000	7.332	9.150

Source: ESS, 2012

Table 5.6: Regression of log (level of assortative mating) (observed frequency/expected frequency) on the log (proportion of population with university education), respondents aged 40<65 years, 26 European nations.

Source	SS	df	MS		Number of obs =	26
Model	2.565	1	2.565		$F(1, 23) =$	212.25

Residual	0.290	24	0.012		Prob > F =	0.000
Total	2.855	25	0.114		R-squared =	0.898
					Adj R-squared =	0.894
					Root MSE =	0.1099
Log40AM	Coefficient	Std error	t	P>|t|	95% confidence interval	
Log40uni	-0.773	0.053	-14.57	0.000	-0.882	-0.663
_cons	8.192	0.183	44.74	0.000	7.814	8.570

Source: ESS, 2012

The results of these two log-log regressions are summarised below in Table 5.7.

Table 5.7: Table showing Coefficients, F-statistics, p-values, and t-statistics for three above regressions.

	Coefficient	F statistic	p-value	T-statistics
26<40 years	-0.772	44.85	0.000	-6.70
40<65 years	-0.772	212.25	0.000	-14.57
	[2] Stata reports p-values to 4 decimal places only. ** Significant regression (<0.05).			

Source: ESS, 2012

The regressions using the log transformed variables shown in Table 5.5 and 5.6 were both statistically significant at the 95% confidence level. We can reasonably reject the null hypothesis across both cohorts; the coefficients attached to the independent variable (educational attainment) differ significantly from zero. Further, a coefficient which differs significantly from zero establishes that the independent variable is a predictor of the dependent variable (level of assortative mating).

The log-log linear regressions in Table 5.5 and 5.6 can also be represented by the following equations.

26<40 year old age group;

$$\ln(Y) \ = \ 8.2413 \ + \ -0.7716 \ln(X)$$

40<65 year old age group;

$$\ln(Y) \ = \ 8.1922 \ + \ -0.7726 \ln(X)$$

What this means is that, for the youngest cohort, a one percentage increase in the proportion with university education is associated with 0.77 percent unit decrease in the level of assortative mating. The corresponding decrease for the cohort aged 40<65 years, the log unit decrease is almost exactly the same. The corresponding graphs of the two age cohorts are in Figure 5.3 and 5.4.

Figure 5.3: Log (Level of assortative mating) amongst those with university educations vs. Log (proportion of population with university education), respondents aged 26<40 years, 25 European nations.[6]
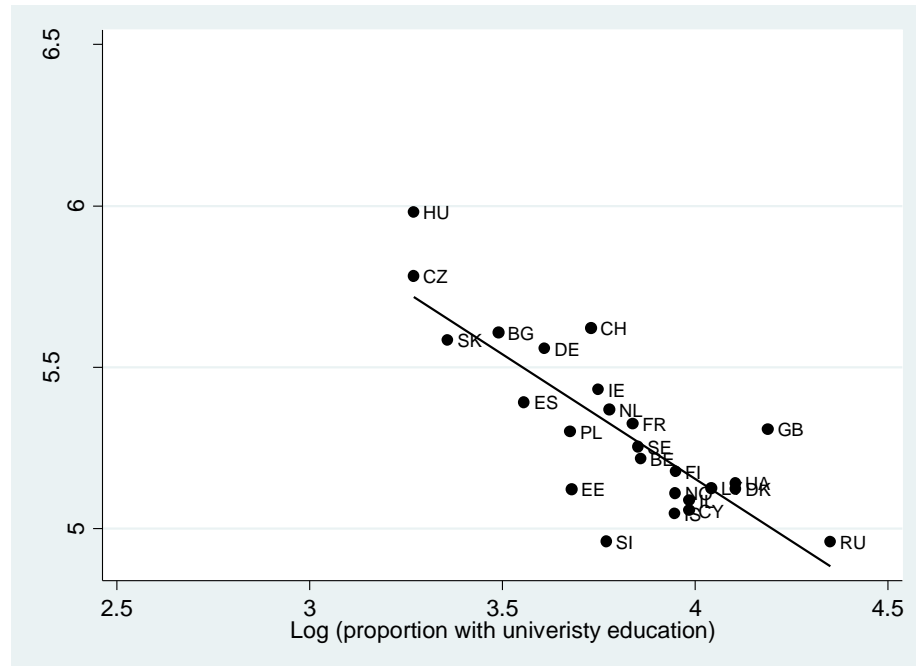
Source: ESS, 2012

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[6] Country codes: BE: Belgium, BG: Bulgaria, CY: Cyprus, CZ: Czech Republic, DK: Denmark, EE: Estonia, FI: Finland, FR: France, DE: Germany, GB: Great Britain, HU: Hungary, IS: Iceland, IE: Ireland, IL: Israel, LT: Lithuania, NL: Netherlands, NO: Norway, PL: Poland, RU: Russia, SK: Slovakia, SI: Slovenia, ES: Spain, SE: Sweden, CH: Switzerland, UA: Ukraine.

Figure 5.4: Log (Level of assortative mating) amongst those with university educations vs. Log (proportion of population with university education), respondents aged 40<65 years, 26 European nations.[7]
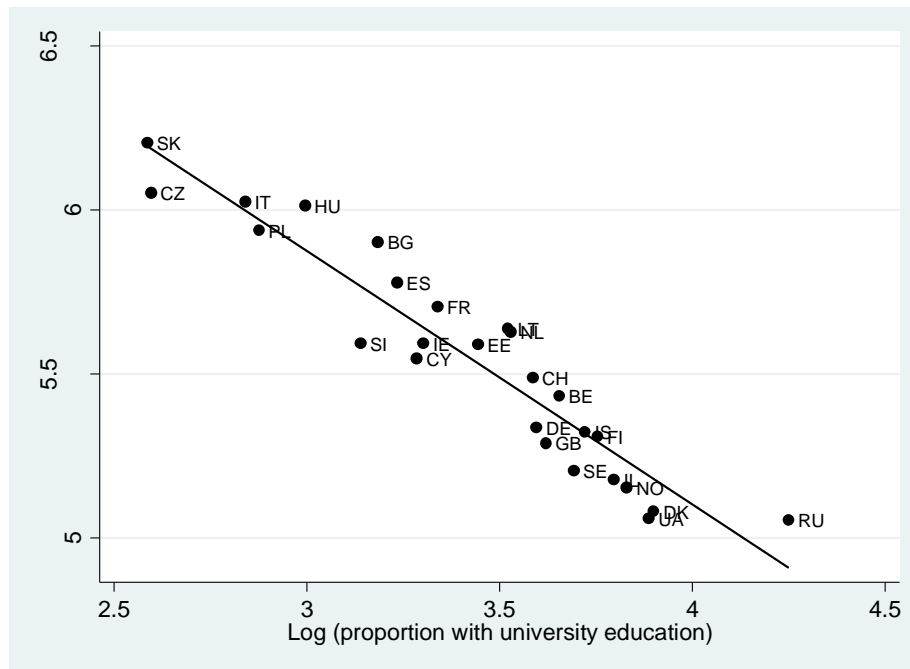
Source: ESS, 2012

We are also able to combine the results for these two cohorts on to one graph to draw a direct comparison. The graph is shown below in Figure 5.5.

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[7] Country codes: BE: Belgium, BG: Bulgaria, CY: Cyprus, CZ: Czech Republic, DK: Denmark, EE: Estonia, FI: Finland, FR: France, DE: Germany, GB: Great Britain, HU: Hungary, IS: Iceland, IE: Ireland, IL: Israel, IT: Italy, LT: Lithuania, NL: Netherlands, NO: Norway, PL: Poland, RU: Russia, SK: Slovakia, SI: Slovenia, ES: Spain, SE: Sweden, CH: Switzerland, UA: Ukraine.

Figure 5.5: Log (Observed frequency/expected frequency*100) amongst those with university educations vs. Log (University educated population/total population*100), three age groups.
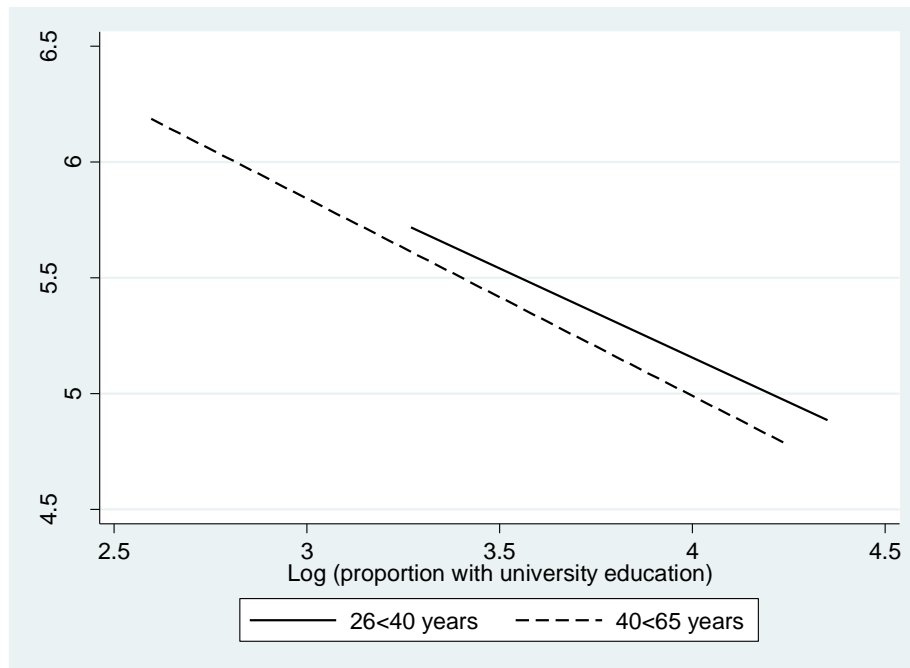
Source: ESS, 2012

Across both cohorts, the log-log linear regression model is a better fit for the data. Using the log-log linear regression model, nearly 70% for the youngest cohort and nearly 90% for the middle-aged cohort of the variance in log assortative mating is explained by variation in log educational attainment. In contrast, the linear regression model, just over 55% of the variance in assortative mating is explained by variation in educational attainment for the youngest group, rising to nearly 80% in the middle-aged group.

The main feature of the log-log linear regression which is significant to my research is the way in which decreases in the propensity of university educated individuals to assortatively mate diminish as levels of educational attainment increase.

The following section will form my discussion of these ideas. In the following section, part 5.4, I will discuss the results from the analysis above, particularly the finding of the suitability of the log-log linear model. In 5.4 I draw on relevant literature to help me provide an explanation for my findings.

5.4: Discussion

In my opinion, there are two significant findings of the above analysis. The first finding was the negative relationship between the proportion of the population of concern with university education and the likelihood of assortative mating occurring between two equally educated people with university educations. Secondly, unlike previously alluded to in the literature, the relationship is non-linear, and is likely to follow a non-linear trajectory.

Discussion of the negative relationship

It was my intention in this chapter to examine the relationship between assortative mating and educational attainment using the conceptual framing of the wage premium hypothesis. The wage premium refers to the increased returns in the form of income a university educated person can expect to receive over a comparable, non-university educated person (Fernández et al., 2005). There is significant evidence that the wage premium is dependent on the supply of university educated individuals. In nations with a small proportion of university educated individuals, these individuals are able to demand higher wages in return for their labour (Carnevale & Rose, 2011). When demand outstrips supply, the market must pay more for the scarce good or service, in this case skilled labour. The wage premium is almost entirely dependent on the level of educational attainment in a country, therefore the rate of educational attainment can be used to predict the wage premium, as has been done here.

As Torche (2010) discussed, in situations of high income inequality between those with university educational and those without, the incentives for those with university education to assortatively mate are greater than in comparable low inequality nations. In countries with low levels of educational attainment, coinciding with a high wage premium, the rewards to university educated individuals for forming educationally homogenous households are greater. Han (2010) writing at the same time, discusses the costs of engaging in hypogamy ('partnering down') in regards to the opportunity cost of household income. When university education is a privilege of the few, the costs of engaging in hypogamy are maximised. While the phrasing these two authors use differs, they essentially deliver the same message. Whether the level of university educational attainment acts as a stick or a carrot for university educated individuals to seek a like

partner, the findings I have presented here appear to support the direction of the relationship as proposed by Han (2010); Torche (2010).

If we discuss the decrease in assortative mating with the increase in university attendance as a linear relationship, we can assume that the wage premium hypothesis explains the phenomenon. However, I believe there may be alternate explanations to the wage premium. In in chapter 2 I discussed a number of theories proposed within the literature as to why it is thought that people engage in assortative mating.

One of these theories discussed the wage premium and income inequality as a driver of the mating process. Another one of the theories discussed within the current literature was what I have labelled the proximity driver. In the proximity driver theory, it is thought that assortative mating occurs at different levels across different countries as a result of opportunities arising from frequent, meaningful contact with educationally similar peers. A discussion of the proximity driver is an alternative, but largely untestable in this context, argument for the relationship between educational and assortative mating.

One of the most salient things to note about the wage premium is that it creates great income inequality by privileging those few with university educations highly. Within the existing literature, there is an emphasis on the idea that social conditions are highly congruent on economic conditions. Torche (2010) discusses how when there are economic disparities, gulfs between social groups emerge. While Torche (2010) takes the view of the importance of the social barriers between groups as a result of economic disparity, Hellerstein et al. (2007); Kremer (1997); Reardon and Bischoff (2011) discuss how economic disparity creates geographic patterns of segregation.

Nevertheless, differentiations make seeking a mate outside of a person's educational sphere more difficult. The added challenges of seeking a non-educationally homogenous partner in situations of high inequality may explain why university educated individuals in assortative mating is more likely in nations where educational attainment is low, maximising the wage premium.

Relating to the effort and challenge of seeking a non-educationally homogenous partner, Becker (1974) discusses the cost of seeking a mate. Seeking a partner outside of your educational sphere is more costly than seeking one within it, and for university educated

people, the potential rewards are reduced. Becker (1974) proposes that people engage in cost saving behaviours by restricting their search to educationally like people.

Becker's theory on cost saving behaviour explains why those in countries with low educational attainment appear to actively seek partners who are similarly educated. However, the theory does not fully explain why individuals in nations with high levels of educational attainment are more prepared to seek partners outside of their social sphere. It could reasonably be assumed that when there are a large number of university educated individuals seeking partners, the search for a partner could be easily constrained within the population with a university education. The search could be restricted to the university educated population while being able to find a suitable partner who met other selection criteria.

However, Becker (1974) does acknowledge that the costs of seeking a mate outside of a person's own education strata are reduced when income inequality is lower. Perhaps then, if we take a purely economic viewpoint, the returns in terms of household income are not great enough for a university educated individual to create a small reduction in costs by searching only for a mate within their social grouping.

From the evidence presented in part 5.2 and 5.3, demonstrating a decreased tendency for university educated individuals in highly educated societies to engage in assortative mating, it appears that university educated individuals still have an overall preference for assortative mating. There remains an overall tendency towards university educational assortative mating, even in countries where the wage premium is low, indicating that when individuals carry out a cost-benefit analysis, engaging in assortative mating is a rational economic decision.

Much of my discussion around the analysis of the relationship between educational attainment and assortative mating has focused on the economic dimension of partner decision. I believe economic choice is vital to understanding the patterns we are seeing, and it is certainly a focus of the literature. However, I am aware that economic incentives are not the sole driver of decision making when it comes to partnering. In the next part of my discussion I delve into how I believe non-economic factors impact on decision making. In particular I hope to communicate how I believe non-economic factors may also contribute to the non-linear relationship established in the above analysis.

Discussion of the shape of the relationship

In part 5.2 we observe that there appears to be a non-linear relationship between educational attainment and assortative mating at the university level. The non-linear relationship involves a steady decline in the likelihood of university educated individuals engaging in assortative mating as the rate university education rises across nations. The sharp decline we observe is then followed by a slowing of this decline.

The two age cohorts examined here also exhibit slightly differing rates of decline. The middle-aged cohort exhibits a much sharper decline in assortative mating as the level of educational attainment increases. The steeper decline in the level of assortative mating suggests to me that when as educational attainment in a nation increases, the rewards for assortative mating fall at a much quicker rate than for the youngest cohort. Furthermore, the steeper decline would suggest that the returns for individual labour are changing at a greater rate in the middle-aged cohort.

It can be assumed that most people find partners during their twenties. Therefore, partnering decisions are likely to be most affected by the economic conditions during this time of their life. During the 1970s and 1980s, significant economic reform deregulated many labour markets. The deregulation of labour markets means that education is now a poorer predictor of income than it once was (Breen & Andersen, 2012). While this is particularly true in nations where more neo-liberal economic policies have been adopted, it is a persistent trend.

Those in the youngest cohort would have likely formed their relationships during the post-economic reform period. Fewer individuals in the cohort aged 40<65 years would have been selecting partners during the period of heavy deregulation. The implication of forming relationships during the post-reform period is that if we assume individuals seek mates based on some economic construct, whether consciously or not, assortative mating may not be as incentivised to the same extent as it once was as education is now a poorer predictor of income (Breen & Andersen, 2012). The fact that education, for those in the youngest cohort is now a poorer predictor of income, may explain why we observe a shallower decrease in the level of assortative mating relative to the level of educational attainment.

The curvilinear shape of the relationship between educational attainment and assortative mating was surprising. I could find no evidence within the existing literature about the

shape of the relationship. The lack of discussion around the non-linear shape of the relationship means that I have needed to investigate alternate theories as to why increasing educational attainment appears to stop the reduction of the incentives of assortative mating beyond a certain level.

Cultural drivers

In chapter 2, I explored one theory some scholars use to explain why there is a general tendency for individuals to seek like partners. For the purposes of my thesis I labelled this theory the cultural preferences driver. The cultural preferences driver states that people select partners based on common interests, values, and tastes. Han (2010); Torche (2010) discuss cultural preferences and how education is likely to be a measurable proxy for cultural preferences.

Initially I was sceptical of the role an understanding of how cultural preferences drive assortative mating could be used in this research. However, in assessing the findings in 5.2 and 5.3 I came to the conclusion that the cultural preference theory was a plausible explanation for the slowing in the decrease of assortative mating we observe as educational attainment increases.

As I discussed in chapter 2, there is little evidence to suggest that the preference for cultural similarities in a partner or the link between the level of education and cultural traits vary between nations. However, the other drivers of assortative mating – the economic disparities and proximity – are highly dependent on intra-country differences. Perhaps then, cultural preferences which favour assortative mating intervene in the relationship between educational attainment and assortative mating, dictating that the minimum level of assortative mating is fixed. If there was no cultural (non-economic) preference for assortative mating, perhaps we would see a linear continuation of the decrease in the propensity for assortative mating. However, as there is cultural value placed on educationally homogenous matches, the level of assortative mating slows the decrease in the level of assortative mating despite the role of exogenous economic forces.

Unfortunately, cultural drivers are unmeasurable from a quantitative viewpoint, therefore the discussion around them here remains grounded in theoretical understanding of partnering behaviour. At the same time, I believe there are likely two aspects of the cultural preferences driver which operate to impose a minimum level of

assortative mating. These two elements pertain to the structural constraints imposed on individuals and the preferences of individuals.

Social pressures

I have already discussed individual motivations for seeking out a partner of equal educational status. I also believe there to be societal expectations or pressures which may influence individuals to seek out educationally homogenous mates. To understand how these societal factors may play out to influence individuals partnering behaviours, historical context is vital.

As Goldin (2006) discussed, within the household, labour market participation has traditionally been highly segregated. Until relatively recently, few women were likely to have access to a university education, they infrequently worked outside the home, and their status in the marriage market was typically derived from social standing (Goldin, 2006). As a result, there was an expectation that men could marry down (hypogamy). However, as women had limited personal means of progressing up the social ladder, they were expected to marry up (hypergamy) as a way of becoming socially mobile.

In the sample of 29 European nations I have used in this analysis, it would be difficult to argue that women continue to have restricted access to tertiary education. In the majority of the nations, for the two cohorts I have examined, women have higher rates of university education than men. However, there is evidence that the social expectation for women to marry up remains strongly ingrained. Schwartz (2013) discusses that because of the increasing financial independence of women, we would expect to see a decrease in their propensity to engage in homogamy, particularly as university educated women now outnumber university educated men. However, women are still inclined to engage in homogamy, and simply extend their search until a suitable mate is found. Jones and Gubhaju (2009) also discuss that there is a preference for women to remain single rather than marry down. This idea, as discussed by Jones and Gubhaju (2009), is not explored in this thesis, however the inclusion of this type of analysis would add an interesting dimension to further research.

It is puzzling that despite greater financial independence, women still prefer homogamy. During the period when men had greater financial power, hypogamy was socially accepted. The disparity partnering behaviours between the two genders indicates to me that there remains a cultural expectation that women avoid hypogamy. This cultural

relic would have initially ensured women were not economically disadvantaged. However, it is clear the pressure women face today to avoid hypogamy is not to avoid economic cost. Instead hypogamy for women it seen as socially disadvantageous.

Social pressure is insidious and can drive individual behaviour. I believe that the social expectation for women to engage in homogamy may be playing a role in dictating a minimum level of assortative mating. This minimum level is persistent despite economic factors suggesting that individuals should be less inclined to engage in assortative mating.

An alternative to this narrative around cultural preferences for assortative mating returns to our understanding of the wage premium. We are well aware of the diminishing returns of university education as the concentration of university graduates in a population increases. However, is it possible that the wage premium does not continue to decrease indefinitely with increases in the rate of university educated individuals?

Is it plausible that beyond a certain percentage of the population with a university education, further increases in educational attainment play no role in decreasing the wage premium? Essentially what this question is asking is, is there an unofficial minimum wage differential for university educated individuals? Hypothetically speaking, if there was a minimum income a university educated person could expect to receive the slowing decrease in the level of assortative mating as educational attainment rises could be explained using the wage premium theory. If there was to be no further reduction in the premium received for a university education, it would logically follow that there would be a slowing in the reduction in the incentives for assortative mating.

Despite the convenience of this theory to explain the slowing decrease in assortative mating we observe, it seems unlikely. In a search of the relevant literature I can find no suggestion that the university wage premium has an impenetrable lower limit. From an economic viewpoint it does not hold that the market would offer more than market value for labour when supply exceeds demand.

I am of the opinion that the slowing of the decrease in the level of assortative mating we observe is as a result of a minimum level of assortative mating societies tolerate. University educated individuals have an overall tendency to gravitate towards engaging in assortative mating. Some individuals, for a number of reasons, will not engage in this behaviour, however it is a cross-cultural and temporal feature of partnering behaviour

we observe. Social and cultural factors which favour assortative mating can be amplified by geographically dependent economic conditions.

The wage premium and decreases in proximity of different social groups either add incentives for individuals with a university education to assortatively mate or impose opportunity costs of not doing so. These economic factors are reduced as educational attainment increases, creating a more equitable society. However, as educational attainment increases and the barriers between educational groups are broken down, assortative mating only falls so far before stabilising as a result of the minimum level of assortative mating imposed by society.

5.5: Summary

The analysis of inter-country differences in assortative mating reported in this chapter has uncovered some interesting findings. Some of the findings were expected and reflected the existing literature. Other findings in this chapter posed a challenge to current research in the field.

The first finding was of the negative relationship between a country's rate of educational attainment and the degree of assortative mating among those with university education. I believe the negative relationship is a product of the wage premium. As the proportion of the population with a university education differs, we expect to observe a corresponding difference in the premium university educated individuals receive from their labour. The decrease in the wage premium as educational attainment increases acts to reduce incentives for university educated individuals to form educationally homogenous households.

Secondly, I have suggested that the negative relationship we are observing between educational attainment and assortative mating within the university educated group is as a result of differences in relative proximity of different education groups. When educational attainment is low and the wage premium is high, social and geographic distances rise. The segregation of educational groups results in a high search costs to seek mates outside of a person's educational group. As individuals act in a cost-saving manner, they will restrict their search to within their group, resulting in high levels of assortative mating. Since educational attainment begins to increase, economic, social, and geographic divides between education groups begin to close. The decrease in the

gulf between groups lowers the cost of searching for a mate in these groups, increasing the propensity to engage in non-assortative mating.

The third significant finding of this chapter's analysis was the discovery of the non-linear relationship between a country's rate of educational attainment and the level of assortative mating within the university educated population. The relationship is in fact linear in the logs of both variables.

The slowing of the decrease in the degree of assortative mating was intriguing and not something which I had encountered within the existing literature. I am of the opinion that the level of assortative mating does not continue to fall at the same rate as education increases primarily as a consequence of cultural and social factors. I believe individuals have a cultural preference for assortative mating. Education is a fairly reliable predictor for tastes, beliefs, and interests. A desire for similar cultural traits may be acting to incentivise assortative mating, even when the economic returns diminish.

There may also be a social or cultural expectation that individuals, particularly women, engage in assortative mating. The expectation from others may also encourage assortative mating when economic factors would suggest people would be less inclined.

The analysis carried out in this chapter has been useful for setting the scene for the next stage of analysis. The next analysis, carried out in chapter 6, will investigate the relationship between assortative mating and income inequality. The purpose of the analysis in this chapter has been to investigate what assortative mating looks like across the 29 nations, while relating the level of assortative mating to educational attainment, and ultimately the wage premium. The significance of investigating education and the wage premium is that it gives us some insight into the existing level of inequality across the 29 nations.

Chapter 6: Assortative Mating and Household Income Inequality

This chapter will address the role educational assortative mating plays in producing household income inequality.

As we established in the previous two chapters, there is a tendency for individuals to seek educationally like partners. Variation in the propensity to assortatively mate across nations is thought to be as a result of differences in the wage premium, although cultural factors are likely playing a role. In particular individual income inequality appears to have the greatest effect on assortative mating amongst those at the top of the education distribution. In other words, partnering behaviour of those with university educations are the most salient in driving potential changes in household income inequality.

Before I begin the analysis section of this chapter, it is important to remind my reader of some of the theory as to why assortative mating is thought to have an additive effect on household income inequality. Schwartz (2013) discusses that the greater propensity for assortative mating, the greater the concentration of household income.

The level of household income inequality is clearly dependent to a large extent on the level of individual income inequality. As I observed in chapter 5, nations with low levels of university education, and consequently high individual income inequality (in the form of wage premiums), exhibit high levels of assortative mating relative to their educated population size. All other things equal, I would expect high individual income inequality to translate into high household income inequality. We are aware that high individual income inequality amplifies the degree of assortative mating; in theory the combination of high individual income inequality and high levels of educational assortative mating should result in greater household income inequality. Conversely, nations with lower levels of assortative mating and lower levels of individual inequality we would expect to display a more equitable distribution of household income.

6.2: Distribution of income deciles

The ESS Round 6 supplies income data in the form of income deciles for each household. Each household is assigned one of ten deciles according to their relative income position; decile 1 has the lowest 10% of incomes, and decile 10 the highest 10%

of incomes. Table 6.1 shows the number of partnered households, where the respondent was aged 26 or over, in each of the ten deciles across the total sample.

Table 6.1: Frequency of partnered households in each of the ten net income deciles across 29 European nations, respondents aged 26 and over, 2012.

Household income (decile)	Frequency	Percentage	Cumulative percent
1	1,409	5.66	5.66
2	2,004	8.04	13.70
3	2,339	9.39	23.09
4	2,850	11.44	34.53
5	2,870	11.52	46.05
6	2,873	11.53	57.58
7	2,929	11.76	69.34
8	2,802	11.25	80.59
9	2,398	9.63	90.21
10	2,438	9.79	100.00
Total	24,912	100.00	

Source: ESS, 2012

Table 6.2 below shows the mean income decile for each type of household, allowing observation of how the relative income position changes with education.

Table 6.2: Mean net household income decile for each type of household, European sample of 29 nations, 2012.

	Female				
Male	Primary	Secondary	Vocational	Bachelor	Post-grad
Primary	**3.25**	3.79	4.76	5.35	5.57
Secondary	3.44	**4.27**	5.39	6.14	6.67
Vocational	4.21	5.08	**5.76**	6.59	7.11
Bachelor	4.75	5.99	6.62	**7.07**	7.54
Post-grad	5.58	6.67	7.15	7.61	**7.97**

Source: ESS, 2012

As hypothesised, the mean income decile increases as the level of education in a household increases. Table 6.2 suggests that each successive level of education results in a net household income gain. The lowest mean income decile is amongst those households made up of two-primary school educated people. The type of household with the highest mean income is those households made up of two post-graduate individuals.

Table 6.2 is evidence of the financial advantage of assortative mating. At any level a man or woman can increase their household income by partnering with someone with a higher level of education. However, as for one individual to partner with someone of a

higher education, it requires hypogamy on the part of the other person, assortative mating is the prevalent type of partnering. Assortative mating allows for the greatest number of people to maximise their household income.

Partnering decisions are highly gendered, in terms of the socio-cultural expectations of men and women, and the returns for labour men and women of equivalent educational attainment can expect to receive. To examine the gendered contribution of education to household income, I am able to carry out a regression. In the regression of net household income decile, and male and female education, I am able to control for country effects. The results of this regression are shown below in Table 6.3.

Table 6.3: Degree to which male and female education raises the decile of a household, 29 European nations, respondents aged 26+ years, country effects controlled for (not displayed).

Source	SS	df	MS		Number of obs =	24912
Model	60966.800	36	1693.522		$F_{(1, 23)}$ =	365.37
Residual	115297.682	24875	4.635		Prob > F =	0.000
Total	176264.482	24911	7.076		R-squared =	0.346
					Adj R-squared =	0.345
					Root MSE =	2.153
hhincome	Coefficient	Std error	t	P>|t|	95% confidence interval	
Male						
Secondary	0.664	0.064	10.38	0.000	0.538	0.789
Vocational	1.106	0.065	16.96	0.000	0.978	1.234
Bachelor	1.847	0.070	26.24	0.000	1.709	1.985
Post-grad	2.246	0.075	29.89	0.000	2.099	2.394
Female						
Secondary	0.748	0.062	12.03	0.000	0.626	0.870
Vocational	1.240	0.065	18.95	0.000	1.111	1.368
Bachelor	1.943	0.068	28.46	0.000	1.809	2.077
Post-grad	2.384	0.075	31.87	0.000	2.237	2.530

Source: ESS, 2012

In Table 6.3, the relative increases for levels in terms of income decile of male and female education are shown. In the case above, the base is primary school education (not shown) with a base of zero. We can see that a male partner with a bachelor's education is estimated to have a net household income of 1.85 deciles higher than if he had a primary school education. The returns to education rise to 2.25 income deciles greater if the man has a post-graduate education. Interestingly, especially considering women have not reached pay parity, the returns to female education are greater for women than they are for men. Female partners with a bachelor's education, she can expect to have a net household income of 1.94 deciles greater than if she only had a

primary school education. The net household gain rises to a 2.38 decile increase over a primary educated woman if she has a post-graduate education.

The slight gender disparity we observe in Table 6.3 indicates two things. It is possible that the greater gains in net household income decile observed for women are as a result of the relative disadvantage experienced by women with primary school educations. Alternatively, it may be that women are able to "partner up" to a slightly greater extent than men. However, the second alternative offered here would not account for post-graduate women being in slightly higher income deciles.

Table 6.4 shows the mean net household income decile for men and women at each level of education. The margins command is presented below in Table 6.4. The mean household income deciles indicate that women with primary school educations only occupy slightly lower earning households than men of the same education. In other words, the mean net household income decile varies very little across the two genders with equivalent levels of education.

Table 6.4: Mean net household income deciles of male and female education, 29 European nations, respondents aged 26+ years, country effects controlled for (not displayed).

Number of observations = 24912

|	Delta-method					
Male	**Margin**	**Std error**	**t**	**P>|t|**	**95% confidence interval**	
Primary	4.598	0.058	79.22	0.000	4.484	4.712
Secondary	5.262	0.030	177.70	0.000	5.204	5.320
Vocational	5.704	0.025	228.37	0.000	5.655	5.753
Bachelor	6.445	0.034	187.10	0.000	6.377	6.512
Post-grad	6.844	0.041	166.51	0.000	6.764	6.925
Female						
Primary	4.498	0.057	79.07	0.000	4.386	4.609
Secondary	5.246	0.028	187.02	0.000	5.191	5.306
Vocational	5.737	0.028	208.45	0.000	5.683	5.791
Bachelor	6.441	0.032	199.73	0.000	6.377	6.504
Post-grad	6.881	0.042	163.45	0.000	6.799	6.964

Source: ESS, 2012

The central aim of this chapter is to establish how assortative mating alters the household income distribution. As we saw from Table 6.3, the lowest average net household income is returned by those households where both partners have only primary school education. Household income increases successively with the level of education, with those households where both partners have post-graduate educations having the highest relative incomes.

One way to assess the role of assortative mating in household income inequality is therefore to assess the differences in the net household income decile at each level of educational assortative mating. The greater the income difference between households comprised of two highly educated people (for example, two individuals with post-graduate educations) and two individuals without a higher education, the stronger the suggestion that economic mobility is more difficult.

The ESS dataset does not collect information relating to the *actual* household income of households only a household's income decile, and hence its relative income position. While the lack of actual household income information does restrict the ability to assess the level of income inequality, I am able to assess differences in the relative position of households, and how this position is affected by the educational characteristics of a households' partners.

Figure 6.1 and 6.2, show the predicted mean net household income decile of men's education at each level of their female partner's education. On each graph there are five lines depicting the predicted mean household net income decile at each level of men's education.

Figure 6.1: The mean net household income decile predicted from men's education at each level of their female partner's education, European sample aged 26+ years, 2012, country effects controlled for.
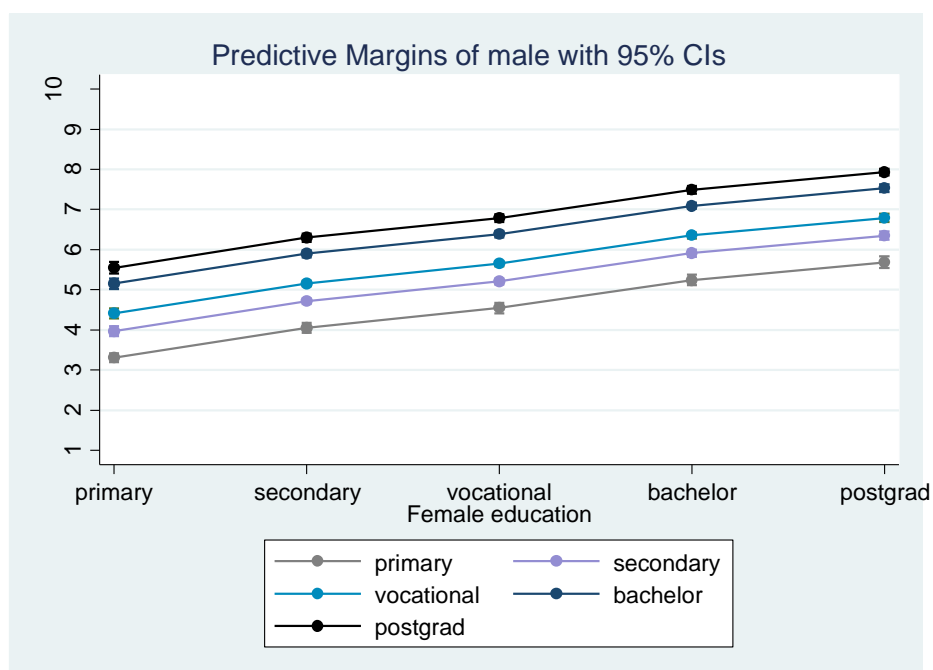
Source: ESS, 2012

Figure 6.2: The mean net household income deciles predicted from women's education for each level of their male partner's education, European sample aged 26+ years, 2012, country effects controlled for.
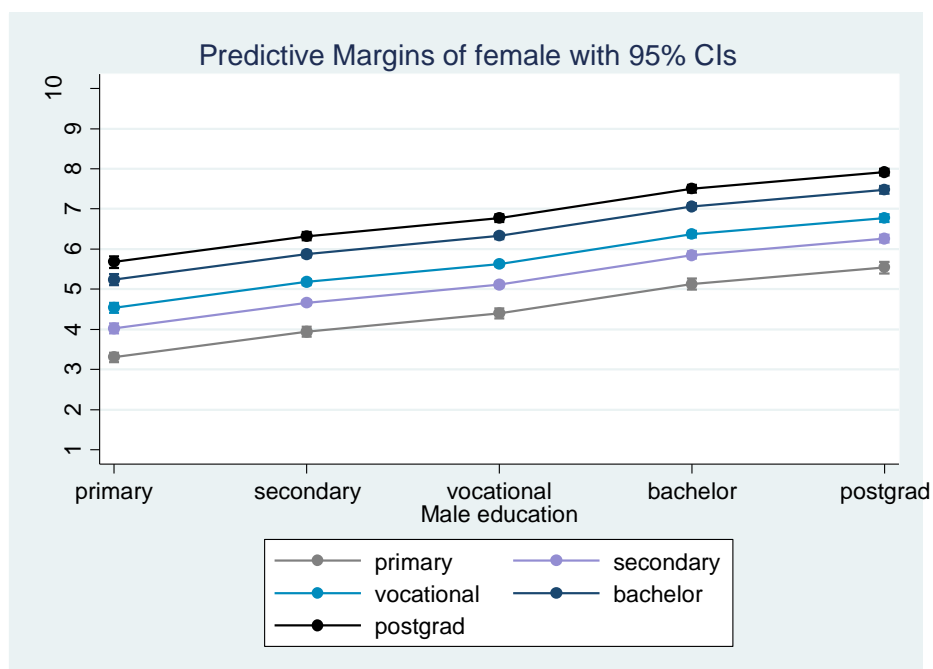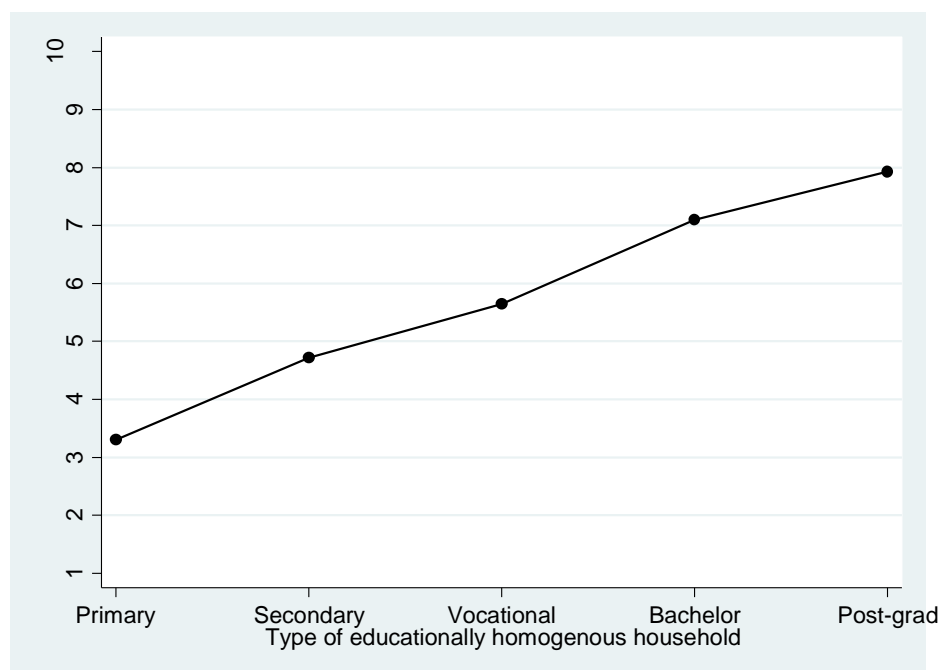

Source: ESS, 2012

The above two graphs illustrate that net household income decile for the partnered sample increases at a relatively steady rate with education. The constant rate of increase indicates that there are similar increases in returns to education at each level.

Figure 6.1 shows the marginal gain in net household income decile for the male partner, Figure 6.2 shows the marginal gain for the female partner. The patterns of marginal income gain appear to be remarkably similar across the two genders.

Although the marginal net gain in income decile appears to be relatively constant with each successive increase in level of education, there *are* some differences. It seems that there is some level of premium for bachelor's and post-graduate education, as evidenced by the larger marginal increase in net household income between vocational education and bachelor's education. Additionally, it seems that those with primary school educations are relatively disadvantaged, with the difference between, in terms of net household income decile, greater for the households with a partner with a primary school education and secondary school education than they are between households with secondary and vocationally educated partners.

As I am primarily interested in households where both partners have an equivalent level of education, I am able to isolate the predicted net household income for these households and plot them. The graphing of the predicted net household income decile across the five types of educationally homogenous household will allow me to examine how predicted net household income decile shifts across the types of household. The graph of the five levels of educationally homogenous households, and their predicted household net income deciles are shown below in Figure 6.3.

Figure 6.3: The mean net household income deciles for educationally homogenous households, 29 European nations, 2012, country effects controlled for.

Source: ESS, 2012

Figure 6.3 demonstrates a relatively steady increase in the net household income decile for educationally homogenous households. The linearity of the relationships suggests that there is a financial advantage to assortative mating, and these advantages accrue at a consistent rate. While the examination of the entire partnered sample population aged 26 years and over is interesting, it tells me little about how geography plays a role in income inequality and assortative mating.

6.2: Educational attainment and earnings distribution

In order to examine how the relationship between educational attainment and household net income decile changes by country, I divide the 29 European nation sample into three

groups based on their rates of university educational attainment. The lowest and middle educated groups both have ten nations, the highest educated group has nine nations.

The group with the lowest rates of educational attainment is comprised of: Albania, Bulgaria, Czech Republic, Hungary, Italy, Kosovo, Poland, Portugal, Slovakia, and Spain.

The middle group is comprised of: Belgium, Cyprus, Estonia, France, Germany, Ireland, Lithuania, Netherlands, Slovenia, and Switzerland.

The group with the highest rates of educational attainment is comprised of: Denmark, Finland, Great Britain, Israel, Iceland, Norway, Russia, Sweden, and Ukraine.

From analysis in previous chapters, the reader will recall discussion of the relationship between the level of educational attainment and individual income inequality (wage premium). It is thought that in situations of low university educational attainment, individual inequality will be higher. The following analysis examines how rates of educational attainment and individual income inequality are translated into levels of household income inequality, as expressed through the distribution of household income decile throughout the education strata.

In the following analysis I expect that in the low educated group, a greater tendency towards assortative mating at the top of the income distribution will result in greater disparity in household income decile.

Figures 6.4 and 6.5 below show the mean net household income deciles predicted from men's and women's education at each level of their partner's education for the ten countries in the sample with the lowest rates of university educational attainment. Figure 6.6 and 6.7, show the same, using the ten countries which rank 10th to 19th on the level of educational attainment within their sample population, and Figure 6.8 and 6.9 show the nine nations with the highest levels of educational attainment.

Figure 6.4: The mean net household income deciles predicted from men's education for each level of their female partner's education, 10 European nations with lowest educational attainment, sample aged 26+ years, 2012.
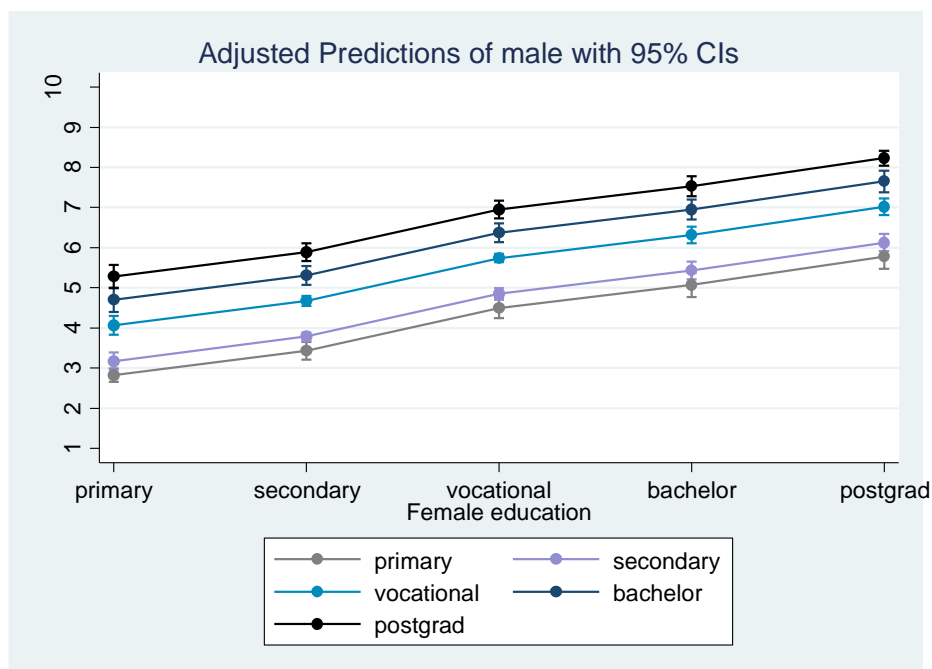
Source: ESS, 2012

Figure 6.5: The mean net household income deciles predicted from women's education for each level of their male partner's education, 10 European nations with lowest educational attainment, sample aged 26+ years, 2012.
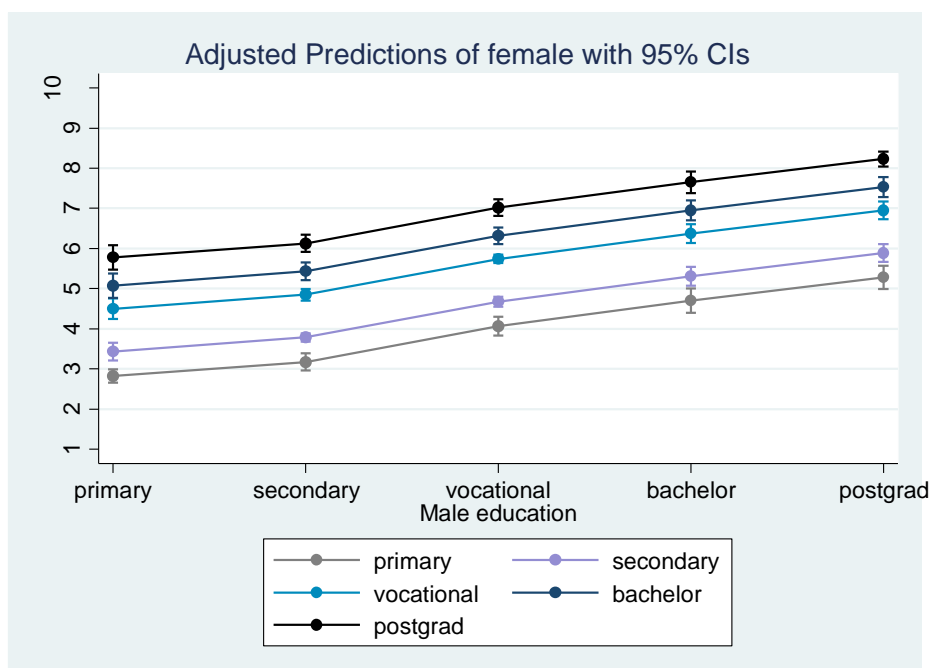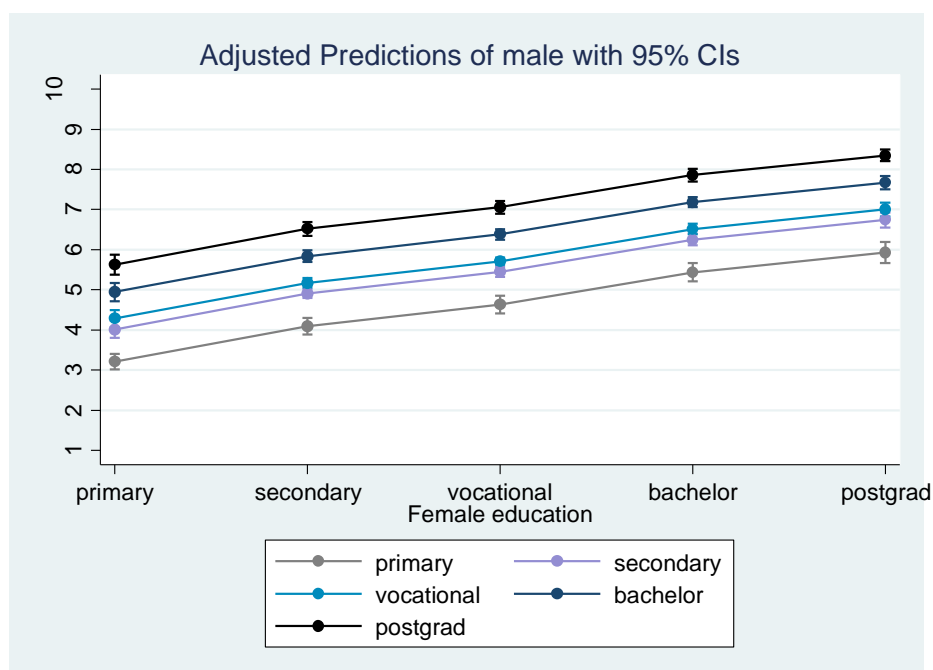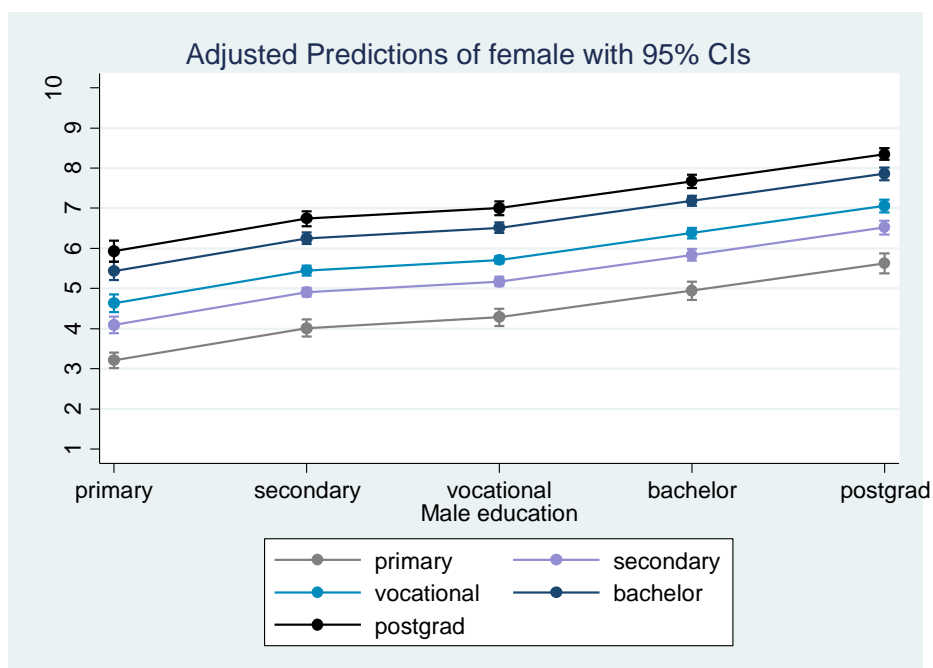

Source: ESS, 2012

Figure 6.6: The mean net household income deciles predicted from men's education for each level of their female partner's education, 10 European nations with middle levels of educational attainment, sample aged 26+ years, 2012.

Source: ESS, 2012

Figure 6.7: The mean net household income deciles predicted from women's education for each level of their male partner's education, 10 European nations with middle levels of educational attainment, sample aged 26+ years, 2012.
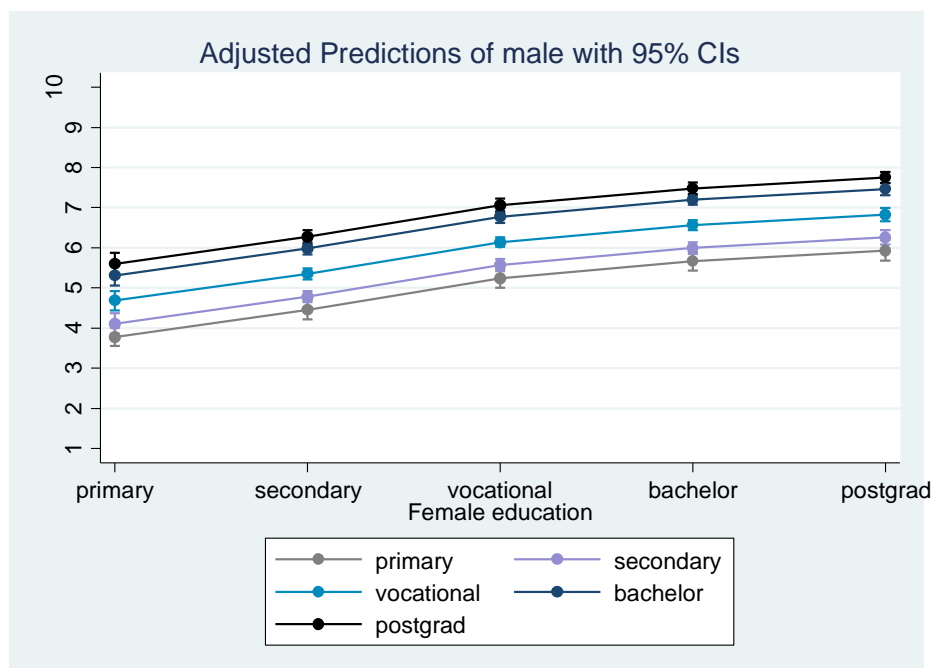

Source: ESS, 2012

Figure 6.8: The mean net household income deciles predicted from men's education for each level of their female partner's education, 9 European nations with the highest levels of educational attainment, sample aged 26+ years, 2012.
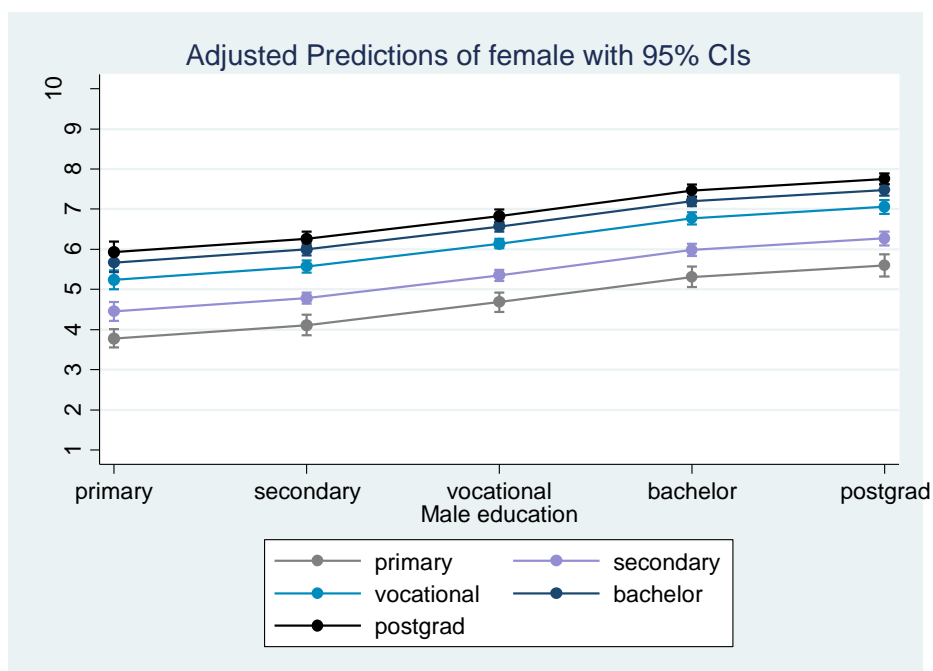

Source: ESS, 2012

Figure 6.9: The mean net household income deciles predicted from women's education for each level of their male partner's education, 9 European nations with the highest levels of educational attainment, sample aged 26+ years, 2012.

Source: ESS, 2012

Figures 6.4 to 6.9 above show how education plays a role in predicting household net income decile. In the above analysis I am particularly interested in the role the level of educational attainment plays in predicting household income and how income changes across the education distribution.

In my hypothesis I predicted that in the group with lower levels of university educational attainment I would observe a greater level of inequality than in the group with higher levels of educational attainment. The premise of the hypothesis was that in nations with low levels of university educational attainment, there will be a greater differential between in terms of income between households with two equally university educated individuals, and those households comprised of two non-university educated individuals.

I theorised that the greater level of individual inequality in low educational attainment nations would be compounded and result in a greater level of household income inequality. The analysis above confirms this hypothesis.

The table, Table 6.5, below shows the mean net household income deciles for each level of assortative mating across the three groups of high, medium, and low educational attainment. From Table 6.5, direct comparison will be easier.

Table 6.5: Mean net household income decile for each type of educationally homogenous household, across three educational attainment groups, 29 European nations, 2012.

	Type of educationally homogenous household				
	Primary	Secondary	Vocational	Bachelor's	Post-graduate
Lowest educational attainment	2.823	3.784	5.740	6.494	8.229
Middle educational attainment	3.203	4.907	5.713	7.181	8.348
Highest educational attainment	3.781	4.781	6.141	7.194	7.750

Source: ESS, 2012

As I expected, the largest differential in income distribution is within the lowest educational attainment group. The mean net income decile difference for the lowest educational attainment group between households with two primary school educated individuals and two post-graduate individuals is 5.4 income deciles whereas the middle education group's differential is 5.1 deciles, and in the group of the most highly

educated countries, the differential is 4.0 deciles. The comparison of the three groups highlights the role the overall level of university educational attainment plays in influencing the relative household returns for education.

The graphical representation of the mean net household income deciles for the three educational attainment groups are combined below on Figure 6.10.

Figure 6.10: The mean net household income deciles predicted from five types of educationally homogenous households, European nations with lowest, middle, and highest levels of educational attainment, sample aged 26+ years, 2012.
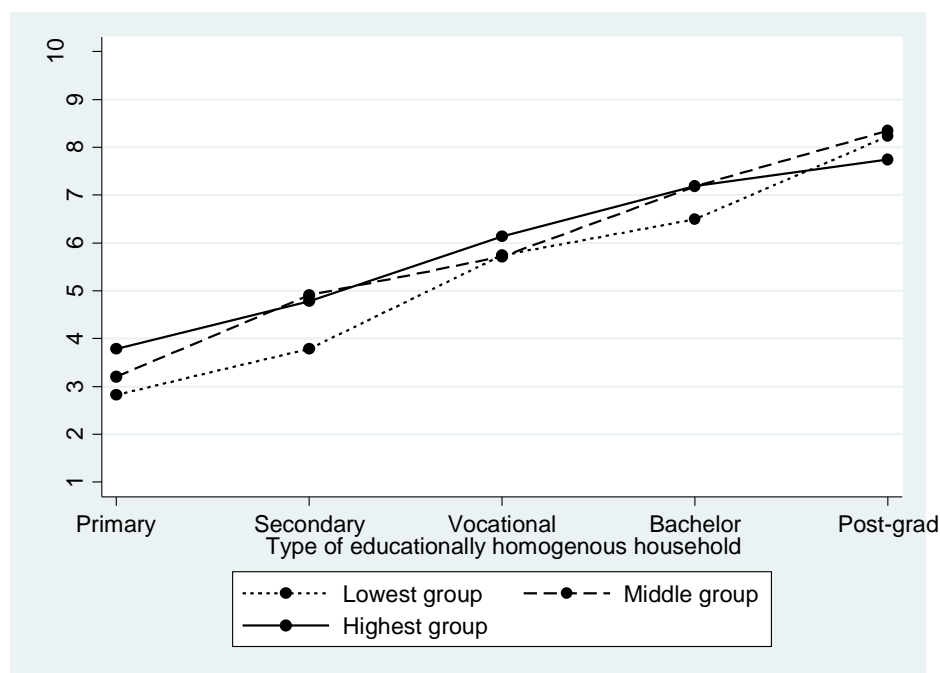
Source: ESS, 2012

I am careful here to discuss differences in the relative returns for education rather than the level of income inequality. However, despite this limitation, having an understanding of the relative returns for education, and the role of geography in these relative returns, can offer valuable insight into how income inequality may be operating within countries.

6.3: High vs. low income inequality nations

While I am unable to assess the level of actual household income inequality from the ESS dataset, I can use external national measures of income inequality to predict the role assortative mating might be having on generating household income inequality. To do so I have used household income inequality data from the European Union database.

A number of measures are available, however I have chosen to use the 80/20 measure which shows the ratio of disposable income for each nation's top 20% of earners compared to the bottom 20% of earners.

In order to establish the role assortative mating in household income inequality, as measured by the 80/20 metric, I am selecting two groups of nations. These two groups are made up of countries in the ESS sample with the highest and the lowest 80/20 ratio. A high 80/20 ratio indicates high levels of household income inequality.

The high inequality group is comprised of Bulgaria, Portugal, Lithuania, Great Britain, and Spain. The low inequality group is made up of Slovenia, Slovakia, Sweden, The Czech Republic, and Hungary.

The purpose of the following is to establish whether mean net income deciles across the levels of assortative mating are in fact different between the high income inequality group and the low income inequality group. Based on existing literature, I would expect that the group with higher levels of household income inequality would exhibit greater income decile differences between households with two non-university educated individuals and two university educated individuals. If this hypothesis was in fact true, I would expect to see greater income differentials between each type of household.

The following analysis will test this presumption, and aim to draw inferences about the relationship between household income inequality and assortative mating. The first stage of analysis will be similar to the regression analysis conducted in part 6.1 of this chapter. In the regression analysis presented below I will examine the mean net household income decile at each type of household, particularly focusing on households which are educationally homogenous.

This first results presented below will illustrate the net household income decile predicted from men's education for each level of their female partner's education of the highest income inequality group. Following this, net household income decile will then be predicted form women's education for each level of their male partner's education. The results from the highest household income inequality group will then be compared to the results from the lowest inequality group of nations. The graphs of the income distributions are shown below in Figures 6.11, 6.12, 6.13, and 6.14.

Figure 6.11: The mean net household income deciles predicted from men's education for each level of their female partner's education, 5 European nations with the highest levels of household income inequality, sample aged 26+ years, 2012.
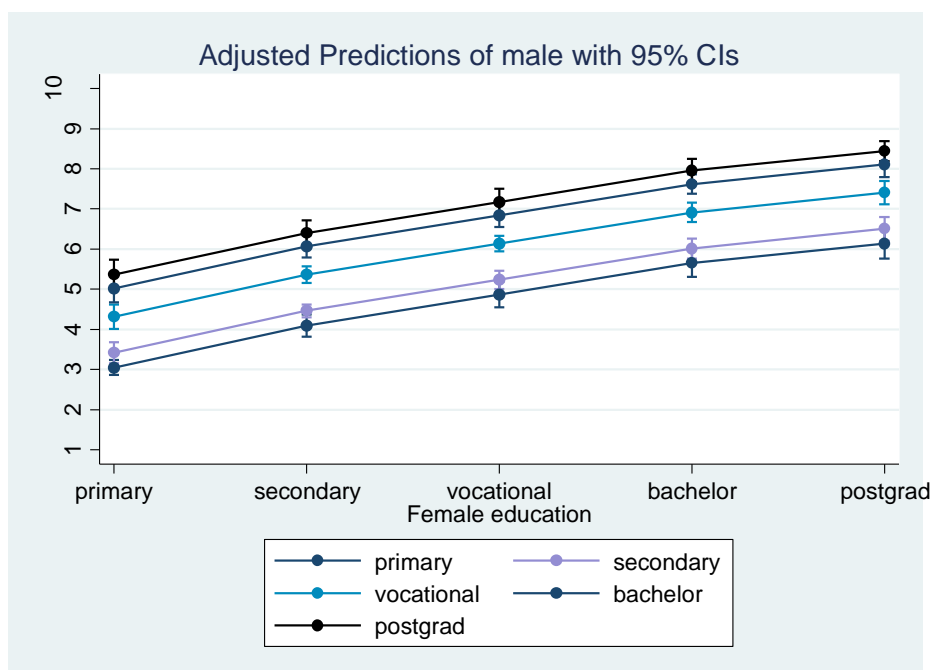
Source: ESS, 2012

Figure 6.12: The mean net household income deciles predicted from women's education for each level of their male partner's education, 5 European nations with the highest levels of household income inequality, sample aged 26+ years, 2012.
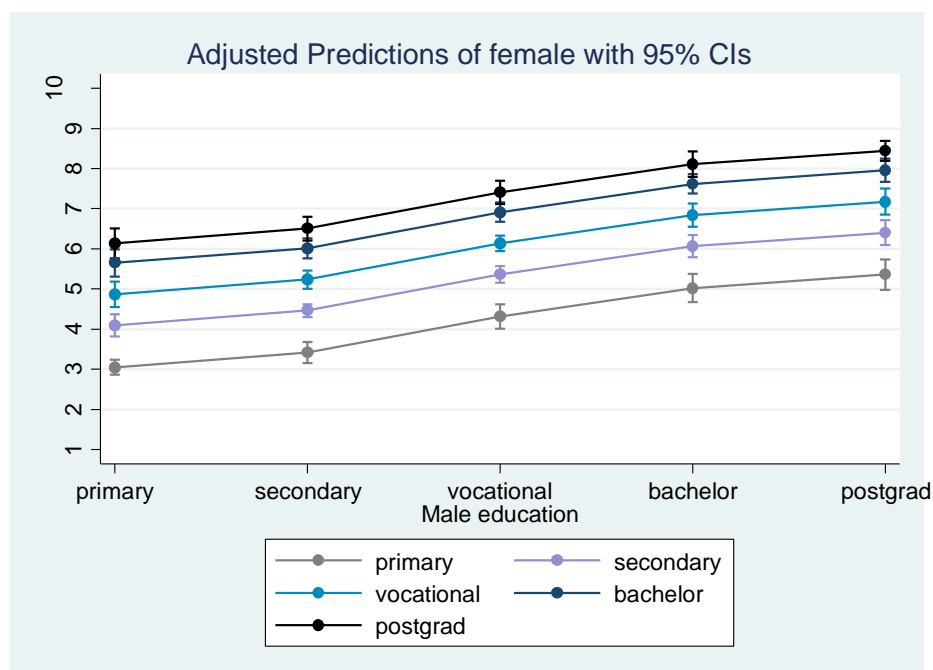
Source: ESS, 2012

Figure 6.13: The mean net household income deciles predicted from men's education for each level of their female partner's education, 5 European nations with the lowest levels of household income inequality, sample aged 26+ years, 2012.
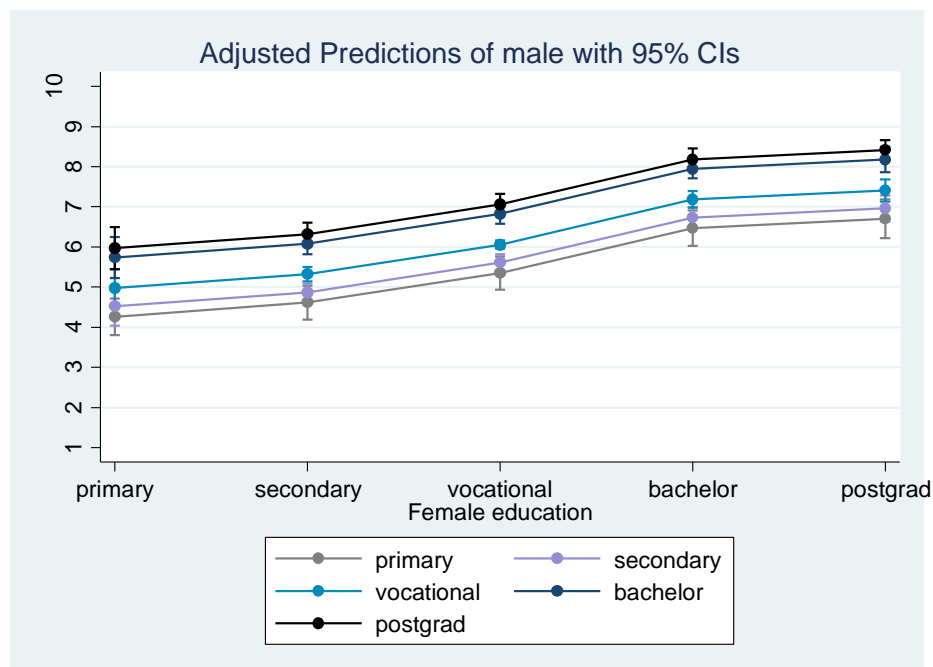

Source: ESS, 2012

Figure 6.14: The mean net household income deciles predicted from women's education for each level of their male partner's education, 5 European nations with the lowest levels of household income inequality, sample aged 26+ years, 2012.
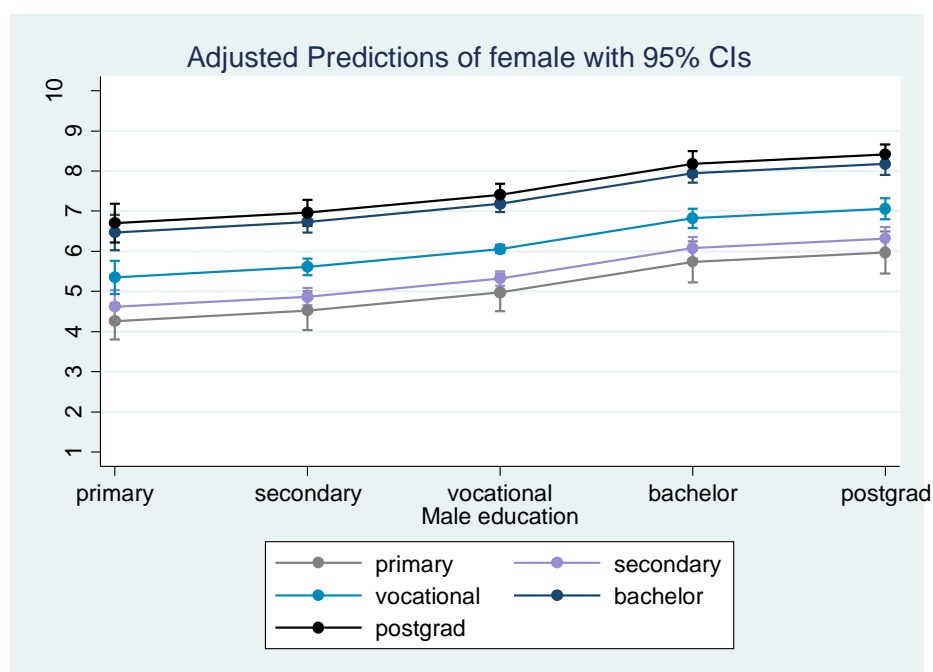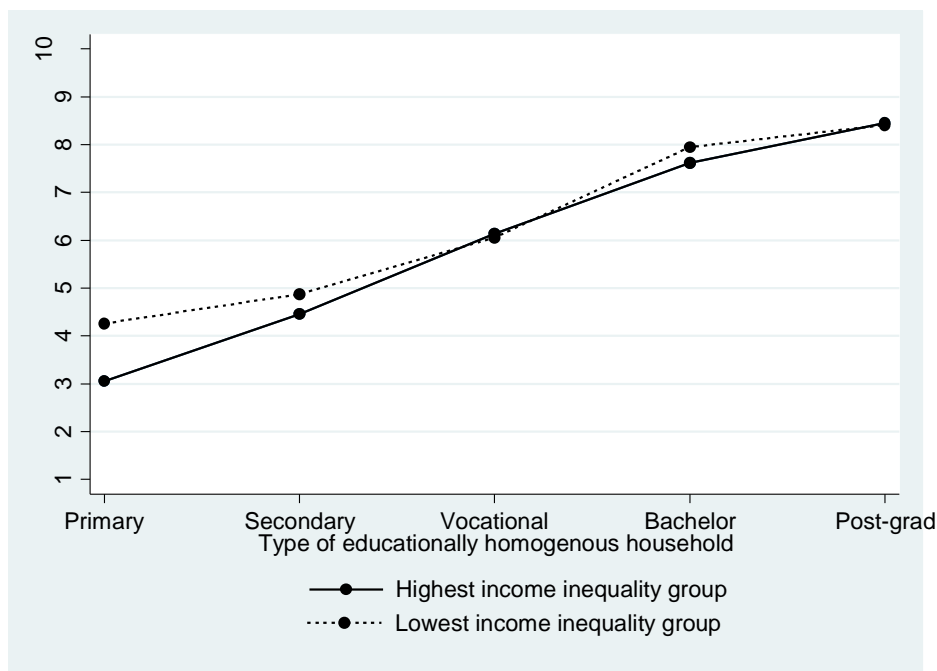

Source: ESS, 2012

The graphs above show every possible combination of household. While this is useful information, I am primarily concerned with the predicted household net income decile for households which engage in assortative mating, how the relative level of income changes across the education distribution when people engage in homogamy, and if so, how do the relative levels of income differ between low and high income inequality nations. Figure 6.15 shows the type of educationally homogenous household, with the predicted net household income decile for the high and low income inequality groups of countries.

Figure 6.15: The mean net household income deciles predicted from five types of educationally homogenous households, European nations with lowest and highest household income inequality, sample aged 26+ years, 2012.

Source: ESS, 2012

I expected countries exhibiting higher levels of household income inequality would show a greater difference in the net household income decile between households comprised of two equally university educated individuals (bachelor's or post-graduate), and households with two individuals with equal levels of educational attainment that are not university level qualifications.

Figure 6.15 did not entirely support my thesis. The most salient difference is the lower predicted net household income decile for households with two primary school educated individuals. More equitable nations – those in the lowest income inequality group – appear to have a smaller difference between households which are most advantaged in terms of education and those who are least advantaged. This smaller differential is achieved, almost entirely, by the higher predicted net household income decile households with two primary school educated people can expect to occupy when compared to the high inequality group.

Implications, and possible reasons for why the low income inequality group exhibits a smaller income differential largely driven by higher relative incomes for low educated households will be discussed in greater depth in the discussion section of this chapter.

The graph of educationally homogenous households presented in Figure 6.15 showed only the role of the household in driving net income decile. However, we can use Figures 6.11 to 6.14 to observe the impact of each level of educational attainment on household income decile for both men and women across the two groups. There was one particularly salient finding from the results above. The comparison of the distribution of incomes across the five levels of education assessed in Figures 6.11 to 6.14 shows that the relative gain in income decile for each successive level of education is not consistent across the education spectrum, nor between the two groups of nations.

In the low inequality group of nations there appears to be a substantial divide in the income decile received for a university level education and a non-university education. Once a university education has been achieved, the returns for achieving extra education with a post-graduate qualification do exist, although they are small. In the case of the high inequality nations, there are more consistent increases in the returns to education, as education increases. Once a bachelor's education has been achieved, the returns to household income decile continue to accrue to a greater extent than in the more equitable nations.

These results have implications for how I discuss the level of income inequality across the two groups. While it is clear from the 80/20 ratio, and the results in Figure 6.15 that there is a difference between the high and low income inequality nations, the level of education at which an individual or household is placed is also an important distinction

to consider when thinking about income inequality and assortative mating. These ideas will be further explored in the discussion section of this chapter.

So far in the analysis I have examined the role of rates of educational attainment on the relative level of income inequality. I have also examined whether there is a difference between externally determined high and low income inequality nations in the rewards for labour different types of households will receive. In the next part of this chapter I wish to discuss these findings in greater depth in reference to the literature.

6.4: Discussion

The aim of this chapter has been to address the contribution assortative mating makes to household income inequality. I have examined this question three ways. First by showing that the predicted household income decile rises with the level of education of the partners in the household. Clearly the rise in mean income is predicted intuitively, however it is an important premise to establish prior to further analysis.

The second was to establish if, and how, differing levels of educational attainment relate to the distribution of household income. I observed that there may be some slight differences in the distribution of household income between the three groups, with the nations exhibiting higher levels of educational attainment displaying some evidence of a more equitable distribution of income.

The third stage established the relationship between household income distribution in the ESS sample, and known levels of household income inequality. It appears that there is some difference in the grouping of nations with high levels of inequality, and those with low, in the income decile occupied by those households with high and low levels of combined education. It seems that this inequality is primarily driven by differences between the groups non-university educated populations. There are potentially some interesting findings in this section of analysis regarding the differences in income received between those with university educations and those without.

Gender and earnings distribution

As part of the first stage of analysis in this chapter I examined how the relative level of income (net household income decile) changes according to the level of education of each of the partners in the 2012 European sample. One of the ways I examined this was

through looking at the contribution of each of the genders education to household income.

From this analysis, I believe there to be two salient, connected, findings. The first of these findings was established when the regression analysis of the gendered contribution education made to household income, relative to a base level of education. In this instance, the base level of education was primary school only education. I found that in the regression analysis, women had greater returns to education than men, relative to the base level. If this were to be plotted graphically, one could imagine, the woman's contribution to household income rising more steeply as the level of education increases than men's contribution.

While interesting, this finding is potentially counter-intuitive. It is well-publicised that women's labour, on average, receives less income than men's. In order to establish whether women's returns for education were in fact greater, or whether there was another confounding factor, I carried out a margins analysis. This test establishes the predicted net household income for each level of education. I observe in this analysis that at all levels of education, men and women have remarkably similar contributions to household income decile. The only substantial difference is at the primary school level of education, where men's contribution is greater than women's. As the regression analysis I discussed previously measures the gendered contribution towards household income decile relative to the primary school level, the apparent greater returns to women's education is accounted for by the lower base level. From this it would be reasonable to conclude that men's and women's education is contributing to household income decile in a similar manner, expect for at the primary school level. The lowered contribution to household income for primary school educated women indicates that this group is disadvantaged.

The gendered analysis of household income has uncovered, in my view, some interesting results. Given evidence within the literature, it is expected that women's returns for education as education increases will be 'flatter'. Goldin (2006) argued that despite women's increasing participation in the workforce from the 1970s onwards, education is a poorer predictor of income than it is for men. While women with a higher level of education can still expect to receive a greater income than their less educated peers, the difference between levels of education is not as great as it is for men (Goldin,

2006). Evidence presented here would suggest that in the European case, returns for increased education of men and women are not dissimilar.

The disparity between the assertions of Goldin (2006) and the results presented in this chapter, highlight the importance of considering geography in the analysis. The examination of women's and men's returns for education is restricted to the United States. Breen and Andersen (2012) discuss the importance of place in labour market analysis. They found that when the U.S. and Denmark were compared, women's returns for education were more similar to men's in Denmark than in the U.S. Breen and Andersen (2012) ascribed this difference to a more regulated labour market in Denmark, resulting in greater fairness in how labour was rewarded. European nations would typically be considered to have a more regulated labour market. The more regulated context may account for the disparity between the results discovered in this thesis and Goldin's findings.

The other interesting finding relates to the apparent disadvantage experienced by women with only primary school educations. While it is expected that individuals with only a primary school education will receive a lower income than their more educated peers, the disparity between men and women is notable. I think it is important again, in order to discuss this feature of the income distribution, to assess women's place in the formal labour force.

Schwartz (2010) documented the changing role of women in the labour force over the 20th Century, and I think it is possible to extrapolate some of her findings into discussing this research. Schwartz (2010) discussed how in the early parts of the 20th Century, it was predominantly poorer, less educated, women who entered the workforce. As the 20th Century progressed, there was a shift towards mainly educated women working, leaving many less educated women relegated to the domestic sphere only.

I believe that the lower rates of labour force participation Schwartz (2010) notes likely explain why there is an observed disparity between the contributions to household income between primary school educated men and women. Women in the domestic sphere will not have the same opportunity to contribute to household income as men will do so. As Schwartz (2010) argues, domestic work is disproportionately assigned to

less educated women, and this division of labour likely accounts for the gendered discord in household earnings contributions.

Educational attainment and earnings distribution

The link between educational attainment and assortative mating has already been established in chapter 5. In this chapter here, I wanted to deal with levels of educational attainment and if, and how, the earnings distribution changed across different levels of tertiary education. In order to conduct this analysis, I separated the sample of respondents and their partners from 29 nations in to three groups; those residing in nations with high, medium, and low levels of university educational attainment.

I hypothesised that low educational attainment nations would exhibit higher levels of income inequality. The reasoning for this was also discussed in the literature review and in chapter 5 of this thesis. When the proportion of the population achieving a university education is low, the wage differential between university educated workers and non-university educated workers will, in theory, be greater. The wage differential, or wage premium, will increase the income disparity between groups of workers, leading to an increased individual income inequality. The validity of this statement was supported by the analysis in chapter 5. It would follow then that greater income inequality, and the accompanied higher level of assortative mating, would result in an increased household income inequality.

There appears, from the analysis done here, to be some evidence in support of this hypothesis. There is evidence that in the group of nations with low levels of educational attainment, the difference in household income decile between households with two post-graduate individuals and two primary school educated individuals is greater than the decile difference in nations in the top third of rates of educational attainment.

80/20 ratio and income distribution

In order to address in part the issue discussed above with the actual level of household income inequality being difficult to ascertain, the next stage of analysis gathered information from an external resource on household income inequality. The aim of the analysis in section 6.3 was to gain some understanding of how the income data from the ESS related to known levels of household income inequality. To do this I used the 80/20 ratio variable for the European Union. I chose to group five nations from the ESS

sample which were shown to have the highest levels of income inequality, and the five nations with the lowest level of income inequality.

The results confirmed my hypothesis that there were decreased differences between high and low earning households in the low-inequality sample. This result was perhaps not surprising, however, I do believe it to be significant. As the ESS income variable deals with income deciles, it is plausible that the low and high income inequality nations, as dictated by the 80/20 ratio, could have a very similar distribution of income. However, my results in 6.3 show that there are in fact some differences between the two groups of nations.

The most salient distinction I observed in the comparison of the two income distributions is that the smaller margin of difference between high and low earning households in the low-income inequality countries is driven by comparatively higher earnings for low income households. As I mentioned previously, much of the literature surrounding the role of assortative mating in generating household income inequality is theoretical and speculative (Breen & Salazar, 2011). As a result, literature which addresses the questions I have touched on here is difficult to find.

One possible explanation for the comparatively higher lowered end incomes received in the low-inequality group of nations, compared to the high inequality, is due to how these nations redistribute wealth. The nations included in the low-income inequality group have such low household income inequality largely due to a strong focus on social security. Social security programmes operate to redistribute wealth (or income) from those with high earnings to those with low. I believe redistribution is a likely cause of the decreased difference in income received by high and low earning households.

Another interesting finding that I touched on in section 6.3 was the returns for each successive gain in education for the two groups of nations. In the high income inequality group returns for education are fairly consistent from one level of education to the next. If the low-income inequality case is examined we see that there are substantial returns to a university education, and then only small returns with a higher than bachelor's education. The substantial return to bachelor's education in the low income inequality group is an unexpected finding. Given the literature regarding the wage premium, I would have expected to see smaller returns for bachelor's education in the low-inequality nations.

The relatively greater returns for tertiary education in the low-inequality nations indicates to me that while the highest and lowest earning households are more equitable than in the high-inequality group, there remains some significant inequalities within the nations. This finding highlights the notion that one measure of income inequality is not going to provide a detailed description of the distribution of income within nations. As overall inequality is low even when there is evidence of the wage premium operating, it seems unlikely that the income distribution within the group is having significant implications for these nations in terms of social outcomes. However, the finding is significant for the assortative mating literature. If low inequality nations are exhibiting higher wage premiums than would have been expected given other factors, there may be potential for future assortative mating to be driven by the increased incentive of the wage premium. In turn, this could increase inequality.

Despite the potential for assortative mating to have the effect of increasing inequality, in the case examined here at least, it seems that redistributive policies are having the effect of dampening any widening of the income distribution.

6.5: Summary

Throughout this chapter I have attempted to gain some insight into the question of the role of assortative mating in generating income inequality. Going about answering this question was difficult due to the classification of income into deciles. Despite this, I believe I have been able to uncover some interesting findings which help build the knowledge in this field.

The first stage of analysis dealt with gendered returns for education. I found that, despite some discussion within the literature, gendered contributions to household income were relatively similar. The exception to this was women with only a primary school education have a lesser contribution to household education. It is likely that the smaller contribution is due to women's involvement in the domestic sphere at this level of education.

Secondly I examined the role of country level rates of educational attainment on the distribution of income. From this analysis I found that countries with lower levels of educational attainment exhibit a greater disparity in household net income decile between high and low earning households. The disparity is likely due to an increased

wage premium when educational attainment is low resulting in a higher fixed position for those households with dual university educations.

Lastly, I investigated the relationship between assortative mating and household income inequality using a measure of country level household income inequality. In this analysis I hypothesised that a greater level of household income inequality would be expressed as a greater income decile differential between types of educationally homogenous households. The evidence presented in section 6.3 supported this hypothesis, with the decrease in income differential between households between the high and low income inequality nations arising as a result of an increase in the predicted household income decile for low income houses.

From this stage of analysis, I believe it is likely that assortative mating has the potential to increase the level of household income inequality. However, the increase needs not be accepted as an inevitability, as there is evidence to suggest that income inequality can be reduced through redistribution policies.

In the next chapter of this thesis I will make some concluding remarks, synthesis the salient points of the thesis, and discuss some future research which could be undertaken as a result of this thesis. In all research, an acknowledgement of the limitations of the research is vital. A discussion of the limitations is particularly important when discussing future research direction. A discussion of all of these elements can be found in chapter 7.

Chapter 7: Conclusions

My interest in assortative mating and income inequality stems from a general concern that income inequality is socially, culturally, economically, and environmentally harmful. I have written this thesis in order to better understand how household formation might play a role in expanding household income inequality

An investigation of the current literature lead me to the conclusion that human geography, as a lens through which to view the world, was being under-exploited in the field of assortative mating and income inequality. There is substantial power in using cross-country examination of assortative mating trends, and attempting to match these to features of income inequality, to help us understand how the mechanisms of assortative mating and income inequality interact.

In this thesis I have asked three key questions.

1. To what extent does assortative mating occur between individuals of various levels of education, and how does this vary by age cohorts?
2. What is the role of education and the wage premium in generating country level degrees of assortative mating?
3. Does assortative mating generate household income inequality? If so, how?

There is some debate in the literature as to the extent of assortative mating. There is general consensus that assortative mating is inevitable and pervasive, however there is some contestation as to at what level(s) of the education spectrum it occurs at, and why.

Becker (1974) in his seminal work, claimed that marriage occurred through a selection process based on the hierarchy of choice. Several decades following, Reardon and Bischoff (2011); Schwartz and Mare (2005) disputed the assumption that assortative mating occurred uniformly across population, reasserting that it was prevalent at the top, and possibly the bottom of the education spectrum, but much less common in the middle. My analysis in chapter 4 supports Becker's claim, finding no substantive difference in the degree of assortative mating across the educational strata. However, there remain differences in the degree of assortative mating by age cohort and gender.

In the analysis of the extent of assortative mating across the European sample, issues of gender and age also began to emerge. Significant differences in the ways in which

individuals of different ages and genders select partners became apparent. The intersections of gender, social expectations, and historical legacies act to influence how individuals partner.

Young women in particular appear to be burdened with social expectations to avoid hypogamy, despite homogamy not numerically possible for many of these women at the higher levels of education. On the other hand, young university educated men, who have historically married down, have begun to engage in homogamy at greater levels than their older male peers as a result of their relative scarcity on the marriage market. These changes, over just the few generations represented in the sample demonstrate how dependent patterns of assortative mating are on the socio-economic conditions of the time.

The next question I presented in my thesis was what is the role of education and the wage premium in generating patterns of assortative mating at the country level? To answer this question, and understanding of the motivations behind assortative mating were required. Numerous authors, including Becker (1974); Han (2010); Torche (2010) frame marriage or the formation of a household as a way of maximising household income through the pooling of resources. Therefore, individuals will seek the best partner they are able to, given their allocated set of personal attributes.

It is thought that when the potential rewards for assortative mating are the greatest, assortative mating will occur to the greatest extent (Torche, 2010). The degree of incentive for assortative mating will be determined in large part by the individual wage premium, which is in turn set by the proportion of educated workers in a population. My findings in chapter 5 were consistent with the literature, showing that in nations with low levels of educational attainment, the propensity to assortatively mate was the greatest. The relationship was a log-log linear, with a plateau in the degree of assortative mating occurring beyond a certain level. I have hypothesised that the plateau occurs, when the wage premium hypothesis suggests we would continue to observe a decrease, due to intervening cultural preferences and expectations for people to partner with an educational like.

In particular, the findings relating to the relationship between education, the wage premium, and assortative mating, highlight the ways in which geography is powerful in telling a narrative about romantic decision making.

The third question I addressed in my thesis was how household income inequality is shaped by assortative mating. The question of assortative mating and household income inequality has been addressed to a limited extent within existing literature, however, empirical investigations are scant. In my analysis I show that there is likely a positive relationship between assortative mating and income inequality.

I examined the difference in the income distributions of high and low income countries. It appears that there is a difference between the two groups of countries in how income is distributed according to education. The reduced level of income inequality seems to be driven by an increase in the predicted income of low education households. Essentially, the income distributions of the two groups are not substantively different aside from an increased income received by low income households in the low inequality group.

I have made the assertion that the reduced disparity in the distribution of income in low inequality nations is a result of redistribution policies in these nations. I presented evidence in chapter 6 to suggest that assortative mating could be a driver of household income inequality. However, it is important to acknowledge that it appears that the role assortative mating plays in generating income inequality can be negated by strong social security policies.

7.1. Limitations of the research

It is pertinent at this stage of the thesis to mention some limitations of my research. The first of these is the gender profile of the households. Due to the way the information in the ESS is collected, I was unable to assess the gender of the partner, and therefore had to assume that every household was heterosexual. This is an assumption I had to allow in order for the analysis to progress. All of the research I have encountered has focused on heterosexual couples, but there could be some interesting research to be done looking at the partnering decisions of non-heterosexual couples.

Additionally, I have only been able to assess income using deciles provided by the ESS. The use of the deciles has somewhat limited my analysis of the degree of income inequality. In the analysis of assortative mating and household income inequality, income would be a helpful metric. The further research into the question of assortative mating and household income inequality is particularly pertinent given the limited scope of the field currently.

7.2. Summary

Overall, it has become clear through the research, analysis, and writing of this thesis that the ways in which individuals decide to partner are both deeply personal, and highly dependent on place. There is a tendency, particularly within in Western discourse to see relationships as personal, private affairs. While it may be fair to believe that these intimate relationships have private dimensions, the way in which they are shaped by the particular social and economic contexts is an important step in understanding inter-country differences in income inequality and assortative mating. Likewise the role individual partnering decisions have in shaping wider, macro scale, economic conditions cannot be underestimated.

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